

2022

SME Past Presidents Columns



1996-2021

Mining[®] engineering

OFFICIAL PUBLICATION OF SME

March 2021
VOL. 73 NO. 3



William Edgerton, PE
2021 SME President



SPECIAL INSERT:

tuc[®]

 me.smenet.org

Being prepared; As an industry, we do preparedness better than most



William W. Edgerton
2021 SME President

Over the past year there has been a lot of discussion about whether the nation and/or individual states have been prepared for a pandemic. Public health is not our area of expertise, and I do not plan to go into that discussion here, but I would like to discuss being prepared for the task at hand.

In our industry, the topic of being prepared is one that we should continue to think about and emphasize. The dictionary defines prepared as ready to do or deal with something. When I am preparing for a task, there are several steps I like to think about: understand the objectives, brainstorm possible solutions (and alternatives), set a strategy and timeline and get any team members in place if help is needed.

As an industry, we do preparedness better than most. Starting with detailed feasibility, planning and engineering for all of our mine and construction sites, we identify and conform to environmental considerations as a normal part of doing business. We file for permits and incorporate contingency planning efforts into our proposed means, methods and procedures. In fact, environmental stewardship is one of the four focus areas in SME's 2020 Strategic Plan, in which we expect that SME will be "... recognized as the premier resource for information on responsible mining and underground construction practices." And responsible mining and underground construction not only includes an emphasis on environmental stewardship, but also on ensuring the health and safety of all who work in and around our industry.

Another way that we maintain preparedness is by creating detailed risk analyses for all of our projects. The mining industry considers project variables and risk as a key component of the business of mining. And the underground construction industry uses risk assessment to such an extent that SME has published "Guidelines for Improved Risk Management on Tunnel and Underground Construction Projects in the United States of America" (O'Carroll and Goodfellow, 2015).

As an industry, and as individual firms working within the mining and underground construction industry, we do better when we plan for whatever the uncertainty that working in and under the ground can send our way. This includes doing better both economically for

Safety share: Prevent struck-by accidents in U.S. mines.

In the last two years, 2019-2020, more than 4,000 accidents recorded in U.S. mines as struck classification were reported by MSHA. This classification includes struck against a stationary object, struck against moving object, struck by concussion, struck by a falling object, struck by a flying object, struck by a rolling object (sliding) and struck by a powered moving object.

To prevent struck accidents in a mine site workers should learn the safety protocols and wear personal protective equipment at the mine site and be aware of possible dangers and do not ignore them.

Before any action is taken, assess the general situation of a safe area to continue any activity. It is extremely important that workers avoid putting themselves in a risky situation in case of seeing or hearing a danger, such as approaching machinery or falling object. A great number of struck accidents were due to insufficient visibility of machinery operators. In light of this, sensors can be beneficial to navigate mining machinery, especially heavy machines, to prevent a collision. Mine operators play a significant role in providing necessary safety equipment for their workers and induce this fact that the safety of workers is one of the main priorities for the company. ■

Elham Rahimi

our own entities and responsibly for the global inhabitants. As a result, we are better prepared than most industries.

It is also worth pointing out that SME is paying forward the idea of preparedness through our educational initiatives. As an example, SME's Minerals Education Coalition (MEC) has continued, throughout the pandemic, to provide training and mentoring for the Mining in Society merit badge for the Boy Scouts of America. "Be Prepared" is, after all, the Boy Scout motto. Earning the Mining in Society badge is a fabulous way to instill the preparedness that is the hallmark of our industry.

I look forward to having future conversations with many of you over the next year about preparedness, and the importance it has on our continued health as a Society. Drop me a line at SMEPresident2021@smenet.org. ■

Finding common ground; Underground Ventilation Committee serves as blueprint



William W. Edgerton
2021 SME President

In the March President's Page, I wrote that one of my objectives would be finding common ground across the Society. Communication on a number of topics, and feedback from you, our members, will help us to be successful in this endeavor. This month I will illustrate an example of how that might work.

The Underground Ventilation Committee (UVC) is a unit committee of SME that functions jointly across the Coal & Energy and the Mining & Exploration divisions, with input from the Health & Safety division.

The purpose of the UVC is to promote engineering interest and technological progress in the ventilation of mines, tunnels and other subsurface openings. This is done through technical sessions at SME meetings and sponsoring the U.S. Mine Ventilation Symposium, which this year will be held on June 12, 2021 at the South Dakota Mines. <https://www.smenet.org/Professional-Development/Underground-Ventilation>.

Recently, in response to an article on UCA working groups, I received a note inquiring about whether there was a UCA working group on tunnel ventilation. As you may remember from the March article, the UCA working groups have been established to "mirror" the technical areas that exist in the International Tunnel Association (ITA) Working Groups. As it turns out, there is not a separate working group within the ITA for ventilation; however the technical content is considered within Working Group 5: Health and Safety in Works. However, ventilation appears to be a relatively low priority within that group, given that only two reports have been produced within the last 12 years — "Guidelines for Good Occupational Health and Safety Practice in Tunnel Construction," November 2008, and "Guidance on the Safe Use of Temporary Ventilation Ducting in Tunnels," November 2011. Both reports are available at <https://about.ita-aites.org/publications/wg-publications/content/10-working-group-5-health-and-safety-in-works>.

Nonetheless, UCA does have a mirror working group for health and safety, as listed in the March Tunneling and Underground Construction article. Although the regulatory framework for mining (U.S. Mine Safety and Health Administration) and for tunnels (U.S. Occupational Safety and Health Administration) ventilation may differ, the principles of mechanical ventilation, the understanding of air flow, and indeed the basic

Safety Share — surviving shift work: Shift work goes against your natural circadian rhythm, causing difficulty adjusting to nontraditional work schedules. Circadian rhythm disruption has also been shown to increase incidence of cancer (breast, colorectal and prostate) as well as many other health issues. The International Agency for Research on Cancer (IARC) classified shift work involving circadian disruption as a probable human carcinogen in 2007. This designation was followed up in 2019 with an IARC working group specifically designating night shift work as a probable human carcinogen.

Finding a nutrition and sleep schedule is important for your health.

Eating guidelines: 5-6 hours between meals and four hours between last meal and bedtime.

Experts agree that adults need 7-9 hours of sleep each day.

Sleep options: Sleep all at once (7-9 hours) or anchor your sleep — one 3-5 hour block of "anchor" sleep that will remain constant on both workdays and non-workdays and one 3-5 hour block before or after the anchor block. Break it up — two 3-5 hour blocks of sleep. Take a nap — one 6-7 hour block of sleep and one 1-2 hour nap.

A full sleep cycle takes approximately 90 minutes. If a nap is what you need, aim for 20-30 minutes or 60-90 minutes to avoid grogginess.

Michelle Reiher,
Colorado School of Mines EMCIS Program

science of controlling air quality are common to both mining and underground construction. In my opinion, the mining and the underground construction communities could benefit from sharing technical know-how at the UVC symposium, and I encourage UCA members to register and take part in this valuable event.

On the same day, I also received a note from someone I've known for more than 15 years asking if I was aware of ongoing developments in the changes to standards for road tunnel ventilation. This aspect of ventilation is related to permanent, not temporary works, and the standard is provided by the National Fire Protection Association. This is another case in which, although methodologies and analyses may differ, the underlying principles are the same. The tunnel engineering community, including many UCA members, are active in the design of fire-life safety systems, including

(continued on page 16)



President's Page: Common ground at the ventilation symposium

(continued from page 6)

ventilation, within publicly accessible tunnels serving highway and rail uses. SME can be a source of technical networking and knowledge transfer for this area of the industry as well.

Although I am not a ventilation engineering practitioner, it is clear

that the SME community is already on the path to becoming the primary source of ventilation expertise for both temporary and permanent ventilation systems in both mining and underground construction industries. Expanding the scope of the existing UVC would

be a wonderful way of demonstrating "common ground" among the various divisions in our Society, and I encourage this cross-divisional activity. I also look forward to hearing your input with respect to other such opportunities within our Society. ■

MN Congressman Stauber introduces legislation to reform permitting of critical mineral projects

MINNESOTA Congressman Pete Stauber (MN-08) introduced the Accessing America's Critical Minerals Act, legislation that brings commonsense reforms to the permitting process for critical mineral projects on federal lands in Minnesota's Eighth District, and nationwide.

Stauber spoke to the 2021 SME Minnesota Conference via Zoom on April 15 and told the attendees that he would introduce the bill. "Accessing America's First Minerals Act means three

things: more timeliness, transparency and reasonableness in our permitting. We have to push for the right reasons and at the right time and we are doing that."

As the ranking member of the House Natural Resources Subcommittee on Energy and Mineral Resources, Stauber has made it a top priority to address the most burdensome regulations that have delayed mining projects for years and kept the United States reliant on foreign minerals.

"For too long, activist groups have been able to hijack the permitting process, leaving our workers sidelined to wait for high-quality jobs. Meanwhile, we ramp up dependency on foreign nations for minerals that we have in our own backyard," Stauber said. "Northeast Minnesota is blessed with an abundance of critical minerals, giving our union members and skilled workers an exciting opportunity to help the United States break free of its dependence on hostile foreign nations for the resources that are integral to our modern way of life. We need these critical minerals now, and not in two decades. That's why I am proud to introduce legislation that will create a more timely, transparent and reasonable permitting process."

The bill would require permitting to finish within two and a half years, prevent "duplication" of work by federal agencies if it's already done by a state agency and set performance standards and other timelines to track permitting agencies.

In Minnesota, the bill, if passed, would affect Twin Metals, a proposed underground copper-nickel mine, processing facility and dry-stacked tailings facility along the shores of Birch Lake, which flows into the Boundary Waters Canoe Area Wilderness via the Kawishiwi River.

The project, which sits on several federal mineral leases, has been under review by state and federal regulators since December 2019.

PolyMet, which faces numerous court challenges, is vying to be the state's first copper-nickel mine. It sits outside the Superior National Forest and has no federal mineral leases, so its permitting process was handled primarily by state agencies. ■

See *Mining Engineering's* featured advertiser in the June 2021 calendar



FGX SepTech, LLC, is the world leader in dry coal cleaning technology, specifically coal preparation that uses NO water. Using a combination of air, vibration and a specially designed and angled table, the FGX plant has the ability to remove large percentages of unwanted ash, pyritic sulfur and other heavy metals.

With a warehouse in Lexington, Kentucky, FGX is centrally located to provide parts and support to the coal industry in the United States and beyond. With plants ranging from 10 tons per hour up to 480 tons per hour, FGX has the right size to suit your coal processing needs.

Featured advertiser:

FGX SepTech, LLC
289 Blue Sky Pkwy
Lexington, KY 40509 USA
Phone: (859) 263-8300
Email: fgx@fgxseptechnllc.com Web: www.fgxseptechnllc.com

Mining
engineering

Industry Workforce Strategic Committee outlines themes to meet goals for future labor needs



William W. Edgerton
2021 SME President

Every five years, SME reviews its strategic plan. In 2019, with significant help from SME members and staff, the SME Board carefully designed a new strategic plan slated for implementation in 2020. The plan includes four goals intended to provide direction to the Society over the next five years. Each goal was given a new strategic committee named after its goal. In this column, I will focus on the Industry Workforce goal.

Industry Workforce: Mining, metallurgy, exploration and underground construction are careers of choice.
Objectives:

1. Stabilize academic program capacity.
2. Share best practices for recruiting a professional workforce.
3. Assist employers to attract and maintain a quality workforce.
4. Explore ways to retain an early career workforce.
5. Recognize and support changing professional development needs.

During the MINEXCHANGE 2021 SME Annual Conference & Expo, the Industry Workforce Strategic Committee, led by outgoing chair Dave Rogstad and incoming chair Cat Joyner identified two main themes to help meet these objectives.

The first theme is related to the supply side: What is the extent of the workforce in the pipeline? The second theme is related to the demand side: What level of workforce do we need to sustain a healthy mining and underground construction industry? An assessment of both the supply and demand sides is needed to determine specific tactics that can be undertaken to address our strategic goal.

In answering the supply-side question, we have already taken steps to address a known reduction in workforce. Recognizing that the number of mining engineering professors was decreasing to such an extent that it could threaten the viability of some programs, the SME Foundation decided to fund both a Ph.D. Fellowship Program and a Career Development Grant Program. Since their inception in 2015, both have been very successful. Ten Career Development grants have been issued, and all 10 awardees have either achieved tenure at mining engineering schools or are progressing

Housekeeping practices to reduce exposure to mineral dust:

Exposure to respirable mineral dust is a serious health hazard that affects thousands of workers. When inhaled, these particles can enter the respiratory system and deposit deep into the lungs. Continued exposure to mineral dust can lead to progressive pulmonary diseases, such as silicosis, chronic obstructive pulmonary disease and cancer. Site housekeeping is important to negate the spread of respirable dust. Housekeeping is not just about cleanliness. It is an important element of any workplace health and safety program. Effective housekeeping will eliminate several health and safety hazards such as fire, dust, falling and the spread of hazardous materials. Employers should design a written housekeeping plan and include protocols regarding the frequency, methods and tools for housekeeping. It is vital to establish a housekeeping schedule to ensure surfaces are free of dust. In practice, wet sweeping, dry sweeping with a HEPA filter, and water scrubbing are three dust control methods you can implement in your cleaning protocols. Wetting down dust before sweeping it up is an effective work practice to control silica exposure. If you are using a tool with water controls, always use the water flow rate recommended by the manufacturer. Do not dry sweep or dry brush to clean up workplaces. Also, do not use compressed air to clean clothing or surfaces. Compressed air should only be used in conjunction with a ventilation system that effectively captures the dust created by the compressed air. ■

toward that goal. Of the 14 Ph.D. Fellowship awards made, three have received the degree and eight are on track toward completing their doctorates. Only three of the initial awardees have dropped from the program. This represents a very successful outcome for the objective of supporting mining engineering schools within the United States.

Having supported the teaching side of the education equation, it is important to look at the student side to answer the question: Is there a sufficient number of incoming students to meet industry needs? To this end, the Society of Mining

(continued on page 16)



President's Page: Industry Workforce Strategic Committee

(continued from page 6)

Professors (SOMP) completed a survey of mining engineering programs in February 2021. The survey identified the following numbers of students for the 14 mining engineering programs in the United States:

- 736 B.Sc. undergraduate students.
- 234 graduate-level students (M.S. and Ph.D.).

This data in itself doesn't mean much without looking at the demand side of the equation. Considering the likelihood that not all those students will graduate, and that not all graduates will choose a career in mining, it becomes important to investigate the industry's demand for mining engineers. Within the next month or so, SME's Industry Workforce Strategic Committee will undertake a survey of employers to get input from their crystal balls as to how many engineers they think they will need for future maintenance and growth. As we all know, increased employment in the mining industry largely depends on the demand for our products, so results from such a study will need to factor in economic fluctuations within our industry and the impact of changing regulations. Nonetheless, SME believes that establishing viable strategies for developing the needed workforce requires input from industry leaders in order to

assess supply and demand. When you see a request from our volunteers and/or staff, please respond with your best guess as to your needs. We will share all the results.

Another element of workforce strategy is illustrated by SME's Underground Construction Division (UCA). Most entrants into underground construction come from the ranks of civil engineers, not mining engineers. There are 256 ABET-accredited civil programs in the United States, a much broader source of supply than that of mining engineers. Despite the larger number of programs, UCA members report that finding new employees has been a problem and facing the problem is a critical issue. It is expected to get even more challenging if government funding for infrastructure projects increases. The results of a recent UCA fact-finding mission showed that there was limited familiarity with underground construction within engineering schools; career decisions are typically made before the junior year of undergraduate school, and the professors within the civil programs have a relatively strong influence on the future path of their students.

Recognizing these factors, the UCA has developed a program to partner with other member associations within the underground industry. In collaboration with ASCE's Geo-Institute, the Moles,

the Beavers, and the Deep Foundation Institute (DFI), the program includes: (1) coordinating with universities to increase relationships with practicing engineers, (2) encouraging volunteer speakers to make presentations to illustrate the exciting world of underground engineering, (3) a "Teach the Professor" program, wherein professors attend the yearly tunnel conferences and participate in a workshop with industry practitioners in developing curricula elements that introduce real-world underground construction problems into the classroom, (4) donating teaching resources (these can be branded), (5) offering tunnel tours of existing projects, and (6) identifying internships and entry-level positions. More information about this "Down for That" initiative can be found at www.undergroundcareers.org. This model may be a useful starting point for SME at large.

Industry Workforce is a major component of the SME strategic plan. Although their business cycles are driven by different factors, attracting a workforce is critically important to both mining and underground construction. SME is advancing major initiatives in collecting data as well as implementing measures to increase the number of students who enter our business. I look forward to hearing your ideas on how we can advance this important element of our strategic plan. ■

Caterpillar surpasses 3-Gt milestone of material hauled autonomously by Cat Command for hauling trucks

CATERPILLAR announced an additional 1 Gt (1.1 billion st) of material hauled by autonomous trucks using Cat MineStar Command for hauling, surpassing the 3-Gt (3.3 billion-st) milestone. This achievement is joined by an expansion of the types of commodities hauled autonomously across a growing number of Cat mining truck class sizes, as well as other brands of mining equipment.

"Since surpassing the 2-Gt (2.2 billion-st) milestone, we've equipped more mines with Command trucks and have established the world's first gold mining application with Command for hauling," said Jim Hawkins, director of Cat MineStar Solutions. "Since surpassing 1 Gt (1.1 billion st), we've expanded our Command fleet by nearly 250 percent."

Caterpillar has Command

autonomous haulage system (AHS) fleets operating across three continents — North America, South America and Australia — at 17 mine locations, operated by nine different customers. Commodities mined using the Cat Command include iron ore, oil sands, copper, coal and gold.

Command for hauling trucks now span class sizes from 190 to 360 t (210 to 400 st). The Cat line of Command models include the Cat 789D, 793D, 793F, 797F and the 297-t (327-st) 794 AC with electric drive. Command retrofit kits are available for Cat mining trucks as well as other brands of trucks and loading equipment. Since the first autonomous Cat trucks were commissioned in 2013, these AHS models have traveled more than 110 million km (68.3 million miles),

equivalent to a minimum-distance, straight-line roundtrip journey to Mars, with no lost-time injuries associated with automated truck operation.

Customers have seen up to 30 percent higher productivity.

"We continue to decrease the time between our major milestone targets because, from initial contract to full deployment, we constantly improve Command implementation efficiency. Consistent with previous milestone trends, we anticipate crossing the 4-Gt (4.4 billion-st) threshold at an even faster pace than achieving 3 Gt (3.3 billion st)," said Marc Cameron, vice president, Caterpillar Resource Industries. "Looking forward, we are planning the expansion of Command for hauling to include our 140-t (150-st) class Cat 785 mining truck." ■

The value of professional associations; Its an important part of one's professional career



William W. Edgerton
2021 SME President

SME is one of four member societies within the American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME). The other member societies are: Association for Iron & Steel Technology (AIST), the Society of Petroleum Engineers (SPE), and the Minerals, Metals, and Materials Society (TMS). This year, AIME is celebrating the 150-year anniversary of its founding, in 1871, by 22 (actually 23) mining engineers in Wilkes-Barre, PA. Current AIME President and former SME President George Luxbacher

continues to provide readers of Mining Engineering the history of AIME. In this issue he writes about the Institutes second 50 years, the time frame of 1922-1971.

Recently, a number of representatives from SME, including myself, and four ex-SME presidents (Barb Arnold, Luxbacher, Raja Ramani and Nikhil Trivedi) travelled to Wilkes Barre, PA to participate in the unveiling of a plaque honoring this 150-year anniversary. This event was organized by leaders from SME's Pennsylvania Anthracite section, illustrating how much SME contributes to AIME. Other participants included Congressman Matt Cartwright (D-PA), the Mayor of Wilkes-Barre, George C. Brown, Mark Riccetti from the Luzerne County Historical Society, and the executive directors of both SME and AIME, Dave Kanagy and Michele Lawrie-Munro. It is worth noting that SME has a history of providing leadership to AIME: In addition to the current AIME president, Luxbacher, sixteen other SME presidents have served as president of AIME since SME's founding in 1957. This leadership has resulted in the continuation of a vibrant AIME that confers awards and scholarships, documents its historical heritage, participates in the United Engineering Foundation (UEF), and partners with other associations in producing collaborative programs.

Being a member of a technical society is an important part of one's professional life. It helps you stay current with technology, it allows expansion of your network and facilitates relationship-building, and it provides educational offerings. All of these are essential

Safety Share — Haul trucks and other large surface mining vehicles are capable of destroying smaller vehicles that cannot be seen by the operator. Traffic controls, training and avoiding distractions are key to enhancing safety. Collision warning and avoidance systems can also help.

Key safety practices

- Communicate and verify with all equipment operators any planned movements and location upon entering or exiting a work area.
- Ensure all persons are trained to recognize workplace hazards. Specifically, train equipment operators on the limited visibility and blind spot areas that are inherent to the operation of large equipment. Do not drive or park smaller vehicles in mobile equipment's potential path of movement.
- Instruct all operators on the importance of using flags or strobe lights on the cabs of their vehicles to make haulage truck operators aware of their location. Flags must be high enough to be in the view of equipment operators.
- Install and maintain collision avoidance/warning technologies on mobile equipment.

U.S. Mine Safety and Health Administration

elements in advancing one's career, and are the reasons why participation in a technical society is a critical aspect of career development.

An equally important element is the historical context of such organizations. This manifests itself in the concept of giving back to organizations. As we age, we recognize the factors that have made us successful, and we look for ways to pay this forward for the benefit of others who come after us. This is a major way that the future growth of our industry is ensured.

Again, I congratulate the Pennsylvania Anthracite Section for an outstanding effort in organizing the unveiling of the new plaque, and the luncheon presentations. This event crystallizes the importance of SME's local sections to our mission. ■

Have we seen the end of virtual meetings? SME and others return to in-person meetings



William W. Edgerton
2021 SME President

Having just returned from the Rapid Excavation and Tunneling Conference (RETC), a biennial conference managed by SME on behalf of the RETC committee, it is useful to reflect on the contrast between this in-person/face-to-face event and the virtual meetings we have all experienced over the last 16 months.

It is pretty well established that virtual meetings are a better medium for direct learning than a large lecture hall with distant screens and numerous distractions. This is because the presenter/teacher is usually more

effective at explaining the topic when working from his/her usual workspace, and the recipient/learner can concentrate on the topic within their familiar surroundings, with all their note-taking supplies and equipment at the ready. That concentration is an important part of it, for it is too easy for the learner to multi-task and listen with only one ear. I think we've all been there. In addition, virtual meetings have the potential to reach more people, because there is less travel expense. Virtual learning also has its negatives. It doesn't provide the inter-personal connection that is needed for some direct learning and there is the potential to lose concentration while multitasking. I think we've all been there as well.

On the other hand, networking is much less effective in a virtual environment. We can try, with the gallery view on our computer screens, but we all agree that in-person meetings are needed for effective networking. People with more experience come to in-person meetings to network and do business development — a lot of which goes on at these industry conferences. This is, after all, what drives the success of our exhibit halls. The networking is important for young people too, including students. Although younger staff and students may be more focused on direct learning, these in-person meetings provide essential networking to this group even though they might not see that as their primary objective. They meet people with whom they will interact for the rest of their professional lives.

Perhaps the most important reason for in-person meetings is that they facilitate relationship-building, even outside the business development arena. The contacts developed during in-person meetings are a critical ingredient in making projects run more efficiently: both current projects and future

Safety Share — Fatigue is a workplace hazard that affects the health and safety of an individual and his/her co-workers.

Signs and symptoms of fatigue can vary. Weariness, tiredness, irritability, reduced alertness, and reduced ability to be productive are among the many signs of fatigue. Fatigue will reduce decision-making ability, productivity, physical and mental capacities and significantly increase errors in judgment, risk-taking and incident rates.

Organizations should develop and implement a response to when a person is experiencing fatigue. Administrative practices such as maximum hours of service, appropriate shift rotation, extended workdays, reducing or eliminating the need to do high-risk activities between certain hours can significantly reduce fatigue hazards at workplaces. Furthermore, regular assessment of mental and physical job demands, fatigue risk assessment, and individual risk assessment will help to address fatigue at a workplace. Finally, regular training and education about fatigue, including recognizing signs and symptoms of fatigue, increasing job awareness, and improving life quality, can reduce the risks of fatigue at workplaces. Workers can take simple actions to control fatigue at workplaces. A healthy and balanced diet, good sleeping habits and positive thinking will significantly reduce workplace fatigue.

Pedram Roghanchi,
New Mexico Tech

projects. It is these inter-personal relationships that allow the identification of common goals, and thus provides the creativity needed in problem-solving that is so essential to an effective project.

I'm glad we are doing in-person meetings again. It is an important part of our mission to serve the mining, resources and underground construction communities for a sustainable future. And more importantly, these meetings are the primary method we have of providing a platform for collaboration — one of the Society's core values. ■

The value of SME sections

Local sections are an important part of the Society



William W. Edgerton
2021 SME President

Strengthening the SME Sections has been an objective of SME leadership for the past five years or more. The sections are such an important part of our Society that it's important to re-emphasize their value.

As background: SME Sections are individual chapters, encompassing a specific geographic area or addressing a distinct interest area. Sections are created and led by volunteer leadership at the section level. They are not separately incorporated, use the administrative authority of SME, and must coordinate all official

business, including financial reporting, through the SME main office. Sections elect their own officers and self-govern within the terms of their bylaws, which are approved by the SME Board of Directors. At present, SME has 46 professional sections and 78 student chapters, ranging in size from 11 to 1,100 members. You can find a list under the membership tab on the main www.smenet.org website. Functions of sections include local field trips, speakers, scholarships and social events. Some of the larger sections hold their own conferences, for which they provide technical talks and other programming.

Sections provide a place for SME members to connect at a face-to-face level, and participate in professional development, networking and provide service to the public as representatives of the mining and underground construction community. Since they are based on geographic area, sections can focus on local or regional topics in mining and underground construction that may not be addressed by SME at the national level. Many of the professional sections partner with student chapters and help educate teachers about mineral resources and participate in scouting and K-12 outreach activities. By so doing, they work to improve the perception of our industry through community outreach and education.

Section membership can foster leadership skills as well. Participation in sections can lead to leadership positions in the Society as a whole, since section officers are considered committee officers within SME and are thus eligible to be nominated for offices at the SME.

Section meetings and field trips support knowledge transfer and facilitate development of regional industry contacts. The friendships and contacts developed through section

Safety Share: With the summer months come summer activities such as boating and bicycle riding. Lee Saperstein provides safety tips for some summer activity.

Life jackets: Massachusetts law requires that children 12 and under must wear life jackets when in a boat. However, it is awful to watch a power boat go by with the children wearing life jackets (PPE) and the adults not. It can send the message to children that when they turn 13 they will not need to wear the life jacket.

Bicycle helmets: The same rules apply to bicycle helmets. When I'm 13, the child may think they won't have to wear the helmet. However, emergency rooms do a roaring trade in bicycle accident victims.

Bow riding: It's a thrill to sit on the very forward part of the bow as a power boat accelerates to its maximum speed. That's called bow riding. If the boat hits an unexpected wave, normally the wake of another boat, the bow rider can be propelled up and forward into the water and under the boat. The propellers can then cause extreme injury. ■

participation are invaluable for career development, and frequently prove helpful, both in developing new business and exchanging technical information. There is clear value in taking advantage of opportunities to meet people within the industry, both new and experienced. The local conversations include history, new product development, and application of new technology - all viewed from local perspectives.

During the past 15 months or so, section meetings have been affected by the COVID-19 pandemic as have all SME meetings. Some of our sections have continued with virtual meetings, with many experiencing loss of attendance. As the country ramps back up into in-person meetings, now is a great time to re-discover the value of section membership. The network of sections strengthens SME's mission to serve the mining, resources and underground construction communities for a sustainable future, and supports the advancement of the industry.

Visit <https://www.smenet.org/Membership-Benefits/Sections-and-Chapters> to find a section near your home or work, or email sections@smenet.org for more information. ■

Why innovation is in SME's strategic plan

Technological advances are only possible with innovation



William W. Edgerton
2021 SME President

Iwould like to share some thinking that influenced SME's current strategic plan, which you can find at: <https://www.smenet.org/What-We-Do/SME-Strategic-Plan>. The core purpose of our society, our mission, is to "serve the mining, resources and underground construction communities for a sustainable future." The reference to sustainability within this mission statement is reflected in the core values, also listed on the website, which include: Safety, stewardship, innovation, ethics, inclusion and collaboration.

The SME Board of Directors recognized when developing this strategic plan that technological advances in our industry are ignited by innovation, and the board wanted to place our society at the center of the mining, metallurgy and underground communities to advance education and support change within the business environment as well as serve the individual members of our Society. SME recognizes innovation and the high ethical practices of its members who have developed and adopted more efficient metallurgical processes, better-performing materials and improved discovery technologies. These are all examples of the innovation that is one of our four goals defined in our strategic plan.

The three objectives that supplement this goal recognize that some of the external trends within our industry include the increased use of data in decision-making and changing workforce skills. This has resulted in an increase in automation and artificial intelligence that we are witnessing on many of our projects. We expect that such technological advances will outpace both regulation and legislation and could create

Industry innovation

SME is the venue of first choice for disseminating research leading to innovation and encouraging its applications in mining and underground construction.

Objective

1. Expand opportunities to disseminate and present innovation research.
2. Encourage the application of innovation research results.
3. Stimulate innovation by learning from setbacks.

barriers to the entry of new technologies and that many of these changes will require adjustments in operational standards and certifications. SME is clearly the professional society best suited to provide

Safety Share — As many companies return to business travel it seems like a good time to examine advice from the Centers for Disease Control (CDC) regarding safe travel.

Recommendations from CDC. Fully vaccinated people should:

- Wear a mask over your nose and mouth as required on planes, buses, trains and other forms of public transportation traveling into, within, or out of the United States and while indoors at U.S. transportation hubs such as airports and stations.
- Follow all state and local recommendations and requirements, including mask wearing and social distancing.
- In areas with high numbers of COVID-19 cases, consider wearing a mask in crowded settings and for activities with close contact with others who are not fully vaccinated.

After travel

Self-monitor for COVID-19 symptoms; isolate and get tested if you develop symptoms.

You do not need to get tested or self-quarantine if you are fully vaccinated or have recovered from COVID-19 in the past three months. You should still follow all other travel recommendations.

such guidance and make the application of new technologies much more efficient.

There is another major factor driving the importance of innovation to our society, and it has the potential to have an even larger impact than the technological advances associated with production methods. As the environment we live in changes, the need for minerals and mining also changes. These changes can significantly increase the demand for products from our industry. One example is the current focus on clean energy. An energy system driven by clean energy technologies differs significantly from one fueled by other technologies: Solar photovoltaic plants, wind farms and electric vehicles generally require more minerals to build. For example, it is reported that the

(continued on page 16)



BHP Group teams with KoBold Metals; Exploration will use artificial intelligence

BHP GROUP announced that it will partner with KoBold Metals to search for what it calls “future facing commodities” as it expects electric vehicles and green energy will be in high demand.

KoBold Metals is a mining and exploration technology company that uses machine learning and artificial intelligence to hunt for raw materials. It gained recognition because of support from the Bill Gates and Jeff Bezos-backed climate technology fund, Breakthrough Energy Ventures. In this partnership, BHP Group, the largest mining company in the world, will use the technology created by KoBold to search for critical minerals in Australia and other locations around the world.

Reuters reported that miners have been moving toward machine learning to find underground deposits in recent years, leading to some big discoveries, such as Rio Tinto’s copper project Winu.

“Globally, shallow ore deposits have largely been discovered, and remaining resources are likely deeper underground and harder to see from the surface,” said Keenan Jennings, vice president of BHP Metals Exploration.

“We need new approaches to find the next generation of essential minerals and this alliance will combine historical data, artificial intelligence and geoscience expertise to uncover

what has previously been hidden,” he said.

The alliance will cover an area in Western Australia of more than 500,000 km² (193,000 sq miles), KoBold CEO Kurt House told Reuters.

“Exploration success rates have been declining over the last couple of decades because the easy things have been found. The discovery zones during the next 20 years will be at depths of 200 to 1,500 m (650 to 4,920 ft). That’s the area that is very poorly explored and is likely to host a tremendous number of ore bodies,” House said.

KoBold has a dozen tie-ups across about 20 locations including Sub-Saharan Africa, North America and Australia looking for copper, cobalt, nickel and lithium. House added that Australia has some of the world’s best mapping data for prospective minerals and its regulatory environment makes it an attractive destination.

KoBold is closely watching development of a bill to protect Aboriginal heritage in Western Australia. Indigenous groups have protested a draft of the bill because it denies them final say over protection of sacred sites, which could become a governance issue for miners and investors.

KoBold is planning to set up an Australian office in the next 12 months and is looking for other exploration partners. ■

President’s Page: Innovation at SME

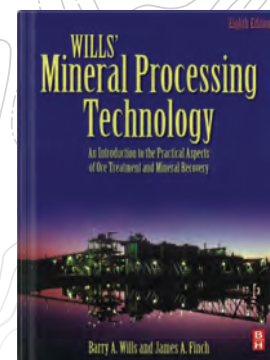
(continued from page 6)

average amount of minerals needed for a new unit of power generation capacity has increased by 50 percent over the past 10 years as the share of renewables used in generating power has risen, and a typical electric car requires six times the mineral inputs of a conventional car. These examples illustrate how innovation can have a major impact upon the health of the mining industry.

There is a lot that SME can do to make our industry more efficient, resulting from innovations in production and innovations driven by the environment within which we live. One of our strategic committees, led by Dr. John Uhrig, is responsible for identifying strategies that we can implement in order to do so. I encourage each of our readers to contact either myself or Dr. Uhrig and contribute your thoughts to this important part of the SME mission. ■

Design for the Future

Achieve your production goals with techniques found in these top-selling Mineral Processing titles from the SME bookstore.



Order online at
smenet.org/store

The importance of youth; Industry will need young leaders to address future challenges



William W. Edgerton
2021 SME President

At SME we pride ourselves on our focus on youth. There are currently 82 student chapters, with more being added every year. SME has sponsored the development of the Mining in Society merit badge for scouting and provides about \$1.3 million in scholarships every year. Our Young Leaders group is very active in providing mentoring and coaching sessions and webinars directed at our younger members. The SME Board has even recognized the importance of young leaders' input to the key governance decisions by developing an internship program

that adds a nonvoting young member to the Board of Directors — a position currently held by Heather Lammers.

Even with all this attention being paid to young leaders — it's still not sufficient. At the keynote session at MINExpo International in Las Vegas, NV, Sept. 13, we heard a panel of industry CEOs expound on how critical it will be for mining and equipment firms to incorporate more youth into our industry. Among the key points raised were:

- Our younger workers want more than to earn a livelihood. They want to use their lives, even their working lives, to make a difference in the world.
- Current technology is so advanced that it requires a workforce who can embrace automation and artificial intelligence. The use of autonomous and semiautonomous vehicles will be a "game-changer" in the advancement of mine productivity and safety.

It's important to note that the workforce we need to incorporate these new innovations won't just appear without some investment. It's definitely not like the Field of Dreams: "Build it and they will come."

We need to invest in education, both at the university and the technical college level. The skill sets that the industry needs today are changing from those of the past. Our methods of recruitment, soliciting interest in working in the mining and underground construction industry — indeed, the selling of our industry — need nothing less than a revolution. We need to change the perception of what it means to work a day in the mines. No one wants to work

Safety Share — Personal protective equipment (PPE) is equipment worn to minimize exposure to hazards that cause serious workplace injuries and illnesses. PPE needs to fit comfortably and properly, or it may not work as intended. It must be regularly inspected and maintained and replaced when no longer functional. Of all the body parts that PPE protects, the face and eyes are among the most vulnerable to chemical, environmental, radiological or mechanical irritants and hazards.

Selection of protective eyewear appropriate for a given task should be made based on a hazard assessment of each activity. Prior to starting a job, the attempt should be made to eliminate the hazards by using machine guards, work screens or other engineering controls. Proper use of eye protection is vital when elimination of a hazard is not possible. Finally, safety eyewear and face protection should be kept in good conditions and be replaced if damaged. Scratched and dirty devices reduce vision, cause glare and may contribute to accidents. It should be noted that contact lenses can't provide significant protection from eye hazards in the workplace. However, there is no evidence that wearing contact lenses increases the risk of eye injury.

six or seven days a week for their entire life in a remote location with limited access to cultural experiences for themselves and their children. Flexibility in working conditions, even to the extent of being able to work remotely, has become a major factor in attracting a workforce.

It will require more than monetary investment in schools and faculty. We need to include outreach not only to mining schools, where the students have already decided that they want to work in our industry, but also to youth earlier in the educational system. This includes middle and high schools and the public at large—the parents, the regulators and indeed, the general public. We need to demonstrate that working in our industry is something that really does matter—to the benefit of society at large.

We have taken some small steps down this road, but the speed with which the world is changing will force us to increase our pace. Let's aim for even more than 10,000 steps per day.

Send me your ideas on how we can do this. ■

The value of SME sections

Local sections are an important part of the Society



William W. Edgerton
2021 SME President

Strengthening the SME sections has been an objective of SME leadership for the past five years or more. The sections are such an important part of our Society that it's important to re-emphasize their value.

As background: SME sections are individual chapters, encompassing a specific geographic area or addressing a distinct interest area. Sections are created and led by volunteer leadership at the section level. They are not separately incorporated, use the administrative authority of SME, and must coordinate all official

business, including financial reporting, through the SME main office. Sections elect their own officers and self-govern within the terms of their bylaws, which are approved by the SME Board of Directors. At present, SME has 46 professional sections and 78 student chapters, ranging in size from 11 to 1,100 members. You can find a list under the membership tab on the main www.smenet.org website. Functions of sections include local field trips, speakers, scholarships and social events. Some of the larger sections hold their own conferences, for which they provide technical talks and other programming.

Sections provide a place for SME members to connect at a face-to-face level, participate in professional development and networking, and provide service to the public as representatives of the mining and underground construction community. Since they are based on geographic area, sections can focus on local or regional topics in mining and underground construction that may not be addressed by SME at the national level. Many of the professional sections partner with student chapters and help educate teachers about mineral resources and participate in scouting and K-12 outreach activities. By so doing, they work to improve the perception of our industry through community outreach and education.

Section membership can foster leadership skills as well. Participation in sections can lead to leadership positions in the Society as a whole, since section officers are considered committee officers within SME and are thus eligible to be nominated for offices at the SME.

Section meetings and field trips support knowledge transfer and facilitate development of regional industry contacts. The friendships and contacts developed through section participation are invaluable for career development, and frequently prove helpful, both in developing new

Safety Share —Restricted site access has started to loosen as travel and field visits have increased. Whether different levels of management start making more mine visits or mine operations re-welcome academic and government researchers into the field, there may be an influx of individuals who are not familiar with site-specific operations and more importantly, what may have changed in site-specific operations over the last two years. With changes to site protocols since 2020, what updates are needed to account for new hazards, potential risks, or changes in work processes? Now would be a fitting time to revisit your site-specific hazard awareness training that visitors must complete before entering and/or traversing the mine site. Even when accompanied by someone familiar with the mine, it is important for visitors to be aware of common health and safety issues such as evacuation and emergency procedures, traffic patterns, restricted areas and powered haulage hazards. Additionally, providing COVID-19 policies and procedures in site-specific hazard awareness training may be a valuable addition to what is already required in MSHA's Hazard Awareness Training Program. We are all looking forward to traveling and in-person engagement, but it is important to ensure that all site-specific procedures are updated to mitigate risks that accompany visitors to the mine. ■

business and exchanging technical information. There is clear value in taking advantage of opportunities to meet people within the industry, both new and experienced. The local conversations include history, new product development, and application of new technology — all viewed from local perspectives.

During the past 15 months or so, section meetings have been affected by the COVID-19 pandemic as have all SME meetings. Some of our sections have continued with virtual meetings, with many experiencing loss of attendance. As the country ramps back up into in-person meetings, now is a great time to re-discover the value of section membership. The network of sections strengthens SME's mission to serve the mining, resources and underground construction communities for a sustainable future, and supports the advancement of the industry.

Visit <https://www.smenet.org/Membership-Benefits/Sections-and-Chapters> to find a section near your home or work, or email sections@smenet.org for more information. ■

Innovation in SME's Strategic Plan; Discussion abounds, especially in context of clean energy



William W. Edgerton
2021 SME President

In my October president's column, I talked about why innovation is in SME's Strategic Plan, especially within the context of clean energy. It just so happens that the last several months have been full of discussion about innovation.

In September, at the SME Midyear Meeting, the SME board of directors discussed the impact that clean energy may have on the mining and underground construction industry. We focused particularly on how the demand for products and services that SME divisions, sections and other corporate entities provide its members may be increased or decreased by changes resulting from the "green economy." It was noted that there is a shortage of certain minerals expected to be in high demand, and the extended time to develop the supply sources may force us to look to foreign suppliers of such minerals. This would result in a reliance on the adequacy and security of the existing fragile supply chain. One benefit of this increased demand for minerals is that the green economy may give impetus to SME's program to improve the public perception of mining and underground construction. This could also improve the appeal of our industry and thus attract additional people to the workforce and academic programs that feed into these industries.

Since the SME Midyear Meeting, I have discussed these points at various section meetings, including the Southern Minnesota section meeting (Oct. 5), the St. Louis section meeting (Nov. 11) and the Latin American Virtual Congress on Mining Technology and Innovation (Nov. 15). At all of these venues, the audience was actively engaged in discussion and enthusiastic about how innovation is a major driver for our industry.

The UCA held the annual Cutting Edge Conference, entitled "Where Innovation Meets Practical Experience" from Nov. 14-16 in Dallas, TX. It was a cornucopia of innovative ideas, including a report on "Changing Tunnel Boring Machine (TBM) Excavation Diameter Mid-Tunnel in Dallas," a presentation on noncircular TBMs, grouting in frozen ground, and what the future of TBM technology is expected to be in 2025. A number of other innovations were presented, including the use of post-tensioned precast segment linings and precast segments designed to cross faults in Los Angeles. Mike Rispin, the current UCA chair, moderated a

Safety Share: Outdoor decorations can be tricky to take down. So, for the sake of your safety, here are a few tips for taking down your outdoor Christmas lights:

Don't be alone: Regardless of how easy it was to put up outdoor Christmas lights and decoration or how easy you think it's going to be to take them down, anything that involves electricity and/or heights should be done with a buddy. It's important to have someone on the side who can react if an accident happens.

Shut off the electricity: All of it. Don't just turn off the Christmas lights themselves, but go to your fuse box and turn off the fuse(s) for the Christmas lights.

Beware of ice: Make sure there is no ice that could surprise you as you're climbing on your ladder and house. Even one slip from a low height can result in trauma, so make sure that you break or thaw all the ice that you see before going through it. Ice can sometimes be virtually undetectable to the naked eye, especially depending on the light outside, so touch everything with your hand before you step there.

Use good equipment: Don't just go climbing on chairs or on ledges — take an actual ladder. Consider preparing anything else that you might need beforehand. And, make sure you have your phone with you. If you fall and break something, especially if you are in your backyard and there's no one else around, you need to be able to call for help as easily as possible. ■

technical panel session entitled "R&D: From Idea to Implementation," which explored obstacles to innovation in the tunnel industry and how they might be overcome. There was also an entire programming session on digitalization and automation in the tunneling industry. But the most talked-about session of the conference was the UCA Young Members' session, looking at future trends.

There is no absence of out-of-the-box ideas in the mining and underground construction industry when it comes to thinking up new technology. Our challenge is to move these new ideas into implementation, and get that message out to the public, as well as to our future workforce. Let's collaborate on how best to accomplish that. ■

Reviewing a challenging and successful year; SME's strategic committees made significant advancements



William W. Edgerton
2021 SME President

SME's mission is to serve the mining, resources, and underground construction communities for a sustainable future. Conferences are one of the primary ways that this mission gets advanced. But 2021 was another challenging year for in-person events. Our annual MINEXCHANGE conference in late February was done virtually, with less than the typical attendance. During the year, many of what are normally face-to-face events were done virtually, via Zoom or Microsoft Teams. We did some in-person

gatherings, including the June RETC conference in Las Vegas, NV, the September SME Mid-Year meeting in Las Vegas, held in conjunction with MINExpo International, the November Cutting Edge conference in Dallas, TX, and the December Arizona Conference in Tucson, AZ. Many of the SME sections were affected by COVID as well, with some doing virtual conferences, and some proceeding with face-to-face events. There are pros and cons associated with each method, and as a Society we are still learning how to provide the best value for our members. Despite the current ramp-up of new virus strains, we are looking forward to our in-person MINEXCHANGE 2022 SME Annual Conference in Salt Lake City, UT in February.

In addition to the conferences, 2021 has been a busy year for our strategic committees:

The Workforce Development Committee conducted a survey of employers to determine specific needs and interests in order to identify initiatives that SME could undertake to both reduce the workforce leaving the industry and increase the number of new entrants. This work is still ongoing, and more information on future initiatives will be provided soon. A summary article in the December issue of *Mining Engineering*, provides the results of the survey.

The Industry Innovation Committee has developed a plan for rejuvenating the Operators Forum, and re-organizing the Thrive Conference, which is one of the SME's major innovation initiatives.

The Association Growth Committee has focused on international growth and developing partnerships with corporations. Also under review are tiered membership levels to better attract groups and professionals that may not be best served by the traditional membership model.

The Responsible Mining and Underground

Construction Committee has been focused on mine tailings, specifically in identifying methods to advance the education of geotechnical professionals as well as to support technical innovations over the next 5 – 10 years. In addition, the committee recommended a collaboration between the Coal and Energy and the Health and Safety divisions to address new safety risks occurring as a result of a newly increased workforce. The committee also recommended that the Sustainable Development Committee consider a benchmarking study for various jurisdictions, organizations and initiatives geared toward standardizing environment, social and governance (ESG) standards.

Clearly, the strategic committees have done a lot of important work in 2021 and are prepared to make a large impact to the benefit of our industry.

The mining industry is a global, culturally diverse industry. In recognition that the best possible solutions for our complex challenges will come through a diversity of ideas and the inclusion of different perspectives, the SME Board of Directors created a new standing committee on Inclusion and Diversity (I&D). This committee's mission is to provide structure, strategy and programming guidance to the SME organization to enable advancement of I&D in the mining community. This mission is an avenue through which the SME can achieve its strategic objectives. In approving this new committee SME has recognized that our Society can benefit from diverse perspectives and membership, where all members feel welcome, all are encouraged to participate, and all talents are utilized.

This past year was a big year in celebrating SME's historical roots in the American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME). SME is one of four member societies, along with the Society of Petroleum Engineers (SPE), the Minerals, Metals and Materials Society (TMS), and the Association for Iron & Steel Technology (AIST). George Luxbacher, the current AIME president, and 2008 SME president, has done a detailed historical journey through the legacy of AIME, in *Mining Engineering* magazine. Several in-person celebrations of AIME's 150th anniversary were held in Wilkes-Barre, PA, and at Lehigh University in Bethlehem, PA during this past year. Stay tuned for the culmination of this 150th year celebration to take place in

(continued on page 17)

Battery-electric trains will haul iron ore in Australia; Mining giants each add trains to reach emission goals

RIO TINTO AND BHP will each purchase four battery electric trains for use in the Pilbara region of Western Australia (WA), the mining giants announced in separate statements.

Rio Tinto purchased the four 7MWh FLXdrive battery-electric locomotives from Wabtec Corp. with production due to commence in the United States in 2023 ahead of initial trials in the Pilbara in early 2024.

The locomotives, used to carry ore from the company's mines to its ports, will be recharged at purpose-built charging stations at the port or mine. They will also be capable of generating additional energy while in transit through a regenerative braking system, which takes energy from the train and uses it to recharge the onboard batteries.

A full transition to net zero emissions technology of its entire fleet of rail locomotives would reduce Rio Tinto iron ore's diesel-related carbon emissions in the Pilbara by around 30 percent annually.

Rio Tinto Managing Director of Port, Rail and Core Services Richard Cohen said delivery of the prototype locomotives will be an important early step for the company on the path toward a decarbonized Pilbara.

"Our partnership with Wabtec is an investment in innovation and an acknowledgement of the need to increase the pace of our decarbonization efforts.

"Battery-electric locomotives offer significant potential for emissions reduction in the near term as we seek to reduce our Scope 1 and 2 carbon emissions in the Pilbara by 50 percent by 2030."

The four locomotives purchased by BHP are scheduled for delivery in late 2023. Two will be supplied by BHP's current provider Progress Rail, a Caterpillar company, and two from Wabtec.

BHP will test the battery-electric locomotives' performance and emissions reduction capabilities in delivering iron ore from its Pilbara mines to the Port Hedland export facility. Conducting the trials in collaboration with two leading providers will support BHP's planned electrification of its iron ore fleet of more than 180 locomotives.

A full transition to battery-electric locomotives would reduce BHP's WA iron ore diesel-related carbon emissions by approximately 30 percent annually.

The trials will also test unique

energy recapture opportunities using the rail network's natural topography to further reduce the trains' overall power demand. On the way to port, locomotives can capture energy from braking on downhill slopes (energy that would otherwise be lost) and use it to help power empty trains back to the Pilbara.

A fully-laden BHP WA iron ore train typically comprises four diesel-electric locomotives pulling approximately 270 cars carrying a total of 34.5 kt (38,000 st) of iron ore.

"WA iron ore is significant within BHP's global operations, and I am pleased we can play a leading role in helping to develop new and innovative solutions with the potential to shape our business for a cleaner future," BHP Asset President Western Australia iron ore, Brandon Craig said.

"Rail is the fundamental link in our pit-to-port value chain, and the power required to deliver fully-laden iron ore wagons from the Pilbara to Port Hedland is significant. Trialling battery-electric locomotives in collaboration with Progress Rail and Wabtec has great potential to support our operational emissions reductions targets and goals," said BHP Group Procurement Officer, James Agar. ■

President's Page: Opportunities lie ahead

(continued from page 6)

conjunction with SME's Annual Conference in Salt Lake City, UT.

As we look to the future, a number of factors will have a major effect upon our industry, and SME can and will play a major part in all of them. One clear example is the country's focus on various clean energy technologies that contribute to what's known as the "green economy." Our nation runs on energy and clean energy needs minerals. Economic growth and prosperity will be driven by environmentally sound and sustainable energy sources in the future. Access to mineral commodities is vital to the achievement of these goals and such minerals are essential to the manufacture of both traditional

and renewable energy technologies. These technologies require minerals that differ profoundly from those fueled by traditional hydrocarbon resources; and sourcing such minerals will require increasing the capacity of U.S. mineral producers to meet this demand while reducing dependence on imports of these minerals from other nations. In many cases, increasing the capacity of domestic producers will require changes in regulatory policies and practices. SME will become a leader in identifying the barriers to the increased use of new technologies in mining and underground construction.

In order to have such a major impact, much of our work in the future will be devoted to changing the

perception of mining. SME has several initiatives which will be implemented within the next year to provide information to regulatory bodies, academia, the media, and the general public on how mining and underground construction practices contribute to a sustainable environment, form an attractive workplace, are at the forefront of innovation, and are necessary to the health of our country. SME is poised to make major contributions to the advancement of our industry's health in the years to come.

In closing, this year I have enjoyed working with the excellent staff and volunteers in this Society. It has been one of the highlights of my career. ■

Mining[®] engineering

OFFICIAL PUBLICATION OF SME

March 2020
VOL. 72 NO. 3

Robert W. Schafer
2020 SME President



SPECIAL INSERT:
tuc[®]

me.smenet.org

Robert W. Schafer;

An interview with the 2020 SME President



You have an interesting background in mining that includes work in more than 70 countries. Can you tell us how you got involved in mining and about your career path?

As I was growing up in Michigan and Ohio, I really did not know that exploration and mining were in my future. However, someone should have suspected as much when I was eight years old and dug a shallow tunnel into a hill located on a vacant lot near our home and began sticking pretty rocks and fossils into the walls and back (ceiling) of the tunnel as a way to save and exhibit them.

I was always pretty good in science, math and languages through high school and, for some reason, I decided to take a class in geology at Miami University (Oxford, OH) in my first year; by the end of the semester, I decided that this science was in my future, with the study of German as my minor. I enjoyed field work so much that I attended a geology field camp in northwest Wyoming twice and came back a third

time to teach it. By my third and final year as an undergraduate, I knew that hard-rock geology was my chief interest, so going to graduate school with a strong economic geology program was a goal. I focused on the Geology Department at the University of Arizona because of its great faculty and reputation, as well as proximity to future employment opportunities. I was also fairly certain that teaching was not a career for me, so I also took classes in mineral economics in the Mining and Geologic Engineering Department and earned M.S. degrees in economic geology and mineral economics. All of these decisions and interests have played significant roles in my career path. Many thanks are owed to John Guilbert, Dick Beane, Spence Titley, Tom O'Neil and DeVerle Harris for passing on so much valuable motivation, information and the ability to structure my thoughts. It was also at this time that I joined SME as a student member in the late 1970s.

Although I was fortunate to have had some great summer exploration and consulting jobs during the academic year, my real opportunity came with my first full-time employment with Billiton Metals, where I worked in the southern Appalachians, as well as the Great Basin, seeking base metals and gold. After eight spectacular years, however, Billiton pulled up stakes. I then took a job as an exploration manager with a startup private company called Addwest Gold. In the course of 24 months, we put a mine into production in Montana, made a million-ounce gold discovery (which later became a mine for a successor company) and set the stage for the discovery of a second, multimillion-ounce discovery. Addwest was taken over, and I lost my job, but this proved to be a disguised reward. Shortly thereafter I was hired by BHP Minerals (thank you, Hugo Dummett!) with U.S. exploration management responsibilities, based in Salt Lake City, UT, with a multitude of short-term international opportunities.

Then, one fateful day in June 1996, I received a call from the president of startup Canadian mining company Kinross Gold Corp. to ask if I would consider joining them as their initial vice president of exploration. With that offer, I moved to Toronto, ON, Canada. This began a Canadian experience of more than 20 years that included developing successful exploration programs on every continent, save Antarctica. At Kinross, we went from junior producer to a major gold company during this time, largely with merger and acquisition activities in North America,

Africa, South America and Far East Russia. This really whetted my ambitions to be involved with business development and corporate growth. I remained with Kinross for seven years but found that Canada liked taxing me more than I enjoyed paying their taxes, so I moved back to Utah and left Kinross.

After facilitating a few minor mining business deals, I joined the Hunter Dickinson Group as executive vice president of business development with the proviso that I maintained my U.S. residence but would commute weekly (unless I was going somewhere else in the world) to the corporate offices in Vancouver, BC. This lasted for about 12 years. I was traveling 45 weeks out of the year. Sometimes during the 20-year period, my wife Patti would join me on trips to the hospitable locations, including a couple of 'round-the-world trips focused on an evaluation visit of mines and exploration projects.

Since 2013, I have continued a global focus, working through Eagle Mines Management,

where we work on programs and acquisitions in Africa, the Americas, Asia and Australia. After all these years, I still have great interest, energy, curiosity and excitement for international geology, operations and deals.

How did you get involved with SME and your volunteer experiences with other mining organizations?

I started out as a student member of SME while at the University of Arizona, urged by Tom O'Neil and Ed Jucevic. Interestingly, I never lapsed my membership after graduation and attended occasional local meetings if I was in town. My first national conference was in 1985 in Atlanta, GA. However, I did not extend my involvement in SME until the late 1980s, when I moved to Reno, NV. This started a never-ending life as a serial volunteer, as I helped organize several regional and topical meetings and led field trips. I joined the Nevada Geological Society and inspired the start of their geological

Schafer is uniquely qualified to serve as 2020 SME President

Robert W. Schafer is founder and chief executive of Eagle Resources Management LLC, a minerals industry advisory and operating entity focused on mineral exploration, mine development, mineral economics, geology, business development and executive advisory. Previously, Schafer spent more than 10 years with Hunter Dickinson Inc. as executive vice president, based in Vancouver, BC, Canada, where he was responsible for identifying, evaluating and structuring transactions for mineral deposits globally. Schafer has had the good fortune to work with several great geologic teams leading to a record of discovery, several of which have become significant operating mines. In addition, Schafer has taken national leadership roles in the mining industries of both the United States and Canada.

During his career, Schafer has worked in more than 70 countries, including most countries in Africa and South America, and particularly Russia, Australia, China, Afghanistan, Kazakhstan and India.

He has served on the SME Board of Directors for more

than 10 years and remains on the Finance Committee. He is also a past president and a member of the Board of Directors for the Prospectors and Developers Association of Canada (PDAC) and a past president of the Canadian Institute of Mining, Metallurgy and Petroleum (CIM). Schafer has also served as president of the Mining and Metallurgical Society of America during 2005-2007, where he obtained Canadian N.I. 43-101 and international accreditation for its Qualified Professional program for members who oversee and report on corporate technical programs for stock exchange and shareholder information. Schafer is also active in the Society of Economic Geologists, where he was a councilor and sat on the SEG Foundation board. He is a past trustee of the Northwest Mining Association. He served on the U.S. National Research Council committee, co-authoring a report to Congress on the preservation of geologic information. Schafer is also a past president of the Geological Society of Nevada, initiating its successful symposium series and proceedings publications in the early 1990s.

In 2018, Schafer was the recipient of the SME Robert Dreyer Award for technical excellence and leadership in mineral exploration. In 2017, he was the recipient of the prestigious Daniel C. Jackling Award from AIME/SME for career distinction, while in 2005, AIME presented him with its William L. Saunders Gold Medal. He is recognized by both CIM and SME as a Distinguished Member of the respective organizations. Schafer is also a Certified Corporate Director and is a Registered Professional Geologist in the states of Wyoming and Utah.

Schafer earned his B.S. and M.S. degrees in geology at Miami University (Ohio) in 1974 and 1976, respectively. He completed course work and carried out research toward a Ph.D. in geology and completed a M.S. degree in mineral economics at the University of Arizona in 1980. He completed the Executive MBA Program at Stanford University. Schafer is also a Fellow of the Society of Economic Geologists and a Fellow of the Canadian Institute of Mining, Metallurgy and Petroleum. ■

conference series and publications and served as its president.

In 1994, I saw a notice in SME's *Mining Engineering* announcing that SME was going to develop a new strategic plan and noted the plan's committee had no exploration participation. I called the SME office and spoke with the executive director. He asked me to join the committee as a last-minute addition. This turned out well, and I began more continuous involvement with the Mining & Exploration (M&E) Division, helping to organize the first "Great Debate" with Doug Silver and Debbie Struhsacker, which pitted well-known mining advocates, including Sen. Larry Craig (R-ID), in a discussion of the future of mining with nongovernmental-organization (NGO) antagonists, such as the director of the Mineral Policy Center and the Assistant Secretary of the Interior, at the 1994 keynote session of the SME Annual Conference in Albuquerque, NM. These activities, as well as chairing numerous technical programs at future annual conferences, provided a springboard to the M&E Division Executive Committee, as well as a spot on the SME Board of Directors and strategic committees from 1995 to the present.

Recall that during a significant portion of this time, I was living and/or working in Canada. As a serial volunteer (I just don't know how to say no), I was drawn to getting involved with the Prospectors and Developers Association of Canada (PDAC) and the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) at local and national levels. No good organization turns away a volunteer, and these groups fed the beast and brought me in. Again, after providing organizational services to assist at national and local conferences, I joined their boards and eventually was president of both of these influential mining groups. As CIM president, I led an extensive strategic planning event, reconfigured CIM's regional and branch structure and brought forward the idea for a collaboration among the key technical mining organizations of the world to form the Global Mineral Professionals Alliance (GMPA). I wrote the original memorandum of understanding that identified their commonalities and future goals. The original group included SME, CIM, AusIMM, SAIMM and IOM3, and now includes similar organizations in Peru and Chile, with Germany and Turkey soon to follow.

As president of PDAC, it was again time to put together an organizational re-evaluation, and the group completed a new strategic plan. By this time, I was getting to be an expert at this pseudo-skillset. Another initiative was

started in my year as president; Canada's vast north is largely isolated and suffers from a near absence of infrastructure. As a result, new mineral discoveries remain undeveloped because access in and out is largely by air or canoe. More than 100 ore deposits are known and largely delineated but not mined because there is no viable transportation alternative to bring in the equipment and ship out the products. PDAC made it a priority to lobby the national, provincial and territorial governments, urging them to develop a master plan for opening the north by collaborating with the private sector to design and build infrastructure corridors that will link the region by land and water to southern Canada and global markets.

In the early 1990s, while in Salt Lake City, I was invited to join in the revitalization of the Utah Chapter of the Mining and Metallurgical Society of America (MMSA). It was an organization with an impressive history but was looking for a purpose as the 21st century approached. Around this time, a global-reaching mining scam/scandal had been pulled on the investment community called Bre-X. The result was the imposition of a new, tough regulatory regime proposed by the Canadian Securities Commission, a law promulgated by the Canadian Parliament and implemented by CIM called "National Instrument 43-101" (N.I. 43-101). This regulation required many new aspects to regulate the information released to the investor and the public. This included defining who was qualified to write and present the information. Thus, the Qualified Person (QP) designation was created as a mining professional with sufficient expertise to oversee and report on technical programs leading to feasibility studies and news releases. The law also provided for Recognized Overseas Professional Organizations, so members of non-Canadian mining organizations could qualify and work as recognized mining professionals. U.S. mining organizations would need to apply to the Canadian government for this recognition, and after scrutiny, Parliament would recognize non-Canadian mining professionals that were qualified members of such organizations. MMSA saw this as an opportunity to create a new purpose. As president, I wrote and walked the documentation through the bureaucracy for Canadian recognition of MMSA's QP program, and the government recognized this with a law passed in 1997 as part of the first group to be recognized as such. SME followed a few years later with its Registered Member classification.

My intent as president of SME is to put the creativity and energy that has characterized my life and career into SME leadership, working with

its incredible staff and giving members the best that I have to offer.

SME will roll out a new strategic plan during your term; can you expand on that?

In 2019, SME undertook a far-reaching approach to update the strategic plan developed and implemented in 2014-2015. The preparation involved a historic look back at SME strategic and operational activities, a research and discovery phase that included input from SME officers and staff and a series of focus group meetings and telephone interviews that culminated in a strategic planning session, which included the SME elected executives, the SME board of directors and key senior staff. An implementation plan has been developed to bring each of the components of the strategic plan to action with timeframes and measurable performance indicators.

To provide a glimpse of what can be expected, the new strategic plan has identified four priority goals:

1. Industry innovation — SME is to be the venue of first choice for disseminating research leading to innovation and encouraging its applications in mining and underground construction.
2. Industry workforce — Mining, metallurgy, exploration and underground construction are careers of choice.
3. Environmental stewardship — SME is recognized as the premier resource for information on responsible mining and underground construction.
4. Association growth — SME leads in amalgamating the community to build a better world.

We recognized that the four components of the new plan do not match well with the existing strategic committee structure of six committees that was developed and put in place with the 2005 strategic plan. In addition, during the past 15 years, some of the strategic committees had evolved toward tactical activities rather than strategic approaches toward attaining goals. As a result, the name and strategic focus of the four committees was modified to reflect the goals developed for 2020 to 2025: Innovation Strategic Committee, Work Force Strategic Committee, Environmental Stewardship Strategic Committee and SME Growth Strategic Committee.

The three remaining committees, the Nomination Committee, Finance Committee and Structure & Governance Committee, are now seen as standing committees that look after the

year-to-year leadership succession and financial stability of our organization.

Objectives and strategies were laid out for each committee to bring each of the priority goals toward fruition in the next five years. Over the next several months, you should begin noticing the impacts of the new strategic plan. In the end, we will have a better Society, better members and a better mining industry, which is conveyed in SME's Mission: "SME serves the mining, resources and underground construction communities for a sustainable future."

What are your thoughts about the state of the mining industry and finance in 2020?

The mining industry of the 2020s, and the environment within which it operates, is going to be pretty dynamic. The world is experiencing at least two revolutions right now. The first is a technology/digital revolution that will encourage change and adaptation in the way we live, the way we communicate and the many ways we carry out business. We are now at the infancy of a Star Trek-style electronic world. The second revolution relates to climate change and how mankind and other inhabitants of the world will live and coexist in the future to develop and adopt technologies that will promote and maintain harmony among the multitude of Earth's processes, the creatures, plants and other organisms that co-inhabit the Earth with humanity and establish a sustainable equilibrium within the biosphere. Mining will hold a key and foundational place in this sustainable world.

We all recognize that no matter in which direction new technologies or quality-of-living philosophies motivate us going forward, accessing raw materials and processing them into materials required to manufacture the tools needed to realize these ambitions makes our industry a foundational component within both of these revolutions. The way that the mining industry positions itself with respect to environmental, social and governmental (ESG) matters within this period of transition will determine whether the industry enhances stakeholder and investor confidence or not. The largest private equity group on the globe, BlackRock Inc., with about \$6.3 trillion under management, has stated that corporate ESG policies and contributions to sustainability will be key measures for investment decisions in 2020 and into the future. The Mining and Metals 2020 survey by the international law firm White & Case indicates that nearly 60 percent of its respondents believe that it is the combined responsibility of raw material suppliers, manufacturers and end consumers to deal with the emissions and wastes from the production

and use of the components of daily living. Taken together with recent tailings storage issues, notably in Brazil and Canada, the mining industry needs to collaborate internally as well as with regulators to develop and initiate programs that will address waste management, environmental stewardship and community safety.

Yet, toward the end of 2019 and now early in 2020, there appears to be a developing swell of investment interest in mining and exploration companies. Copper and many other raw-material inventories are at critically low levels, and investment into new and expanded production is beginning to take hold. The first new copper mines in the United States in decades are realizing production in Nevada and Arizona, with in situ leach and recovery technology in Arizona at the forefront of this generation of copper mines. But these alone will not be able to fill the looming supply required to transition toward a more electricity-based, noncarbon, renewable society. With the tide rising for hybrid and electric automobiles, the demand for electric metals such as Co, Ni, V, Mn and graphite is destined to increase, while the catalyst metals, especially Pd and Rh, are realizing impressive positive price movements.

Similarly, global political and economic stabilities are teetering and becoming less stable as we enter the 2020s. Within many mineral-producing countries, resource nationalism is looming large. Many developing countries are introducing ways to capture larger returns from the minerals they produce and are enacting laws that require larger levels of local ownership, increased royalties and taxes and require that value-added processing steps are carried out locally and not exported. Taken together with a volatile U.S. impeachment and election-year environment, gold prices are rising and speculative investment in gold producers and explorers is beginning to take root early in 2020. It appears that the speculative investor is returning to gold and avoiding over-indulgence in the cannabis market. The exploration sector is longing for, and preparing for, a run in gold and copper prices and funds that will allow them to get back on their financial feet, explore and create market excitement from new discoveries.

All in all, with climate-change politics, anticipated commodity inventory shortages, introduction and changes in applied technologies, investor attitudes and preferences as components of the dual revolutions that the world is experiencing, the coming decade is looking to be one of serious transition for the mining industry. SME is working to adapt to this environment through several initiatives, including a new

strategic plan, a program and publication addressing new mine tailings storage technologies and the development of a new program that addresses stakeholder issues and relationships called the Responsible Mining Toolkit to promote ESG activities.

And the health of SME?

SME continues to be a vibrant and impactful organization that advances the interests of its members and the mining industry by creating opportunities for networking, technology and innovation dissemination, educational opportunities, professional development, collaboration and mentoring and the like.

With this foundation, SME is embarking on several initiatives that will advance the Society and the industry. Among these are:

- 1. The Mining ESG Toolkit:** This is in development and is to be an online product that will provide online access to the best of published materials that describe applicable practices to address issues across the spectrum of environment — social — government (ESG) activities in a continuously updated, living document. The toolkit will be available to the global mining industry as well as interested parties to encourage communications and understanding among stakeholders, including government, communities, NGOs and media in important areas such as community education and outreach, sustainability, regulatory compliance, environmental stewardship, waste management as well as health and safety at the mine and in the community. The knowledge of best practice alternatives will help better align mining industry activities in the multitude of settings in which they exist with the evolving priorities of the communities and stakeholders, thus demonstrating a responsible and open approach to operational, social and environmental performance.
- 2. Inclusion and Diversity Committee:** This committee is in its formative stages with a goal to address how SME and the mining industry are developing and implementing practices, policies and actions to make certain all people are treated fairly, given opportunities and provided with a positive work environment within which to prosper, and removing historic prejudices for certain

disadvantaged groups within society and the mining industry.

3. **Global Mineral Professionals Alliance (GMPA):** More collaboration and communication are anticipated with SME's sister technical mining societies across the world. In addition to the original member societies (SME, CIM, SAIMM, AusIMM and IOM3), in 2019 the organization invited the mining engineering societies of Peru and Chile to join the organization, and others look to join this group in 2020. Through GMPA, member organizations cooperate in addressing global mining issues such as new technology transfers, mine waste disposal issues, mutual member benefits and participation in OneMine.org.

SME membership, finances and products remain in a very strong position in 2020. As a result of wise planning and prudent fiscal management over the years by SME leadership, the overall health of the Society is excellent. In 2019, SME recognized an operating surplus with total revenues of all entities exceeding \$15 million. Membership remains stable at 13,630 members in all categories. SME is also strong, with total assets exceeding \$40 million, thereby maintaining its ability to provide quality products and benefits to our members at a high level, as well as develop new benefits and programs. We just finished an energetic and positive MineXchange 2020 Annual Conference & Expo

in Phoenix, AZ. This annual event replenishes the funds needed to support SME activities.

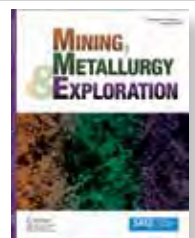
Any closing thoughts?

I have a few bits that I would like to share. AIME, the original founding organization that continues to provide benefits to SME and its other member societies, will be celebrating its 150th anniversary in 2020. There will be several events throughout the year that will recognize this amazing achievement, including a special celebration at the MineXchange SME 2021 Annual Conference & Expo next February in Denver, CO. I hope that many of you will be there to join in recognizing AIME.

As I mentioned early in this piece, I am a serial volunteer. SME has greatly benefited from exceptional leadership by past presidents and individuals serving on the board, Foundation, strategic committees and the divisions and sections. The success of the Society is solely dependent upon the contributions of countless volunteers who are guided by the energy, skills and experience of the SME staff. I am regularly amazed how well everything works given the breadth of the activities and programs of our organization. I full-heartedly encourage everyone to participate in SME as a volunteer. You will gain far more value through participation and the satisfaction and enjoyment that it brings. I am privileged to be serving as the 2020 president. I look forward to an exciting year full of great opportunities and challenges. ■

Call for papers!

Submit by March 31, 2020



MME Special Issue on Miner Health and Safety in the Fourth Industrial Revolution

The mining industry has developed one of the strongest safety cultures of any heavy industry. Virtually all companies promote a safety-first culture, and boards of directors carefully monitor safety performance. Protecting worker health and safety on the jobsite is similarly a priority. While advancing technologies are rapidly improving the mining work environment, there are secondary and tertiary health and safety considerations as well.

As the industry, with academia and other partners, strives to anticipate and mitigate the unintended consequences of technological change occurring within mines, this special issue of the *Mining, Metallurgy & Exploration* journal is expected to inform stakeholders of the challenges faced and current state of the science. Download submission guidelines from www.springer.com/engineering/journal/42461, and submit your paper by March 31, 2020.

Why publish in MME?

- Online First publication in 16-21 days of acceptance.
- No charge for publication.
- No restrictions on number of pages/figures.
- Free electronic access by all SME members.
- Link to share freely with colleagues, friends and associates for reading, citation and awareness.
- Extended abstract published in *Mining Engineering*.
- Expanded reach to up to 7,000 libraries and institutions and 20 million desktops worldwide through SpringerLink.
- Journal impact factor and coverage in Clarivate Analytics' Web of Science.
- Abstracted and indexed in Science Citation Index Expanded, Scopus, Ebsco, Proquest, Google Scholar and more.

www.springer.com/engineering/journal/42461

Submit at <https://www.editorialmanager.com/mmex/Default.aspx>

Safety comes first for SME; COVID-19 leads to difficult decisions for the Society



Robert W. Schafer
2020 SME President

Like many of you, I spent the last week of February and the first week of March at mining industry conferences, interacting with hundreds, if not thousands of people. All the while, COVID-19, also known as the coronavirus, was spreading and moving closer to becoming a world-wide pandemic.

At the MineXchange 2020 SME Annual Conference & Expo in Phoenix, AZ, Feb. 23-26, the virus had not yet impacted the United States on a grand scale, but SME was operating under an umbrella of caution, providing hand sanitizer at many locations and urging our attendees

to follow the guidelines for staying healthy from the Centers for Disease Control (CDC), which are also this month's Safety Share. SME also took proactive steps in refunding registration costs for a handful of members whose travel plans from China and other countries in Asia were impacted by the outbreak of the virus. Leading up to the meeting, SME leadership monitored the situation closely, and fortunately for the Society, we were able to have a great Annual Conference with no reported cases of coronavirus.

The following week, I attended the Prospectors & Developers Association of Canada meeting in Toronto, ON, Canada. This is a huge international gathering, and like MineXchange, coronavirus was the topic on everyone's mind. Following the conference, attendees were informed that one visitor had tested positive for coronavirus, sending many of us into self-quarantine for 14 days.

Safety is, and always has been, SME's top value. We are committed to the health and well-being of members, volunteers, exhibitors and visitors to our conferences and events and to the staff and other stakeholders who help us put on these events. With that in mind, we were forced to make the difficult decision to cancel the 2020 SME Minnesota Conference that was scheduled to take place April 6-8 in Duluth, MN. An SME Foundation Golf Tournament (March 28, Phoenix, AZ) and many regional and section meetings have also been called off. Additionally, the Global Mining Professionals Alliance meeting (March 24, Perth, Australia); the Science and Engineering Festival (April 24-

Value share: There is currently no vaccine to prevent coronavirus disease 2019 (COVID-19). The best way to prevent illness is to avoid being exposed to this virus. The CDC provides the following advice.

Preventive measures include:

Wash your hands: Wash your hands often with soap and water for at least 20 seconds, especially after you have been in a public place, or after blowing your nose, coughing or sneezing. If soap and water are not readily available, use a hand sanitizer that contains at least 60 percent alcohol.

Avoid close contact: Avoid close contact with people who are sick and put distance between yourself and other people if COVID-19 is spreading in your community. This is especially important for people who are at higher risk of getting very sick.

Stay home if you're sick: Stay home if you are sick, except to get medical care. Learn what to do if you are sick by visiting the CDC website at <https://www.cdc.gov>.

Cover coughs and sneezes: Cover your mouth and nose with a tissue when you cough or sneeze or use the inside of your elbow.

Wear a facemask if you are sick: If you are sick, you should wear a facemask when you are around other people and before you enter a healthcare provider's office. If you are NOT sick you do NOT need to wear a facemask unless you are caring for someone who is sick. Facemasks may be in short supply and they should be saved for caregivers.

Clean and disinfect: Clean and disinfect frequently touched surfaces daily. This includes tables, doorknobs, light switches, countertops, handles, desks, phones, keyboards, toilets, faucets, and sinks.

26, Washington, D.C.); the Engineering Public Policy Symposium (April 27-28, Washington, D.C.) the Offshore Technology Conference (May 4-7, Houston, TX) the Current Trends in Mine Finance Conference (May 10-13) and the Canadian Institute of Mining, Metallurgy & Petroleum annual conference (May 3-6, Vancouver, BC, Canada) have all been postponed or cancelled. Using the jargon of the business world, we are experiencing a Black Swan event, that is an unpredictable event that is

(Continued on page 16)



Rio Tinto to invest \$1 billion to reach net zero emissions; Global mining company sets goal for 2050

RIO TINTO ANNOUNCED plans to invest \$1 billion to reach its goal of net-zero greenhouse gas emissions by 2050. It has also committed to reduce its emissions 15 percent by 2030.

It's an ambitious goal for the world's second-largest mining company that builds on the company's 46 percent cut in emissions since 2008, although much of that reduction was due to it selling operations that produce a lot of pollution.

Rio Tinto's chief executive Jean-Sébastien Jacques said to reduce its total emissions 15 percent by 2030, every new business opened by Rio Tinto in the next decade will need to be carbon-neutral.

The Guardian reported that in announcing Rio Tinto's full-year results, Jacques also warned that the coronavirus outbreak could hurt its operations in the near term. Chinese steel mills are major Rio Tinto customers. However, Jacques said the company's iron order books were full.

"But we are likely to see some short-term impacts such as supply chains and possibly even provision

of services from Chinese suppliers," Jacques said. "We acknowledge that there will be some short-term volatility and uncertainty, but we are very well-positioned."

He said the emissions cut by 2030 would be achieved using existing technology, but Rio Tinto would also be investing part of the \$1 billion on developing new ways of eliminating carbon production. "We have approved around \$100 million for the Pilbara; I think it would be a good example of things we may look at going forward."

"It's a 34-MW solar photovoltaic plant and a battery system of 12MWh storage facility at one of our operations.

"By doing this investment ... we'll be able to take out about 90 kt (99,208 st) compared to commercial gas-power generation." This was equivalent to taking 28,000 cars off the road or about 3 percent of the company's emissions from the Pilbara, he said.

"At the same time we are investing serious money in order to find the technology for the future. We have only a pathway for the next 10 years. If we don't work today on options

beyond the next 10 years, we'll never get there."

Jacques defended Rio Tinto's decision not to set scope targets for its customers — something rival BHP did in July as part of a \$400 million program to cut its emissions. "We will not set targets for our customers," Jacques said.

Jacques said examples included a deal the company struck with giant Chinese steel mill and key customer Baosteel in September to reduce emissions from steelmaking and another deal struck with Apple and the Quebec government two years ago relating to aluminum.

"Remember, we are the only large diversified mining and metal company that is not selling coal, and the carbon associated with coal, or drilling oil and gas and the carbon associated with oil and gas.

"So if you step back, if you believe in climate change — and we do believe in climate change — we know we need to have more high-quality copper and aluminum in order to be part of the solution." ■

President's Page: SME has many ways for members to get involved

(Continued from page 8)

what is normally expected of a situation and has potentially severe consequences that may dramatically change the business and social landscape for a period of time.

The global spread of this virus is just too dangerous, and there are still too many unknowns about this virus for us to move forward with large gatherings at this time. And we are not alone; all major sports in the United States, and around the world, have been put on hiatus, as have conferences, concerts, business and personal travel and other gatherings. Dining in restaurants and social gatherings of more than a few people are also discouraged or banned. I'm sure that everyone reading this column has been impacted in some way by this unprecedented event and I hope that

you are all healthy, even though your 401(k) might not be doing as well.

In spite of all of this, SME is still here for its members, and while we might not be able to host large events in the near future, you can continue to rely on SME for technical resources like OneMine.org, webinars, *Mining Engineering* and *Mining, Metallurgy and Exploration*. You can also continue to network with your peers and colleagues through the SME Community and your sections can still meet virtually using Skype or Facebook Live.

In a few weeks we will have a pretty good idea of the impact of the delays and cancellations, both real and projected. We will be adjusting plans and making new ones to seek means and measures to compensate for anticipated losses. With good

work and luck on our side, SME can emerge stronger and better positioned to address the future for our members and the mining industry.

These are challenging times — stay safe, take precautions, wash your hands and, if you are sick, stay home.

On a lighter note, I would be remiss if I did not remind you to read the monthly "Great Debate" column in this April issue of *Mining Engineering*. Marc LeVier takes the pen to represent the metallurgist and mineral processors on page 17. Please follow the Great Debate at *Mining Engineering*, and donate and vote so that we can ultimately determine which profession is the most important contributor to the success of the mining and underground construction industries. ■

Some thoughts for our times; Looking ahead at the landscape of COVID-19's lasting impact



Robert W. Schafer
2020 SME President

To paraphrase Charles Dickens, “It was the best of times, it was the worst of times ... it was the winter of despair, it was the spring of hope, we had everything before us, we had nothing before us ...” and so on.

For explorers as well as base and precious metals miners, and even the iron ore, met coal and construction materials producers, 2020 and a few years beyond were anticipated to be promising times. Warehouse inventories of almost all metals were near all-time lows. Mine suspensions and closures were occurring due to resource nationalism, and worker unrest in Africa and Latin America

set the stage for commodity shortages, so the prices of many metals were to advance in a growing global economy. Precious metals were coming out of their funk because inflation was looming in the near term. Infrastructure projects were going to move forward, so construction materials would be in demand. The trade war with China was showing signs of relief, so there would be increasing demand for the mined materials that go into a manufacturer's products. Each of these stimuli pointed to better times in the near future. Then in Q4 2019 the first signs of highly contagious COVID-19 began to show in Wuhan, China, and pretty soon the world was thinking pandemic as it viciously spread. Everyone was admonished to “stay home and stay healthy” in order to halt the spread of the virus. Societies and industries essentially shut down.

It is now mid-April, and as I write this column for the May issue, we need to look beyond the calamity of the present and think about and prepare for the positive actions needed in the future. When the world shuts down, a proclamation or executive order does not turn on a switch to instantaneously re-ignite the complex interactions of local and global governments, small and mega industries, states and communities, economic flows of retail and banking, air-sea-land transportation logistics and many more interconnected components that make the world as we know/knew it work relatively smoothly.

Although it may not seem like it right now, some positive opportunities will certainly emerge from this global pandemonium.

Safety share: As the world begins to look to a post-COVID-19 future, we again turn to the Centers for Disease Control for guidance.

Critical infrastructure workers who have had an exposure but remain asymptomatic should adhere to the following practices prior to and during their work shift:

- **Pre-screen:** Employers should measure the employee's temperature and assess symptoms prior to them starting work. Ideally, temperature checks should happen before the individual enters the facility.
- **Regular monitoring:** As long as the employee doesn't have a temperature or symptoms, they should self-monitor under the supervision of their employer's occupational health program.
- **Wear a mask:** The employee should wear a face mask at all times while in the workplace for 14 days after last exposure. Employers can issue facemasks or can approve employees' supplied cloth face coverings in the event of shortages.
- **Social distance:** The employees should maintain 6 feet apart and practice social distancing as work duties permit in the workplace.
- **Disinfect and clean work spaces:** Employees should routinely clean and disinfect all areas such as offices, bathrooms, common areas and shared electronic equipment. ■

Yes, positive inertia will require the best of leadership, planning and implementation to get both the big world and our personal islands right again. There are now indicators that the worst of the pandemic may be behind us. However, returning to normalcy will be a challenge over the next several months. There will undoubtedly be losers and winners. At times, it may be difficult to identify a silver lining to an economic restart. Yet in the moments of crisis we are all largely showing that people can communicate,

(continued on page 18)



PolyMet's air permit rejected by Minnesota appeals court; Permit remanded back to the Minnesota Pollution Control Agency

THE MINNESOTA Court of Appeals has dealt PolyMet Mining Corp. another setback in its plans for a proposed copper-nickel mine. The latest setback comes from a ruling from a three-judge panel that rejected the air permit that was issued to PolyMet in 2018 by the Minnesota Pollution Control Agency (MPCA).

The *Star Tribune* reported that the judges ruled the MPCA should have looked harder at whether PolyMet plans to expand the state's first copper-nickel mine well beyond the limits imposed by the permit.

Writing for the court, Judge John Rodenberg said the regulator should have clearly addressed whether PolyMet "is engaged in sham permitting" to avoid a permit requiring greater review and more stringent controls.

According to reporting, PolyMet's Canadian securities filings indicate it may actually be planning a mine nearly four times larger than operations covered by the air permit, which limits the mine to producing 29 kt/d (32,000 stpd) ore, the court noted.

The court remanded the permit

back to the MPCA for further review. The MPCA said it's reviewing the decision and will soon decide its next steps.

PolyMet is already engaged in litigation and investigations into how regulators handled its water quality permit. In February, PolyMet filed a Petition for Review to the Minnesota Supreme Court seeking to overturn a January state Court of Appeals decision that remanded the company's Permit to Mine and dam safety permits back to the Department of Natural Resources for a contested case hearing.

If the proposed mine gets built near Babbitt and Hoyt Lakes, it would be the state's first nonferrous mine.

"We stand ready to provide the additional information the agency might need to update its decision on the air permit," the company said.

Jobs for Minnesotans, a pro-mining group backed by business and labor groups, issued a statement saying they are concerned about the signal the decision sends to prospective investors in Minnesota.

"We're increasingly concerned by court rulings that appear to effectively

transfer regulatory authority to the judiciary from agencies long established under state statute and staffed with experienced experts in the scientific fields relevant to decisions, such as air permitting," the group said.

The openpit mine and its operations for crushing and processing ore required an air permit, because it will emit a range of pollutants into the air such as carbon monoxide, fine dust and mercury. Although the MPCA considers the PolyMet mine's mercury emissions to be small, the metal is a neurological toxin that drifts down into water and builds up in the tissue of fish.

The Court of Appeals has rejected or suspended environmental permits on three different projects over the last year. It is the second time this year that the appellate court has rejected permits issued to PolyMet. In January, the court reversed three permits that the state Department of Natural Resources issued to PolyMet — its permit to mine and two dam safety permits. Both the company and the agency have asked the Supreme Court to review that decision. ■

President's Page: COVID-19's lasting impact on the mining industry

(continued from page 6)

cooperate and collaborate to make day-to-day efforts successful — except maybe the partisan politicians.

Where will we find this positive inertia? First, we need to get the ball rolling. For mining and underground construction, activities will ramp up over time as many operations and projects are gradually restarted from care-and-maintenance status. Some people will be mobilized to remote sites and supply chains and timely deliveries of critical components will be re-established.

It is my belief that our industry will play a key role in the return to a new normal. An argument can be made that because mining is the

industry that identifies, recovers and delivers the materials that restart the manufacturing and commercial cycle, it is also one of the most important job and economic multipliers of all businesses and is, therefore, the key to economic recovery.

There are very few people who have the vision to know all of the moving economic parts, can create the links so they fit together and provide the right type and quantity of economic and social accelerants to move the stalled machinery that comprise local and global economies and communities. Actions do not necessarily have to come from the political top to be effective. To recover

from the quagmire and restart the economies of the world smoothly, we need "statesmen and stateswomen" (not necessarily political leaders) who rise to the occasion and integrate the complexities of a world that is emerging from its suspended status. Statesmen in mining need to emerge and point the way as our industry may have the longest perspective on the components that are the drivers of modern living. The mining industry as a leader must recognize and voice the need to be on the same page to make social and economic recovery succeed and minimize severe dislocations. This can be our time to improve the image of mining. ■

United States and Canada share a unique border; Mineral production plays a key role in the international relationship



Robert W. Schafer
2020 SME President

Borders are funny things. They are erected for numerous purposes but largely exist to create separation. Sometimes a border exists to allow for collaboration. Consider, for instance, the border created by an ionic membrane that is part of an electric flow battery. This border allows the movement of electrons between two compatible electrolytes from one side to the other to create and store an electrical charge. This cross-border cooperation within the battery creates a functional unit that can power a small industrial

complex, like a hospital, when grid electricity is temporarily cut off. It can be recharged almost infinitely without losing its effectiveness.

The United States-Canada border includes four of the five Great Lakes, many rivers and lakes, major airsheds and migratory routes for wildlife species. The extensive border, diverse geography and ecosystems shared by the two countries require close cooperation among many U.S. states, Canadian provinces, U.S. tribes, First Nations and local and federal governments. The two federal governments have implemented more than 40 international agreements for the management and protection of environmental quality and ecosystems in the border area, and there are more than 100 additional such agreements between U.S. states and Canadian provinces.

This border has almost always been a border of cooperation and collaboration (except during a short period of time around 1812-1815 and while Olympic hockey games are in play). All in all, the cross-border relationship has been one of peace — friendship that is often mutually beneficial or symbiotic. We are compatible but distinct. The distinctions and cooperation make the relationship great and the envy of much of the world.

Both Canada and the United States are large countries in terms of land space. The United States has a population of about 335 million people; Canada's population is about 10 percent of that number at 35 million people, most of whom cluster along our mutual border. Mineral production is a very important component of Canada's economy, while it is less so as a percentage of the economy in the United States. As Canada's largest trade partner, not surprisingly, the U.S. economy is fed by their mineral exports. With this in mind,

Safety share: Every organization has a safety policy, a system of standards, procedures and tools, designed to support working safely. Whether it is a large organization with a comprehensive and complex system or a small business with the minimum specs needed to comply with the U.S. Mine Safety and Health Administration, every company has something. So, if all organizations have these resources to support exploration, mining and processing operations what makes the difference in achieving great performance? The difference — leaders who really care and those who are leading by example by getting into the field, seeing the real conditions and identifying opportunities to support the team in working safely. Lead by example.

Submitted by Mick Routledge, 2020 SME Health and Safety Division Chair

communication and collaboration at national and corporate levels in the development and trade of important minerals would be anticipated.

This year, a transborder relationship was established that has direct mining and natural resource utilization implications that can be far-reaching and beneficial not just to both countries, but also to the rest of the world as we move toward minimizing waste generation, promote greater environmental consciousness and encourage green economies. The Canada-U.S. Joint Action Plan on Critical Minerals Collaboration aims to advance the mutual interests of both countries in securing supply chains for the critical minerals needed for manufacturing sectors, communications technology, aerospace, defense and clean technology. Specific to mining, of the 35 minerals and metals the United States deemed as critical earlier this year, Canada is the major import source for 13 of them. The Action Plan will guide cooperation in areas such as industry engagement, efforts to secure critical minerals supply chains for strategic industries, improving information sharing on mineral resources, and will promote joint initiatives, including research and development cooperation, supply chain

(continued on page 16)

President's Page: Cross-border cooperation benefits all parties involved

(continued from page 8)

modeling and increased support for the mining industry. Top-of-the-list priorities include joint initiatives to address shared mineral security concerns — helping ensure the continued economic growth and national security of both Canada and the United States.

In 2019, the U.S.-Canada Innovation Partnership was established with leading educational and research institutions to promote deeper bilateral relationships through collaboration on innovation, technology, research, science and related issues. The Innovation Partnership will work to grow cross-border collaboration, foster ideas to develop the workforce of the future, and cultivate a shared values-based approach to promote the adoption and acceleration of emerging technologies, innovations and research. The innovation partnership has near-term positive

implications for mining, processing and remediation technologies.

SME and the Canadian Institute for Mining, Metallurgy and Petroleum (CIM) have long held mutual respect and participated in each other's events over the decades. In 2011, the two organizations thought it important to take their cooperation to a new level. Together, SME and CIM proposed the establishment of a growing organization called the Global Mining Professional Association (GMPA) to foster international collaboration among the leading minerals professionals around the world. Today, the member organizations represent approximately 60,000 members from seven key mining countries on four continents. The first collaborative activity of GMPA is the Global Action on Tailings initiative to address critical aspects of managing

and minimizing mining waste and its impacts on the environment and communities.

Mining professionals on both sides of the border should think about how fortunate we are to have a friendly counterpart with many shared interests. We are nations and people who provide alternative perspectives on issues and oftentimes willingly share and collaborate to our mutual benefit. The mining and construction industries, and the people in them, will prosper as a result of our cross-border cooperation.

One final point to be made this month. Please remember "The Great Debate" and vote your conscience as to which mining and construction profession is most important to the wellbeing of society. Vote with your mind and wallet in support of the National Mining Hall of Fame and Museum. ■

SME Foundation Benefit Golf Tournament



Enjoy the spectacular Dinosaur Mountain golf course at Gold Canyon Golf Resort, while raising money for the valuable education, outreach and professional development programs supported by the SME Foundation.

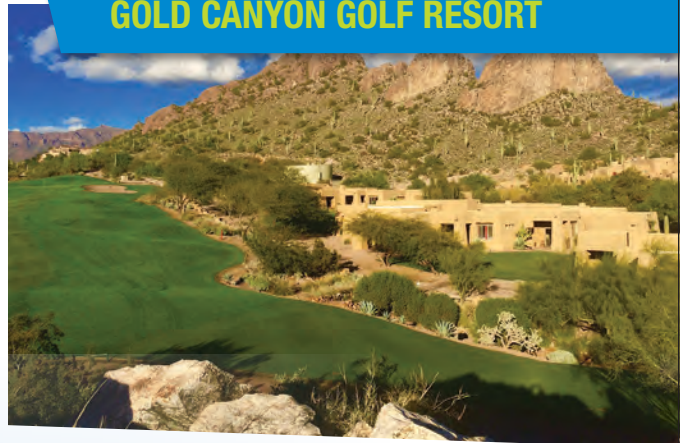
INCLUDED:

- 18 holes at one of the area's best courses
- Golf cart
- Men's and Women's contests
- Mulligans available
- Open prize raffle
- 19th Hole Banquet

CONTESTS:

- Closest to the Hole (Men's and Women's)
- Longest Drive Contest (Men's and Women's)
- Hole-in-One Challenge
- Beat the Pro

OCTOBER 2, 2020
GOLD CANYON GOLF RESORT



Register as a foursome – or individual golfer – at smefgolfing4good.com
The tournament is almost full, reserve your spot today!

Sponsorships available! Learn more smefgolfing4good.com or smefoundation@smenet.org



Reversing the the myth of the resource curse; Evidence suggests that the long-held belief is not accurate



Robert W. Schafer
2020 SME President

Ever since I learned of the resource curse many years ago it seemed paradoxical that the populace and economy of nations with abundant mineral resources were somehow destined to stagnate in poverty, remaining less-developed as a result of development and utilization of the nation's mineral wealth. Finally, a scientific study has been published concluding that the "curse" is misconceived, and the negative propaganda promoted by antimining nongovernmental organizations (NGOs) and prejudiced

academics over the decades to suppress mining in less developed parts of the world has little empirical information to support it. The study, published in *Mineral Economics*¹ in 2019, is the result of research carried out at Lulea University of Technology in Sweden, a country well-known for its liberal thinking and environmental conscience.

This paper reports on an abundance of statistical analyses that convincingly evaluates the contribution of nonfuel mineral mining to the economies of 50 countries, from the wealthiest to the least developed, with a focus on mining's impact on less-developed countries where the resource curse should be most impactful. Using country-by-country data from 1996 to 2016 that included mineral production, prices, mineral rents, exploration expenditures, government revenues and employment, the study provides insights to the mining industries' contribution to each national economy and the change in mining's economic contribution over time. Taking it one step further, an assessment was made regarding the magnitude of each country's economic dependence on extractive resources.

Not surprisingly, coal, iron ore, copper and gold are the chief value contributors across all countries, providing about 80 percent of the annual \$1 trillion global business. Fertilizers provide about 5 percent of the economic contribution, and other metals (Zn, Ni chiefly) fill out the balance.

The study readily recognized that there is a true market failure when it comes to mineral exploration, something that I have realized through my career as an exploration geologist. Exploration activity and spending should be driven by expectations of future demand, mostly long term. However, the reality is that exploration spending in a given year closely

Safety share: Now, more than ever, supporting miner well-being is critical. As an industry, we can draw from research and lessons learned around healthier work design and organizational practices to support miners during COVID-19. Mainly, organizational support can be advanced by showing that health and safety is a true priority of the company. Ways to illustrate this message include the following: provide all employees fair treatment and equal opportunities; install adequate pay and benefits including paid sick leave; allow for more flexible work environments with increased opportunities for cross-training; and maintain consistent, open communication to facilitate trust.

Additionally, finding ways to increase employee involvement in decision-making authority through newly formed committees may result in an increased sense of control in a less certain environment. CDC has offered guidance on worker safety and support for a variety of occupations, including mining, available at: <https://www.cdc.gov/coronavirus/2019-ncov/community/miners.html>.

Submitted by Emily Haas, 2020 SME Health and Safety Division Chair Elect

correlates with metal prices of the preceding year. This means that the future demand for metals, which logically should determine the levels of exploration expenditures, is not the key driver at all.

Here's the meat: among the 20 less-developed and moderately developed countries that were profiled, the economies of 11 of these grew sufficiently to advance them at least one step in the World Bank's income-group classification scheme. Among the winners, Zambia, Ghana, Guyana and Mongolia graduated to Middle Income Economies. Peru, Suriname, Botswana and Namibia moved up to Upper Middle Income Economies, and Chile is now classified as an Upper Income Economy. On a regional basis, West Africa certainly improved the most, largely as a result of gold mining. Many factors certainly contribute to economic development, but for these countries, mining played a key role.

However, income is not the only or best way

(continued on page 17)

President's Page: Countries with resources have improved over time

(continued from page 6)

to measure development and progress. Social and political development are also important. Improved human development, education and equality as well as political stability, rule of law and accountability are key socio-political considerations in realizing whether the resource curse exists. The United Nations' Human Development Index shows that countries with high economic contributions from mining showed larger improvements than those without mining. Similarly, considering all good governance indicators, mining countries have exhibited significantly better political development than non-mining countries. Interestingly, a number of oil-producing countries have actually regressed.

The result of this exhaustive study fails to support the view that

mineral resources create a difficult dependency, breeding poor social, political and economic development. Quite the opposite – less-developed countries with rich mineral endowments have a better chance for positive social and economic improvement than those without. The development or exploitation of mineral resources within a country does not create a resource curse in terms of a tragic dependency.

The ultimate conclusion is one that I believed from the first: it is unlikely that a country classified as a “low-income economy,” relying heavily on mineral-resource-production revenues, is destined not to prosper. It is not the mining-based economy that is the problem, but rather it is the way economic benefits of mining are managed that underpins this issue. If

the economic benefit created from the mineral resource patrimony by the process of mining is not appropriately shared among the citizenry, there is a problem. The curse is that the economic benefits are sometimes kept by a privileged few, commonly within less-than-honorable governments or those with ties to such governments.

I now feel vindicated. My remaining hope is that those that are carrying out the mining activities are following the international guidelines set forth by the ICMM and are not in collusion with debased governments and its cronies. I hope that you are feeling better about this issue as well. ■

¹Ericsson, M. and Lof, O., 2019, Mining's Contribution to National Economies between 1996 and 2016, *Mineral Economics*, v.32, pp. 223-250.

Mining
engineering



Be a part of the next big
Mining Engineering issues!

Contact information:

August – Crushing and Grinding, Media Review
September – Business Profiles
October – Underground Mining & Best of Canada Part II

Gary Garvey // Media Manager/Advertising
garvey@smenet.org // 1.800.763.3132

Key Features



Up to 3X
Increase in
Capacity*



Crowned
Screen Bed for
Higher Efficiency



Faster
Screen Changes
with FTB
Tensioning



Reduced
Height and
Structural
Requirements

*Compared to
Derrick's 5-Deck Stack Sizer®

Reduce Ash Content in Clean Coal

Maximizing Efficiency in Resource Recovery

Derrick® has once again redefined high capacity, high efficiency, fine particle wet screening with the introduction of the SuperStack®. With 8 decks operating in parallel and innovative Front-to-Back (FTB) tensioning system, the SuperStack has a demonstrated capacity **up to 3 times that of the best fine screens currently available**. All of this added capacity comes with only a slight increase in the space required per machine, significantly reducing the total capital and installation cost as well as OPEX for any screening installation.

DERRICK
SUPERSTACK®

To discover more visit:
www.Derrick.com/Products/SuperStack



ESG, public perception and COVID-19; Every incident has the potential to affect the entire industry



Robert W. Schafer
2020 SME President

Mining starts with a tarnished image. It is unavoidable that mining and underground construction have both social and environmental impacts by the nature of their activities. A report of a misstep or accident, large or small, is sufficient to shake public confidence and motivate anti-mining nongovernment organizations to rev their propaganda machine for months. It is the way in which necessary impacts or accidents are managed that is important to restoring credibility. I hope that the industry is never willfully negligent

and strives to operate within well-established environmental, social and governance (ESG) principles while emphasizing safety as part of a broader scheme of social and environmental responsibility.

The extractive industries tread a fine line between development and threat in the community and ecosystem. The media and critics commonly amplify the negatives, such as potential damage to local environmental or heritage resources, while ignoring or paying lip-service to positive contributions, such as quality employment, improved community infrastructure and the tax contributions that feed back to provide government-paid community services. Forward-thinking companies address these issues by implementing consultation and education mechanisms designed to give voice to and empower the community to influence decision-making positively and strengthen our social license to operate.

When it comes to government and regulators, most in those positions tend to seek an equitable balance to allow development of mineral resources and reaping the economic benefits while protecting the community and environment from unnecessary disruption. In the past decade or so, many companies and regulators have enacted controls to ensure that ESG goals and requirements are achieved in balance with mining activities.

In February 2020, when I became president of SME, I never dreamed that I would be sidelined and concerned about a virus that has now overtaken the mining and underground construction industries as well as global society. With this new reality comes decisions and actions that are needed to overcome the challenges of today and tomorrow. Today we are putting in place human resource and financial

Safety share: Influenza, also known as the flu, is a contagious respiratory illness caused by flu viruses. It can cause mild to severe illness and, at times, can lead to death. The flu is different from a cold. The flu usually comes on suddenly.

According to the Centers for Disease Control, typical seasonal flu outbreaks cost employers some \$10.4 billion in hospitalization and outpatient visits. The precise timing and duration of flu seasons can vary, but activity often begins to increase in October, peaks between December and March, and can last as late as May.

Tips to avoid contracting the flu

- Avoid close contact with sick people.
- While sick, limit contact with others as much as possible.
- If you are sick with a flu-like illness, the CDC recommends that you stay home for at least 24 hours after your fever is gone except to get medical care or for other necessities.
- Cover your nose and mouth with a tissue when you cough or sneeze.
- Wash your hands often with soap and water. If soap and water are not available, use an alcohol-based hand rub.
- Avoid touching your eyes, nose and mouth. Germs spread this way.
- Clean and disinfect surfaces and objects that may be contaminated with germs like the flu.

engineering solutions to maintain a healthy and productive workforce and safe workplace, ensuring continuity of operations and supply chains, and implementing sound cash flow management for survival. People, companies and society are enacting strategies to maintain stability today, planning for the rebound that will come with the recovery in the near term and discovering new ways to succeed by pivoting to a future that includes both opportunities and disruptions. The future developments of the mining and underground construction industries must and will have critical components of ESG in order to succeed and be accepted by society.

With the reset of the world as a result of COVID-19, our industries have an opportunity to improve upon the public's perception of

(continued on page 17)

President's Page: ESG and public perception

(continued from page 6)

mining and more broadly achieve its social license to operate. If our businesses are more transparent and attentive to public concerns by implementing programs with strong emphases on the “E”nvironment and “S”ociety components of ESG, we can elevate our image as a valued and responsible contributor within this technologically and socially connected world.

I hope that this will be the last time that I reference anything that is

related to COVID-19, pandemics and social distancing in my column. As an industry and a society, we are learning how to adapt to black swan disruptions, develop and put in place practices and technologies that allow us to remain and improve our productivity, while adjusting our practices to gain public trust and improve the perception of mining as a vital component within the overall scheme of an improved quality of living for all inhabitants of the planet and a better world. ■

Minnesota: Legislation could impact iron ore

(continued from page 14)

Watershed and Superior National Forest, while the facilities' open mine pits sit mostly within the Lake Superior Watershed.

Cleveland-Cliffs' Northshore Mining mine pit near Babbitt sits in both watersheds and on the border of the Superior National Forest, while its plant and tailings basin are in the Lake Superior Watershed and outside federal land.

In a news release, Republican U.S. Rep. Pete Stauber said McCollum's bill “seeks to ban not only new mines, but future operations in existing iron ore mines within the Rainy River Watershed and the Superior National Forest.”

The Trump administration has been criticized for fast-tracking the review of projects and for giving back mineral leases to Twin Metals that were rescinded in the final days of the Obama administration.

It's unclear if any of those iron

ore mines will go through the mine proposal process in the next year for any sort of expansion. ArcelorMittal and U.S. Steel declined to comment on the bill and a question on whether they anticipated filing any new mine plans in the next year.

But in an emailed statement, Cliffs applauded Stauber's response to McCollum's bill.

Twin Metals, the company behind the proposed mine targeted by the bill, said it opposed the bill.

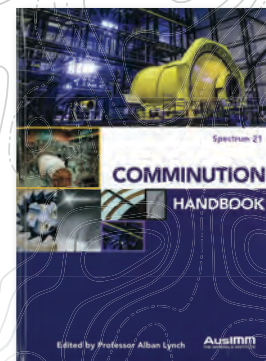
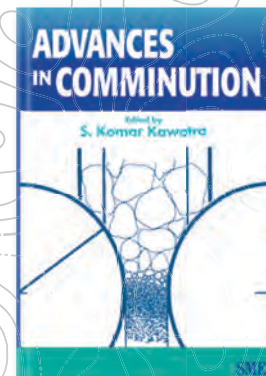
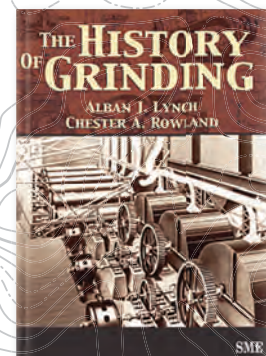
“The proposed legislation attempts to delay the development of mining projects in northern Minnesota and ignores today's urgent need and growing demand for these critical metals,” Twin Metals spokesperson Kathy Graul said in a statement. “This legislation would be devastating to the economic future of our state and to a myriad of industries that depend on its mineral deposits.” ■

Clarification

It was reported in the July issue of *Mining Engineering* on pages 12 and 101 that the Round Top rare earths project near El Paso, TX had issued a press release that reported that it had made significant strides toward production after it had received permits to begin construction on a pilot processing plant in Wheat Ridge, CO. These reports are not meant to be endorsements of the Round Top project by *Mining Engineering*, SME or David Hammond, who was cited in the report on page 100-101. Dr. Hammond's opinions regarding the commercial viability of the Round Top project remain in alignment with his presentation and the discussion in this article. ■

Sharpen Your Knowledge

Read more about crushing and grinding with these titles from the SME Bookstore



Order online at
smenet.org/store

The spectrum of innovation; New technologies have allowed communications to continue



Robert W. Schafer
2020 SME President

I am now a lame duck. It is a little more than halfway through my year as your SME president, and I can say with full certainty that almost everything that has happened so far was not what I expected or hoped.

I thought that I would be meeting many of you on a face-to-face basis by attending various local section meetings and technical conferences. I thought that I would have the chance to meet counterparts in other technical organizations as well. And, I thought that I would be giving lots of speeches.

Instead, there have been many, many virtual meetings and introductions and only a couple speeches. The best of these have been the conversations that have occurred courtesy of the Section Leader discussions and the New Member Outreach events, where I have had the pleasure of talking with small groups, answering questions and trying to address the individual and local issues that are rarely discussed in large gatherings. I enjoy them and wish I could meet and talk with many more of you. None of this could happen, however, without the internet and innovation of the various meeting platforms that we now take for granted.

September's *Mining Engineering* is the Innovation issue. The mining and underground construction industries are in many ways innovation leaders and among the first to apply innovation in practical, efficient and revenue-generating ways. It is not only the broad spectrum of the industries' activities that promotes creativity and implementation of technologies — it is also the external stimuli that push us to develop more effective discovery technologies, move earth more efficiently, develop new science to liberate products, minimize waste, protect the environment and improve the safety and health of workers and communities. We also want and need to improve the perception of our industrial activities to the general populace and regulators, and innovation in each of these areas can move the needle in that direction.

Innovation in our businesses comes in many forms. On the exploration end, the application of artificial intelligence to evaluate large data sets for an exploration region, learn from it, compare it to known deposits to recognize often subtle patterns that may lead to a new discovery from a menu of algorithmically generated targets is

Safety share: Working underground, an employee used alcohol-based hand sanitizer as recommended during the pandemic. The person touched a metal surface before the liquid evaporated. Due to static electricity, the vapor from the hand sanitizer ignited with an almost invisible flame on both hands. The person quickly went to a sink to extinguish the flames. This resulted in first- and second-degree burns.

Lessons learned:

- Hand sanitizer is not a substitute for handwashing with soap and water for 20 seconds.
- If you choose to use alcohol-based hand sanitizers, make sure all liquid is evaporated before touching any surfaces or performing any activity that may potentially cause ignition:
 - Smoking tobacco products.
 - Sparks caused by static electricity.
 - Open flames and hot surfaces; cooking.

among the newest innovations.

In operations, we are seeing the deployment of robotic equipment to remove the human factor at the working face to improve safety and efficiency. There is the move to green mining with the replacement of diesel machines with electrical machines to diminish the carbon footprint. There is a lot of research investigating waste minimization or its elimination by finding alternative uses for waste rock and repurposing tailings. For waste materials that cannot be eliminated, new ways to store or neutralize it are sought to diminish the operational footprint. There are also studies that seek to mobilize and recover the mineral product without mining the rock that hosts it.

Processing ore to recover the mineral products is also seeing innovation. Important efforts are being made to minimize use of water as a component of green processing. More

(continued on page 17)

President's Page: spectrum of innovation

(continued from page 6)

effective crush/grind technologies are in the works so that big rocks can be converted to small rocks with less energy employed.

Perhaps the most visible and publicly appreciated innovations may come in the areas of environmental, social and governance (ESG). When the health and safety of the community and the workforce are addressed and improved, people notice. When continuous reclamation occurs and historic eyesores are eliminated, the public and the press cannot complain. Addressing and improving the handling and technologies associated with mitigating potential hazards, such as tailings storage, to assure the public safety and minimizing environmental impacts takes the industry off the front page. Taking mine closure seriously, not deferring it, so that the operating site can be re-purposed in constructive ways attracts good

publicity. The community, the regulators and the media appreciate a different type of innovation in the way and the regularity by which operators and companies communicate and encourage participation, so that positives of the mine in the community are amplified and negatives are addressed early and minimized or eliminated.

All of these styles of innovation for mining and construction have the potential to improve the nebulous goal to “improve the public appreciation of mining.” Public outreach campaigns are shown to yield positive but short-term results. Implementing the full suite of improvements in mining and effectively communicating and involving the stakeholders and onlookers may have an impact that will progressively make them believers that we are finally “walking the talk” when we portray miners as good citizens. ■

Freeport-McMoRan: new executive leadership

(continued from page 10)

future.”

Adkerson continued, “Josh has earned the respect and confidence of the organization and is a seasoned and accomplished operational leader. He has exceptional technical acumen in a broad range of mining and development activities, a relentless commitment to safety, a strong drive and value focus and proven abilities to lead, challenge and motivate our teams. I am confident that Josh will do an outstanding job in leading this exceptional operating team.”

FCX is a leading international mining company with headquarters

in Phoenix, AZ. FCX operates large, long-lived, geographically diverse assets with significant proven and probable reserves of copper, gold and molybdenum. FCX is one of the world's largest publicly traded copper producers.

FCX's portfolio of assets includes the Grasberg minerals district in Indonesia, one of the world's largest copper and gold deposits; and significant mining operations in North America and South America, including the large-scale Morenci minerals district in Arizona and the Cerro Verde operation in Peru. ■

The Standard: global tailings management

(continued from page 10)

of this Standard, ICMM members will set the bar for all mining companies to work together to make all tailings facilities safer,” said Tom Butler, chief executive officer of ICMM. “The Standard will be integrated into ICMM's existing member commitments, which includes third-

party assurance and validation, and we are in the process of developing supporting guidance. Members have committed that all facilities with ‘Extreme’ or ‘Very high’ potential consequences will be in conformance with the Standard within three years of today, and all other facilities within five years.” ■

Sharpen Your Knowledge

Explore all aspects of mining influence water with the six volume set
Management Technologies for Metal Mining Influenced Water Series



Order online at
smenet.org/store



SME President
Hugh B. Miller
VOL. 71 NO. 3 – VOL. 72 NO. 2

March 2019: VOL. 71 NO. 3

An interview with the 2019 SME President

April 2019: VOL. 71 NO. 4

Effecting change: The ongoing fight to improve the public perception of mining

May 2019: VOL. 71 NO. 5

Get involved and make a difference: Submit your nominations for SME leadership and awards

June 2019: VOL. 71 NO. 6

Remembering Sunshine: Lessons learned continue to shape the mining industry

July 2019: VOL. 71 NO. 7

Education sustainability: Understanding the threats to higher education

August 2019: VOL. 71 NO. 8

Work/life balance: For many professionals it can feel like a pursuit in futility

September 2019: VOL. 71 NO. 9

The changing nature of academia: Realities are much more complicated than many realize

October 2019: VOL. 71 NO. 10

The US National Academy of Engineers: What is it and what does the organization do?

November 2019: VOL. 71 NO. 11

What happened to civility in debate: Remembering valuable lessons to resolve problems

December 2019: VOL. 71 NO. 12

Declining student enrollments: A cyclical challenge

January 2020: VOL. 72 NO. 1

How NIOSH fulfills its mission; The completed research has made mining much safer

February 2020: VOL. 72 NO. 2

Where did the time go? A word of thanks and a crucial look ahead for SME's future

A whole lotta changing going on! 2020 and 2021 invite unprecedented change for SME



Robert W. Schafer
2020 SME President

Paraphrasing the late Jerry Lee Lewis, there is “A whole lotta changin’ goin’ on,” seems appropriate right now. His original lyrics came out at a time when a new style of music erupted in the 1950s and shook it up. Today we have many stimuli that are creating upheaval in social and physical infrastructure and society is adapting, sometimes radically.

We have a new virus that has caused us to alter the way we meet, socialize, entertain and educate ourselves. We also have a collision of natural and imposed factors that are causing us to reconsider the way we source and use energy, water and air. In addition, we have a technological revolution that is altering daily lives in terms of communication, information and the speed at which our daily lives happen.

Things are changing as well at SME, some of them resulting from these stimuli, others are the result of our own perceived need for innovation. When the dust settles, I believe that we will all find that updating SME is for the good.

The most noticeable SME change will be our website. After years of work, October 2020 will see the new public view of SME and what we offer. The new site can be personalized, so you will be able to access the information that is likely to be of most value to you when you log on. It will be very user-friendly, so you can also find other topics easily. Let us know how you like it and if other improvements are desirable.

By now, I will bet that everyone has been bombarded by virtual webinars, meetings and conferences. If it cannot be live, it must be virtual. SME is also going virtual in its board, division, committee and section meetings. We are also developing the means to hold conferences in virtual space, since all things live have been cancelled into 2021 at this point.

The next experiment will be the THRIVE Virtual Conference, Oct. 20-21. The headline theme is innovation in finance and is titled “Financing Exploration, Mine Feasibility, Construction and Closure — Keys to Success and Navigating the Way Forward in a Pandemic World.” The slate of speakers is globally renowned. The cost is

Safety share: Sharing workplace safety tips often can help build top-of-mind awareness and put safety into perspective.

Recognize workplace risks — The key to mitigating risks begins with understanding what could cause a potential hazard or incident.

Know how to report incidents or hazards — Employees should know how to report issues expeditiously to lessen their effects.

Don’t take shortcuts on tasks or procedures — Remind employees about the importance of following procedures to the letter for their own sake.

Keep your workspace clean and clear of clutter — Clear away any clutter or unnecessary items that could pose risks of tripping, falling, slipping or other injuries.

Engage yourself with the company — Volunteering for projects, lending a hand outside of normal duties, joining a committee or team or participating in company-sponsored programs can immerse employees in your company’s culture.

Take regular breaks — Taking regular breaks can ensure projects are completed on time and without incident because it gives workers a chance to grab their focus.

Get a good night’s sleep — Emphasize the importance of a good night’s sleep and how it can ultimately affect your employees’ performance.

Help new employees embrace the safety culture — Set expectations up front and make it easy for them to learn the ropes to stay safe on the job.

Source: ehsinsight.com

reasonable — much less than traveling and attending in person. And yes, there will even be networking events. So please check it out, register and attend.

THRIVE will be the warm-up for the big virtual event: MINEXCHANGE 2021 SME Annual Conference & Expo to be held March 1-5. Everything that is the annual convention will be there: a multitude of technical programs, the exhibit hall, keynote speeches, awards presentations, committee and division meetings — and all can be enjoyed virtually. We will even hold virtual networking events (happy hours).

(continued on page 17)

President's Page: times of change

(continued from page 6)

Facing reality head-on, the global social and economic disruption will also cause SME to review, analyze and develop a new business model. The entire revenue and cost structures of our organization, our services and benefits to members and the way day-to-day business is carried out are impacted. Membership dues are a key source of revenue, so we hope that all of you will not only maintain your place at SME, but that you will encourage associates and colleagues to join the best mining organization on the globe. While the format of some member benefits may have changed, SME offers a wealth of leading-edge technical resources to help you excel in your job. For the price, membership in SME is a great value.

Our annual conference and technical meetings also bring in critical revenues and have significant costs to stage them professionally. The paradigm for holding a large conference will change. Whether it is all face-to-face, or perhaps a hybrid that includes a virtual component, the way we attend live events will change.

We are confident that SME will continue to bring the best technical content to its members, the industry and interested stakeholders. And while the expectations will be different, the SME committees and staff will continue to do an immense amount of planning and work to make the whole package worthwhile and enjoyable.

The cost and size of the meeting location, hotel or convention center space will change, as will catering costs. The audio visual and computing needs will likely be amplified, internet broadcasting abilities will be a premium. Importantly, the number of exhibitors will likely be different as will the need for display space.

The SME staff is working diligently and with urgency to create a business model that reflects these new realities. Even creating a base case scenario engenders a lot of estimating with large margins for error. Working together, we can optimize the value created by the coming changes to further improve SME for its members and solidify its status as the premier mining and underground construction organization. ■



GEONET

WIRELESS DATA HOSTING SYSTEM

GEOKON

TRUSTED MEASUREMENTS



SCAN ME

Producing **Quality Geotechnical Instrumentation** Since 1979.
 For more information please visit: www.geokon.biz/geonet

GEOKON | Lebanon, NH, USA | +1.603.448.1562 | info@geokon.com

Sharpen Your Knowledge

Explore all aspects of mining influence water with the six volume set
Management Technologies for Metal Mining Influenced Water Series



Order online at
smenet.org/store

Halfway through my year as President; SME and I are adjusting to new realities



Robert W. Schafer
2020 SME President

November is here. The leaves and temperatures have dropped. We are managing to live through an election that is everything, but mostly challenging, irritating and frustrating. Through all of this, and considering the situation, I am happy to say that SME is doing well.

In late September, we held a successful SME midyear meeting. For the most part, it was virtual, although the SME Board of Directors met face-to-face (F2F) in a very large room that allowed for

wide spacing. The SME divisions, as well as the SME Strategic and Standing Committees and the SME Foundation all met in virtual space. I spent time attending most of them by slipping into their virtual space for a few minutes as these meetings were held Monday through Thursday in half-day sessions. The Board met, with a number of guests on Friday to learn of the events and actions that occurred since March and earlier in the week.

All in all, SME is activating its new Strategic Plan and finding ways to communicate and bring services to its members creatively, and maybe even more often as we utilize digital technologies. I will admit, I never realized how dependent we would become on Zoom or Microsoft Teams meeting technology just eight or nine months ago. It is an entirely evolving industry that already exhausts us with their invitations and frequency.

Along those lines, SME held its third annual THRIVE conference in October as a virtual event. It was held over a few days and brought together numerous speakers and panelists to discuss many of today's issues as they relate to pandemics, technology revolutions as well as societal and institutional expectations in the mining industry now and into the future. In a number of ways, THRIVE is a dry run for the much larger MINEXCHANGE 2021 SME Annual Conference & Expo March 1-5, which will also be virtual. THRIVE Conference chairman, Tim Alch, along with all of the participants, attendees and the SME staff, carried it off flawlessly. It gives me courage and the expectation that MINEXCHANGE will be an event that you will enjoy and capture a lot of value. I encourage all of you to register and

Safety share: Water makes up to 60 percent of the human body, and without it, we cannot function properly. Water keeps us at optimal performance levels by regulating our core body temperature, carrying essential nutrients to vital organs and flushing internal toxins through sweat. Mining workers must take extra care to keep their hydration level while working. Performing heavy work uses energy stored in the body cells. This can lead to dehydration, which will significantly affect the worker's performance, heart function and overall health.

To avoid dehydration, drink a cup of water every 15 to 20 minutes and do not wait until you are thirsty. It is essential to consume pure and cool potable water and electrolyte drinks throughout the shift. Electrolytes are the essential salts we lose in our sweat along with water. Electrolytes regulate PH levels and blood pressure, and play a key role in water retention. Avoid caffeinated and carbonated beverages because they can increase fluid loss. Do not share cups or personal water containers and encourage a hydration program at the workplace.

Pedram Roghanchi
Assistant professor of Mineral Engineering
New Mexico Institute of Mining and Technology

attend the annual conference. I assure you, it will be well worth your time and (discounted) registration fee.

We have also managed to attend a few virtual technical conferences, but no F2F events. In addition to speaking at the THRIVE conference, I was able to attend and address SME members in a simulcast in Latin America for mining students in Chile, Peru, Ecuador and Mexico. I was also the honored guest and keynote speaker at the Khanan '20 mining conference in Dhanbad, India.

Closer to home, both the Minnesota and Pittsburgh section members celebrated their respective 100th anniversaries as SME/AIME Sections in October. Both groups provided me with special opportunities to congratulate them and give presentations. In addition, the SME Salt Lake City section joined up with the Utah Mining Association to hold a technical conference in October and provided a venue for me to discuss mining finance.

(continued on page 17)

As December arrives, it is a time for reflection, opportunity and commitment



Robert W. Schafer
2020 SME President

With 2020 nearing its end, now is the time to celebrate our successes, reflect upon the unconquered challenges we faced and chart out a future course. Let's face it, 2020 was not one that was anticipated, nor do we have a desire to repeat it. Yet, this one-time event (I pray!) spawned rapid adaptation and innovation in ways that we as individuals, families, communities and nations communicate, work, recreate and collaborate. Yes, as a national and global community, we continue to struggle, but there is a not-too-distant

light that provides hope for positive outcomes in 2021.

Reflection: In late February we held our MINEXCHANGE 2020 SME Annual Conference & Expo in Phoenix, AZ. It was one of the last large assemblies of technical mining people anywhere in the world for the year. Shortly thereafter, every live event for the rest of the year was postponed or eventually cancelled. It took SME about three months to regain its footing, but then we successfully staged another event, albeit virtually, with the North American Tunneling conference. We became confident and set schedules, organized and successfully staged both THRIVE 2020 virtual conference in October and the virtual Cutting Edge Conference in November. With this experience, I assure you that the MINEXCHANGE 2021 SME Annual Conference & Expo from March 1-5 will exceed your expectations, and I encourage you and your mining cohorts to register and attend. In the future, I am pretty certain that every conference will have both face-to-face and virtual components and that the hybrid convention model will allow you to keep current in your expertise as well as provide outlets for networking with your peers and friends.

Opportunity: The health/business/social disruption of 2020 is also providing an opportunity for the mining industry that we do not appear to be optimizing. While society and global leadership today rely heavily upon social media to keep abreast of information, thoughts and news, we should be maximizing all forms of communication and media to tell them the positive story about mining.

With a global push for greener business, minimization of carbon inputs to the

Safety Share: Personal protective equipment use and care is one key element in preventing the spread of the COVID-19 virus. It is recommended that people who may be exposed use these precautions:

1. Practice good hand hygiene by washing hands thoroughly and often or using hand sanitizer when washing isn't possible.
2. Use a cloth facemask when interacting with other people. The mask ties should be secured on the crown of the head or, if there are loops, hook them securely around your ears. Disposable face masks should be single-use only and cloth masks should be laundered regularly.
3. Face shields that can contain droplets can be used in place of face masks.
4. When there is a potential for contacting the virus from surfaces, gloves can be worn.

MSHA recommends following the CDC guidelines found at <https://www.cdc.gov/coronavirus/2019-ncov/prepare/prevention.html>.

**Jerry Power, Colorado School of Mines
EMCIS Program**

environment and seeking ways to offset apparent effects of climate change, our industry should be shouting loudly about our role in the new world that is coming. Transitioning today's world to a clean, high-tech, electric society requires tremendous increases for mined products, not just for copper, steel, rare earths and the like, but essentially every element of the Periodic Table lighter than uranium. We also must be telling the world that we can provide the necessary raw materials in a responsible, sustainable and acceptable manner with our improved technologies and principled ways for doing business that will achieve the highest levels of environmental, social and governance (ESG) performance. Then we need to put our performance out front and prove to the skeptics that we can do it.

Commitment: The view to the public, to regulators and to investors is that companies that have a positive reputation in areas of

(continued on page 19)

Pebble mitigation plan submitted; Pebble Mine's fate still undecided

NORTHERN DYNASTY Minerals Ltd. has submitted a Compensatory Mitigation Plan (CMP) for the Pebble Project in Southwest Alaska to the U.S. Army Corps of Engineers (USACE) ahead of the 90-day deadline that expired on Nov. 18, 2020.

Northern Dynasty and its subsidiary, the Pebble Partnership, said it believes the submitted CMP fully satisfies mitigation requirements for the proposed copper-gold-molybdenum-silver-rhenium mine in southwest Alaska.

Following publication of a positive Final Environmental Impact Statement (EIS) in July 2020, the USACE published its mitigation requirements for Pebble on Aug. 20, 2020 and provided the Pebble Partnership with 90 days to submit a CMP to address them. Filing an approved CMP for the project is a necessary prerequisite to receiving a federal Record of Decision.

"The 'in-kind' and 'in-watershed' requirement for mitigation the USACE established for Pebble clearly sets a high bar for offsetting project effects on wetlands and other aquatic features, but it's a challenge we have embraced and believe we can achieve," Ron Thiessen, Northern Dynasty president and chief executive officer said in a statement.

"Based on the findings of the Final EIS, we already know Pebble can operate safely and reliably, while fully protecting the water, fish and wildlife resources of Bristol Bay. Meeting the USACE's challenging mitigation requirements provides even greater evidence that Pebble can and will co-exist with commercial, subsistence and sport fisheries in southwest Alaska."

In addition to meeting the rigorous environmental standards enforced by the Clean Water Act and other U.S. federal legislation, Thiessen said the Final EIS for Pebble indicates the project will make important, positive socioeconomic contributions to the region, the state and the nation.

"Pebble will also deliver the critical and strategic minerals the United States requires for its economic and military security," he said, "while helping facilitate the transition to a 'lower carbon future.'"

Thiessen said that the Pebble Partnership technical/permitting staff and expert, third-party consultants in Alaska have prepared a high-quality mitigation plan to fully satisfy the lead federal agencies' requirements, including undertaking extensive field investigations this summer and fall. ■

President's Page: There could be a promising future for the mining industry

(continued from page 6)

of environmental, social and governance (ESG) performance are also high performers operationally and financially. Therefore, if the mining industry is not applying the training, technologies and funding toward improving both operational and ESG performance levels, we are not doing our best to maximize value for our investors. More importantly, however, if this is done, we can tell the world that we as an industry are the key player that underpins the transformation toward a sustainable future society.

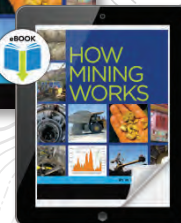
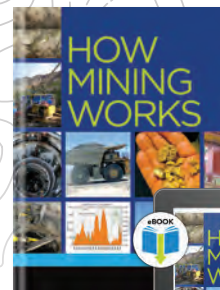
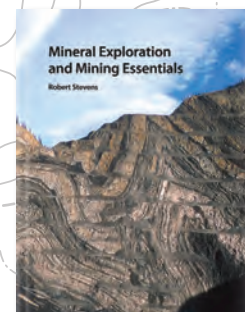
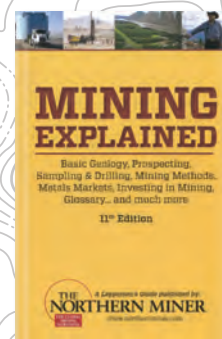
When we perform at our best levels, the mining industry can

proudly broadcast its contributions to society and the world. We will no longer seek to improve the social perception of mining. Mining will be held up as the positive example of an industry to be emulated.

So let us prudently spend the time and dollars necessary to optimize all aspects of mining operational and ESG performance. And let's crank up the volume on promoting the good things that mining does and can accomplish. The results will be worth the investment. This is a shared task and I hope that SME can help facilitate collaborations to make it possible for the future. ■

Back to Basics

Reinforce your mining knowledge with the tools found in these foundational texts from the SME Bookstore.



Order online at
smenet.org/store

It's a new year and things should be improving; There are signs of hope for a much better year in 2021



Robert W. Schafer
2020 SME President

Before I begin to ramble about the near-term future, it seems appropriate to recognize an important event in mining that occurred 150 years ago in 1871 with the founding of the American Institute of Mining, Metallurgical and Petroleum Engineers, better known as AIME. SME and its more than 13,000 members should offer congratulations and “Happy Birthday” to AIME on its founding in Wilkes Barre, PA by 23 of the most influential and distinguished leaders of mining at

the time. During the next 12 months or so, there will be special events commemorating the establishment of AIME including events at our MINEXCHANGE 2022 SME Annual Conference & Expo in Salt Lake City, UT. Similar festivities will be hosted by our sister societies (TMS, AIST and SPE) that will include special speakers, a video, champagne and cake events and commemorative gifts. I hope that you can participate in honoring and remembering this piece of American mining history. And please read the article in this issue on page 34 by George Luxbacher.

Looking at the present, and especially toward the next 12 months, the stock market and metal prices continue to move in the right direction. We will soon have three choices of COVID vaccines that we hope will knock down another wave and head off another year of social and economic lockdowns. We start the year with a new administration taking office in the United States and some different chemistries in both houses of Congress and in the Supreme Court. We are not able to forecast the weather to the accuracy we desire nor predict the random events that uplift us or challenge our patience. But, because we are a part of the mining and underground construction industries, we are dominantly optimistic, supremely creative and able to turn adversity into opportunity no matter the circumstances we encounter along our paths.

In the words of PricewaterhouseCoopers (PwC), among global industries, “mining has proven to be both resilient and resourceful,” as it addressed the challenges of the past months. Many countries have come to realize that mining is essential during times of crisis and is the bedrock of economic recovery.

Safety Share: With winter upon us, we should all be careful of ice and/or slick surfaces when walking. Watch your step. Slips, trips and falls account for 19,000 deaths in the United States each year. That’s enough people to fill up Staples Center in Los Angeles.

Practice safe walking skills. Take short steps on slippery surfaces to keep your center of balance under you and point your feet slightly outward. Clean up or report spills right away. Even minor spills can be dangerous. Don’t let grease accumulate at your work place. Be extra cautious on smooth surfaces such as newly waxed floors. Also be careful walking on loose carpeting.

To prevent trip hazards, make sure you can see where you are walking. Don’t carry loads that you cannot see over. Keep walking and working areas well lit, especially at night. Keep the work place clean and tidy. Store materials and supplies in the appropriate storage areas. Arrange furniture and office equipment so they don’t interfere with walkways or pedestrian traffic in your area. Properly maintain walking areas and alert appropriate authorities regarding potential maintenance-related hazards. ■

Yet, events of recent months have challenged many assumptions regarding the wisdom of some business strategies and practices. Together with shifting values expressed by communities, investors and regulators, and in the face of the pandemic, the mining industry’s approach to act locally and implement globally is providing far-reaching and positive responses and actions.

As an example, following on the near collapse of face-to-face business, mining leadership has revisited the risks of critical global-supply chains. Many are implementing plans to invest more in local communities. As a component of a broader environmental, social and governance (ESG) effort, shortening and localizing supply chains can be an innovative and productive form of community engagement that may provide enduring and positive growth opportunities. This style of collaboration has been a cornerstone of the International Council on

(continued on page 18)

President's Page: There are five keys to success for mining companies

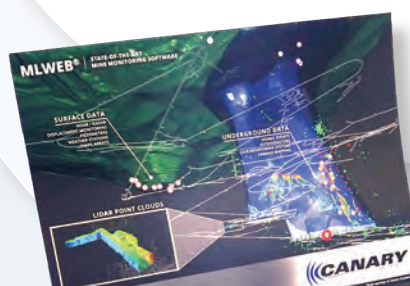
(continued from page 6)

Mining and Metals (ICMM) members' response to the pandemic. SME became an association member of ICMM in the past year.

There is clear consensus that mining and mineral resources are integral to establishing a sustainable society of the future. However, for success, it will be the company that can adopt a culture and business approach that include five important components:

- Access to resources — There will be a need to venture into frontier areas, whether in remote locations on surface, sub-sea, ultra-deep earth or in space to access the raw materials required by a decarbonized, sustainable society.
- Innovation in discovery, mining, processing and waste handling — New technologies will be needed to find mineral deposits, to extract them with minimal disruption to the ecosystem, to recover all of the useful components of the deposit, and ultimately, to responsibly handle the waste products, if any. The ideal mine of the future will process an ore deposit using all of the component minerals and leave zero waste.
- Evolving workforce — Deploying new technologies and business models will require mining employees to possess new skills, as companies revamp the workforce of the future.
- Flexibility and balance will be required as some mines will be largely automated with a minimal workforce, while other mines will need to be conscious of host communities desiring an optimized workforce.
- Social contract — Creating new business models that deploy real and sustainable benefits for communities near mines will be key for successful projects before, during and after closure. The way new mines interact with other industries and agriculture and the use, treatment and budgeting of water, land and air resources are components of the contract.
- Finance and economics — Innovative and alternative financing instruments, better feasibility and economic modeling and risk-mitigation alternatives, such as joint ventures, consortia and production service agreements, will become more common for capital-intensive projects, especially in challenging locations.

See Mining Engineering's featured advertiser in the February 2021 calendar



Canary Systems has developed 3D enabled browser-based solutions capable of digesting all data produced by mine monitoring systems, and combined it into a powerful, comprehensive, and flexible interface accessible anywhere.

The groundbreaking three-dimensional capabilities add a whole new perspective to monitoring for your mining operation, making risk management easier and more accessible than ever.

Featured advertiser:

Canary Systems, Inc.
2010 N. Forbes Road, Suite 102
Tucson, AZ 85745 USA
Phone: (603) 526-9800 Ext. 3
Email: info@canarysystems.com • Web: www.canarysystems.com

Mining
engineering

OFFICIAL PUBLICATION OF SME

It is evident from research and publications, as well as in statements by business leaders, that the mining and underground construction industries are making huge efforts to implement all of these drivers for future success. In an unexpected way, the dislocations caused by the social and business disruption of 2020 have accelerated efforts in all of these areas. As daily life moves back to a new normalcy, we need to remember what PwC said about mining as resourceful and resilient. As we continue innovation and improvement in the areas of operational and ESG technologies, mining and underground construction will be the standard bearer of a trusted industry in the next century.

Things are improving. ■

Mining and the BIG compromise coming under a new administration



Robert W. Schafer
2020 SME President

All expectations suggest that the coming year will be a marked improvement over 2020, socially and economically. Assuming those in control will eventually figure out the logistics of vaccinating the world ... twice, the global health and business disruption of the past year will give way to a bounce-back and vibrant economy for which new leadership in Washington will likely take full credit. The agenda of the Biden administration leading to a decarbonization of the economy and transformation of the energy, transportation, manufacturing and consumer sectors will require new technologies, new infrastructure, new thinking and a lot of patience.

The specifics of energy plans from the Biden administration remain to be seen; however, there are indications that some sectors of the mining industry in the United States could and should thrive under this agenda. Many elements of its transformative plan to move away from all things carbon will require an immense increase in inputs of newly mined minerals and construction materials to achieve these ambitious goals. I believe that the transition will be rough and there will be some stark awakenings by the idealists ready to implement changes, who will then realize that some significant trade-offs will be required to reach their endgame. Care should be taken that there are few unintended consequences as well.

The development and maintenance of a decarbonized, electric economy has potential to be a renaissance opportunity for the mining and underground construction industries as we source the materials needed for all aspects of the transformation and participate in providing the infrastructure corridors and components consumed by a modern society. It will be very challenging for the government to promote sustainable electrical energy sources (wind, solar, hydro, nuclear, geothermal) and their transmission and energy storage (all of which require our products) without rejecting some of the demands of environmental preservationists. And despite the movement toward green energy, there will still be a need for coal within the energy mix for the foreseeable future.

Energy sustainability requires the development of large expanses of open spaces for wind and solar farms, the disruption of notable inland and coastal waterways for hydroelectric power and constructing safe, state-of-the-art

Safety Share: Experts agree that adults need 7-9 hours of sleep each night, yet approximately 35 percent of working adults do not get enough sleep. Fatigued workers are 70 percent more likely to be involved in accidents.

- Brain-imaging studies show that sleep deprivation activates areas associated with risky decision-making, while areas that control rational thinking are suppressed. Sleep-deprived workers may be making riskier decisions, ignoring the potential negative implications and taking gambles in scenarios in which the losses outweigh the benefits.
- Sleep deprivation can hinder the ability to work safely by significantly reducing reaction time, motor control, decision-making and situational awareness. Research shows that 10 days of six hours of sleep a night was all it takes to become as impaired in performance as going without sleep for 24 hours straight.
- Sleep deprivation also causes increased microsleep episodes. During microsleep, your brain becomes blind to the outside world and your decisive control of motor actions will momentarily cease.

To combat sleep deprivation, we need to change our mindsets about the importance of the quantity and quality of sleep we need. In other words, sleep needs to be a high priority and essential actions need to be taken to treat it as such.

*Koretta Vault — EMCIS Program,
Colorado School of Mines*

nuclear power facilities to achieve zero-carbon energy across society.

That will be the political rub. How will the Biden administration promote the mega-developments of a clean-energy economy while simultaneously encouraging governmental regulatory agencies to tighten environmental oversight and deny development permits in areas preservationists consider off limits to keep Biden's constituency happy? All the while the new administration collectively knows it needs to

(continued on page 18)

President's Page: Mining and the coming compromise

(continued from page 6)

satisfy the demands for goods and services and advance the values and comforts of first-world societies to maintain its leadership position in future elections.

That is the BIG compromise that is coming as the government and the media explain that responsible and properly managed mining and development are necessities to achieve a utopian world of zero waste and clean energy. For the government and interest groups to communicate this new message to a populace that for decades has heard only of "big, bad mining" will challenge credibility. But, as an industry, we need to show, do and say the right things to alter this perception.

As I move into my last few weeks in this SME leadership role, I must say that it has been interesting, enjoyable and not what I expected.

We learned and accomplished much by taking on new communications technologies to hold virtual meetings and conferences. We may have had more communications with SME sections and new members than ever before as a result of these technologies. We now have a new SME website up and functioning well. We moved forward in communicating the science and engineering of mine waste management with new collaborative publications and conferences coming in 2021. More scholarship funding was presented by both WAAIME and the SME Foundation than ever before.

Most of all, this year I learned and appreciate more than ever, the dedication and creativity of the SME membership and SME staff as together we all took measures to preserve and enhance the benefits

and value of this organization. Thanks very much to all of you.

One final comment, I encourage all of you to support SME by registering for our first virtual annual convention, the MINEXCHANGE SME 2021 Annual Conference & Expo during the first week of March. The advantages of never missing an important presentation, the ability to connect with your friends and industry peers and doing it at times of your own convenience largely offsets face-to-face networking that will be missed. If you have never attended, this year's virtual MINEXCHANGE 2021 SME Annual Conference & Expo is a great event to gain all the benefits and save on travel costs.

Let's all have a safe, healthy and productive 2021 as we participate in the bright future of mining and underground construction. ■

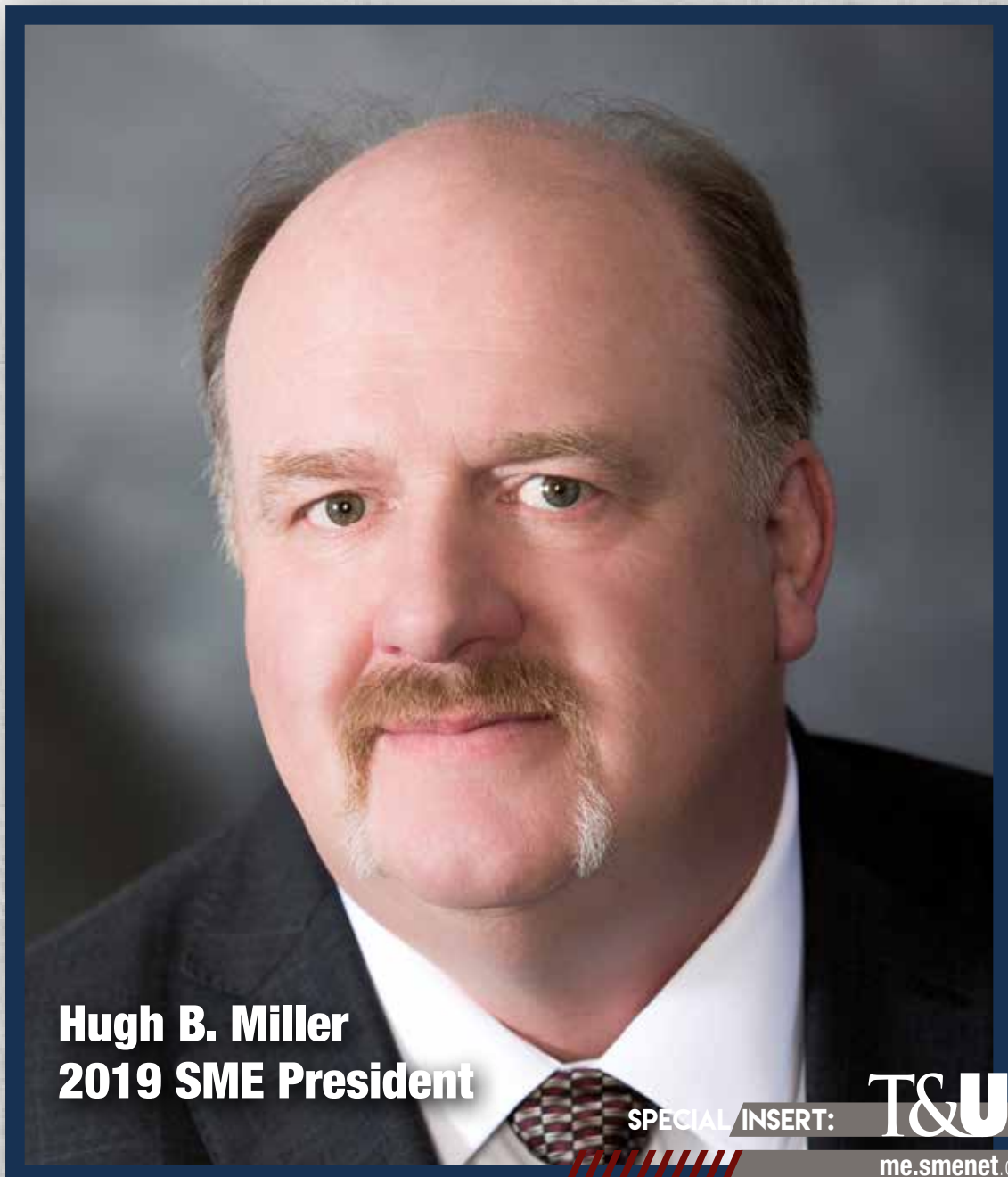
SMEF
half page

Mining

engineering

OFFICIAL PUBLICATION OF SME

March 2019
VOL. 71 NO. 3



Hugh B. Miller
2019 SME President

SPECIAL INSERT:

T&UC

me.smenet.org

Hugh B. Miller;

An interview with the 2019 SME President



Tell us how you got involved in mining?

I was first exposed to mining at a young age, as a consequence of my dad and his passion for the industry and rock collecting. Even though he graduated with a degree in mining engineering from Washington State University, my dad spent most of his career working as a structural engineer for the Boeing Company. At the time, Boeing supported a range of employee activities and clubs, including one devoted to mineral prospecting, small-scale dredging and rock hounding. My dad was extremely active in the Prospectors Club, where as a family, we spent a good part of my youth tramping around the Pacific Northwest digging for mineral specimens and panning for gemstones and gold. On my mother's side of the family, I had relatives that mined in Dawson City and Fairbanks, AK which left a family legacy of sorts. I loved the stories that my dad and a close buddy of his, who was a geologist, would tell about various operations and towns, as well as the wild times at the annual Northwest Mining Association (NWMA) meeting

in Spokane, WA. My first recollection of ever being at a commercial operation was during a tour of the Bunker Hill Mine with my dad when I was 7 or 8 years old; this had to have been shortly before the May 1972 fire at Sunshine. That visit of the mine and processing facilities made a permanent impression on me. While I always knew there was something special about the Silver Valley, I began to understand why. To this day, I still get the same feeling when I visit historic mining districts like Leadville, Morenci, Virginia City, Butte, Silverton and Barkerville. During our summer excursions to Helena, MT to dig sapphires, we would usually make visits to Butte and watch mine operations inside the Berkley Pit and surface activities at the Kelly and Mountain Con. In high school, I did well in math and science and began entertaining thoughts of pursuing a degree in engineering. Above all, I wanted to go to a college in the West that had a good academic reputation, where I could also play football. As a 6-ft, 190-lb nose guard, my options for a Division I scholarship were pretty slim, and there weren't that many technical schools in the Northwest that were Division II that offered athletic scholarships. As fate would have it, I was unexpectedly contacted by Marv Kay, a legendary coach at the Colorado School of Mines (CSM), and was recruited to play ball. Fortunately, I had a couple of high school friends who were already attending CSM, and I had just secured a summer internship with Asamera Minerals in Wenatchee, WA. It was as if all the stars had aligned, and, with the support of my parents, I made the decision to attend Mines. Despite the stress of getting through CSM during a period when the mining industry was in free-fall, it was a great decision to attend Mines, and I'm thankful for all the opportunities, friendships, and faculty mentoring I received as a student.

How about your involvement with SME?

I was introduced to SME as a student in the mid-1980s. At the time, the CSM Student Chapter resembled a social club for students within the mining department and was the central organization responsible for hosting most departmental events, like BBQs, parties and alumni functions. It was also the driver for numerous student activities, like tours of local mines, events at the Edgar Experimental Mine, E-Days, the student mining competitions and competing in intermural athletics. It was a really tight group, where there was a special bond that brought students together and connected them

to the faculty. As a student, I had the opportunity to attend several SME Annual Meetings and the occasional section meeting in Denver. I can't overemphasize how important being able to attend these meetings was to my professional development, particularly the opportunity to meet and interact with professionals from industry. Funding for most of these conferences and trips usually came from the generosity of alumni or directly out of the pockets of faculty. As broke students, it was something we truly appreciated. As a consequence, providing student support to attend these types of events is a practice I've tried to continue throughout my career.

After I graduated with my undergraduate degree, I had the good fortune of working for Paul Jones on an exploration and rehab project

of a small underground mine in Colorado. Paul was truly the consummate professional who deliberately took an active role in mentoring dozens of young engineers and geologists who were lucky enough to work for him. I still remember that, during the job interview, which took place in Paul's living room, he asked what professional and civic organizations I belonged to outside of school. I mumbled something about the SME Student Chapter, at which point he strongly suggested that all young engineers should belong to at least one professional organization, because it was important for networking, keeping current with what was happening in the industry, and being part of the profession. He also emphasized the importance of belonging to a civic group that gives back to the local community. Thinking these suggestions

Miller brings a wealth of experience from academia and operations

Hugh B. Miller is an associate professor in the Mining Engineering Department at the Colorado School of Mines (CSM), where he teaches courses and conducts research in a variety of subjects including mine design and operations, project feasibility, occupational safety and hydro-excavation. Miller also serves as the research director for the CSM Energy, Mining and Construction Industry Safety Program (EMCIS). While at CSM, Miller has also served as the interim department chair for mining engineering, as a representative on the Faculty Senate, and on numerous committees associated with student activities, institutional governance and departmental operations. Before joining CSM in 2005, Miller spent six years teaching at the University of Arizona, Mining & Geological Engineering Department, where he served as the director of the San Xavier Mining Laboratory and co-director of the International Center for Mine Health, Safety and Environment. Prior to entering academia, Miller worked for 13 years for several mining and engineering companies in capacities ranging from operations to management, including four years as director of operations for International Engineering

Technology Inc. (IET). While at IET, he oversaw a range of projects related to equipment development and technologies associated with underground mining, civil-construction and drilling systems. Through his career, he has served on the boards of numerous companies and professional organizations and regularly consults in the technical and economic evaluation of mines and mineral resources, as well as the integration of new technologies and equipment in mining and excavation. Miller currently serves as a technical advisor for RAMAX Ltd. and is extremely active in several professional and civic organizations.

Miller was first introduced to SME as a student at CSM and became an active member of the Mining & Exploration (M&E) Division in the mid-1990s. Within SME, he has held every leadership position in the M&E Division at least once, has served as a member of the SME Board of Directors (2012-2015), and has chaired numerous committees, including the Health & Safety Committee, the Educational Sustainability Committee and Academic Grant/Fellowship Selection Committee. He has also been the program chair for two national SME conferences — SME Annual Meeting (2009) and SME/CIM Safety Management & Systems

Reliability (2012). Miller has served on the Finance Strategic Committee, as an associate editor for the peer review editorial board and as the faculty advisor for SME Student Chapters at both CSM and UofA.

While in academia, he has received a combined 15 teaching and mentoring awards while working at two different universities. He received the SME Presidential Citation in 2015 and the SME M&E Division Distinguished Service Award in 2011. Miller was inducted as a SME Distinguished Member in 2012 and received the AIME/SME Mineral Industry Education Award and the AIME Honorary Member Award in 2017. In December 2018, he received the Medal of Merit from the American Mining Hall of Fame at the annual meeting of the Mining Foundation of the Southwest.

Miller received his undergraduate and graduate degrees from the Colorado School of Mines and is a registered Qualified Person for Mining and Mineral Resource Estimation by MMSA.

Hugh and his wife, Nadia, a petroleum engineer, have been married 31 years and live in Golden, CO. They have two sons, Matt and Jerry, who are both mining engineers and work for Southwest Energy and Intrepid Potash, respectively. ■

were more of requisite for the job than advice, I quickly joined SME and NWMA. With regard to the service organization, I think Paul signed me up for the Kiwanis Club before I even knew what the Kiwanis Club was. Ironically, nearly 30 years later, I still belong to all three organizations.

As a young engineer, I presented a few papers at a couple of SME conferences and chaired a session on underground mining at the 1998 Orlando, FL meeting but wasn't really engaged in a division or local section. When I left industry to join the University of Arizona (UofA) as an assistant professor in 1999, Kadri Dagdelen and Don Gentry invited me to attend an M&E Division Executive meeting at the 2000 Annual Meeting in Salt Lake City, UT. I couldn't believe how welcoming, energetic and committed the entire group was. Paul was right. I could see definite value associated with belonging to a professional organization like SME and knew that I wanted to be part of it. I soon began the leadership progression within the M&E Division and got involved in a host of other committees. While at UofA, I also began attending Tucson Local Section meetings and really enjoyed it. It was a great way to meet people working in the area and develop relationships with the local mines, consulting groups and suppliers. In addition, the section generously provided much needed support for the students and the mining program. Over the years, I've had the privilege of working with SME staff and some exceptional people on the programming of two conferences and on several SME initiatives. In time, I had the honor of serving on the SME Board of Directors. As I look back to how I initially got involved in SME, I find it rewarding that many of the people I met during that first M&E Division meeting in Utah nearly 20 years ago I now consider close friends. Over the years, I've had the pleasure of meeting people and forging life-long relationships that I probably would never have had if not as a consequence of serving in the Society. For me, the networking opportunities and the ability to serve with some truly outstanding people were primary incentives for getting involved. In addition, the technology is pretty cool too.

What are your thoughts on the health of SME?

As a consequence of prudent planning and wise fiscal management by SME leadership and staff, the overall health of the Society is excellent. While membership has dropped slightly over the last year (-3.5 percent), SME incurred an operating surplus of \$117,000 on total revenues of more than \$9.7 million. The balance sheet is fundamentally sound with total assets of \$40.6

million. In an effort to continue to provide high-quality benefits and value for members while managing expenses, several recent past presidents of the Society, along with the current and in-coming presidents and SME staff, have been meeting on a regular basis to explore opportunities to improve the health and welfare of the organization. Instead of pursuing ways to reduce costs by facilitating cuts in programs, the focus has been placed on how we can expand our offerings of products and services in order to increase revenues and encourage member growth. These efforts will continue this coming year and will be fully integrated into the Society's next strategic plan that begins this spring.

Despite volatility in commodity markets and the political environment in North America, SME has done well as compared to its sister professional societies in weathering these challenges. That said, there are always opportunities for improvement and challenges that the Society must address due to the changing needs of the membership and the industries that it serves. Given the opportunities for growth and new collaborations, the Society strives to be strategic in evaluating these opportunities relative to the potential benefits to our diverse membership and alignment with our established set of core values and objectives. This is one of the strengths of the Society and an approach that has worked extremely well.

One of the major contributing factors for the continued success of SME over the last decade is its outstanding executive director, Dave Kanagy, and the tremendous contributions of a very dedicated and truly talented staff. They are simply the best. And I have the utmost respect for their skills and abilities, as well as commitment to the Society. SME has also greatly benefited from exceptional leadership by past presidents and individuals serving on the Board, Foundation, strategic committees and the divisions. The success of the Society is solely dependent upon the contributions of countless volunteers and it constantly amazes me how well everything works given the breadth of the organization.

What are your SME goals?

One of the strengths of SME has been our ability to develop and execute strategy. In 2015, SME developed a strategic plan that has served as the guide for the last four presidents and boards. While any given president might implement initiatives to address specific issues of personal interest, perceived importance to the membership, or in reaction to opportunities or threats to the Society, these initiatives are usually minor in comparison to the vision, mission,

values and goals outlined in the strategic plan. This consistency allows the Society to operate efficiently with incremental improvements toward specific goals without wholesale changes that could potentially occur during each presidential term. In 2019, we begin the process of developing the next strategic plan for the Society, which will be implemented in 2020 under Bob Schafer's term as president. Given the importance associated with this new strategic plan, the SME goals for 2019 will focus heavily on the development of the plan and the continued emphasis of the goals and initiatives advanced by Barb Arnold (2018), John Mansanti (2017), Tim Arnold (2016) and J. Steven Gardner (2015).

During John's term as SME president, he developed an acronym that emphasized areas that directly supported the three identified SME values; (1) member first, (2) professional excellence and (3) innovation. The acronym John developed was H-E-L-P-S, which defined the goals of his term.

H - Health of the Society
E - Educational Sustainability
L - Local Sections
P - Public Perception
S - Safety

Last year, Barb added the letter "I" to the list to represent innovation. Each of these letters translated to program objectives, where we've made significant strides in each. As I indicated, we will continue to work on each of these initiatives in 2019. Particular emphasis will be placed on improving the website and how the membership interfaces with the Society, strategic growth in membership, which is critical for sustaining high-value programs and controlling costs, and looking at innovative ways to increase revenues through additional member services and products, including conferences, webinars, short courses and publications. The THRIVE conference initiated by Barb last year is an excellent example. With an all new program slated for this fall, THRIVE19 will be held in conjunction with the SME midyear meeting in Vail, CO in early October. Major achievements of last year were the launch of the *Mining, Metallurgy & Exploration* journal and the certification program for mining safety (CMSP). Efforts to foster growth and continue the success of these programs are priorities for the coming year. Another priority is the continued support of local sections, providing the resources and assistance necessary for them to meet their own strategic objectives and better serve their members.

The SME Foundation has done an incredible job raising the resources necessary to fund a wide range of important programs central to the mission of the Society, including ABET, professional engineering, MEC, Move Mining, the Scouting Merit Badge, and a host of scholarships. These many scholarships includes the Ph.D. Fellowship and Career Development Grants that have been instrumental in developing new faculty for academic degree programs in mining and mineral processing and keeping these programs sustainable. A goal in 2019 will be to continue to assist the Foundation in raising the needed resources to sustain these key programs.

The success of SME as a whole can be gauged by the health of its individual divisions. While SME has generally done a good job in providing assistance and maintaining communication with each of these divisions, more can be done. As part of the strategic planning process, the individual needs, wants and challenges of each division will be better identified, where tangible recommendations for making substantive improvements can be made. Several ad-hoc committees are being formed to collect information and provided recommendations regarding a number opportunities, including the realignment of responsibilities associated with specific committees to eliminate possible gaps and areas of overlaps, making the award nomination process more inclusive and transparent, and the introduction of some new products and standards that should appeal to many Society members.

Any closing thoughts?

Yes, I have a couple of final thoughts I'd like to share. A wise, old farmer I used to work for as a kid used to say, success in life is largely about showing up. Like most stuff, the more you put into something, the more you generally get out of it. I would like to encourage everyone in the Society to get involved in whatever capacity fits your interest, time and passion. As a volunteer organization with an incredible range of programs and activities, there should be something for everyone. Participate in something that you'll find rewarding. Getting involved is easy and straightforward, show up at a division or section meeting or contact the chair of a committee and simply indicate your interest.

Lastly, I want to thank everyone for this opportunity to share my thoughts on SME. It's a truly an outstanding organization and I feel privileged to be serving as the 2019 president. I look forward to an exciting year full of great opportunities and challenges. Take care, be safe and tap'er light. ■

Effecting change: The ongoing fight to improve the public perception of mining



Hugh B. Miller
2019 SME President

During John Marsden's term as SME president, I remember sitting in a large conference room at the 2014 midyear meeting in Scottsdale, AZ while the SME board of directors discussed the goals and objectives for the Society's new 2015 Strategic Plan. The results of a survey compiled by a facilitator listed the public perception of mining among the top concerns of the membership. While this wasn't a surprise to most everyone in the room since the topic had been part of the strategic agenda of every SME president as far back as I could remember, it prompted intense debate on what initiatives the Society should pursue in order "to move the needle." It also made me wonder what the true impact of these collective efforts has been over the years and whether it has resulted in quantifiable improvement on the public's view of mining.

Since the implementation of that 2015 Strategic Plan, the last four SME presidents, along with countless volunteers within the Society, have devoted considerable time and resources toward this pursuit. As many of you are aware, we begin the process of developing the new 2020 Strategic Plan this year. In an effort to gather data and member feedback, interviews with several focus groups took place during the SME Annual Conference & Expo in Denver, CO, Feb. 24-27. Ironically, preliminary results from these interviews have shown that public perception is still deemed a major priority for the membership. As a consequence, the question now becomes — what new initiatives should the Society pursue, if any, given our current economic, social and political reach as the leading global professional organization in mining and mineral resource development?

The challenges associated with the public perception of mining are not just U.S. centric. This is an issue that resonates throughout the developed world. I once heard a presentation from an economist at The World Bank who hypothesized that mineral resource policy is often adversely affected in countries with mature, service-based economies because of the lack of direct interaction between consumers and the production of raw materials on which these consumers are ultimately dependent. I

Safety share: There are more than 10 million motor vehicle accidents in the United States annually. On average, these accidents account for a minimum of 2.5 million injuries and nearly 40,000 deaths. This translates to a staggering 110 fatalities everyday — one person being killed every 14 minutes. A significant percentage of these accidents are attributed to impaired drivers, which, in addition to drugs and alcohol includes individuals suffering from sleep deprivation and mental fatigue. (National Highway Traffic Safety Administration & U.S. Census Bureau, Statistical Abstracts). Driving to and from work is the most hazardous aspect of our profession. Remember: There is No Substitute for Sleep. If you feel tired and drowsy, pull off somewhere safe and sleep or simply let someone else drive.

believe this to be true. I was once seated next to a young woman in her thirties on a long flight from Los Angeles to Tokyo, Japan. She was from someplace on the East Coast of the United States and worked as a clothing buyer for a major department store chain. As part of the obligatory small talk that takes place before everyone puts on their headphones, she asked me what I did for a living. As soon as I said that I was a mining engineer, you could see a mask of confusion cross her face. Her next question floored me. "You mean we still mine?" After diplomatically asking her where she thought the materials came from for the airplane we were riding in, as well as her laptop, cell phone, jewelry and makeup, she indicated that she had never thought about it before. And that's the inherent problem — the general public has little to no concept of what's required to sustain the high standard of living and quality of life we currently enjoy. Electricity comes from the light switch, food comes from the grocery store, lumber comes from Home Depot and consumer products come from Amazon.

It is often said the mining industry does a great job of advocating the merits of our industry to those who are already in the business, or, as Steve Gardner has eloquently put it, we're good at "preaching to the choir." I used to love

(Continued on page 14)



President's Page: Changing their perception of mining is an ongoing fight

(Continued from page 6)

hearing the coal spots during the Colorado Rockies baseball games sponsored by the Colorado Mining Association. They were professionally done and conveyed an extremely positive message for the industry. Unfortunately, they were also very expensive. While this approach has been effective in achieving specific objectives on a regional basis (such as permitting a property or opposing a piece of legislation), the challenge of trying to change the general public image of mining to a national audience through advertising on radio, television and print media is simply cost prohibitive for professional organizations like SME to even consider. Furthermore, how does one assess whether these efforts are successful in achieving their intended objective?

The other key consideration is

that a single accident or incident that becomes widely publicized anywhere on the globe can effectively erode any public goodwill developed from these advertising campaigns and further galvanize negative perceptions of mining, regardless of the regulatory environment or type of operation under which the event occurred. As such, it seems prudent for the Society to continue its focus on efforts that support activities where there is a proven track record of success, like K-12 teacher education. MEC, along with several state mining associations, universities and other mining organizations, has done an excellent job in providing educational materials, teaching plans and teacher instruction in support of elementary and secondary education. In addition, SME has truly been innovative in its approach toward engaging the public through the use of social media and

youth activities, including initiatives like Move Mining, Move Mining-The Next Gen, EngineerGirl and

the Boy Scout merit badge. Other important contributions to community education and public outreach stem from the efforts of local sections, the student chapters and individual members in our Society.

Over time, the combination of these activities has had a definite impact on how the public perceives mining, regardless of our ability to directly quantify it or not. As Tim Arnold recently told me, we might not be able to change the public perception of mining but we can certainly influence it. I totally agree with Tim's assessment — we are in this for the long run. We need to continue to fight contemporary perceptions of the industry and explore innovative, cost efficient ways to engage the public. As a continuation of this discussion, a future article will address special interest and activist groups that are opposed to mining and the role they play in this complex issue. If you have a good idea or suggestion how to positively improve the public image of mining, we'd love to hear from you, but be prepared to get involved.

Take care and be safe. ■



Vale: Markets react to suspensions

(Continued from page 10)

balanced.

"These closures were not expected. A continuation of iron ore supply issues in Brazil, combined with improvements in Chinese demand due to tighter steel markets and an expected VAT cut starting in April, should lead to a prolonged period of high iron ore prices," said Christopher LeFemina, an analyst at Jefferies, told the *Financial Times*. "A supply response from other miners will be limited as Rio Tinto, BHP and Fortescue are all basically operating full out, Chinese mine production growth will be constrained by environmental issues as the government continues to crack down on pollution Indian iron ore is low quality, and miners elsewhere have very little ability to meaningfully increase production."

Analysts had been forecasting a 50-Mt (55-million st) net reduction in Vale's output this year, which equates to 3-4 percent of the global seaborne iron ore market. The company expects to make up some of lost production from its mines in the north of the country. ■

Get involved and make a difference: Submit your nominations for SME leadership and awards



Hugh B. Miller
2019 SME President

Like most volunteer organizations, the lifeblood of our Society resides in the countless individuals who generously contribute their time and resources toward advancing the objectives of SME and making a positive impact on the industries we serve.

One of the inherent strengths of our Society is the diversity of its membership. This is also reflected in the volunteer leadership of the organization, which varies in terms of cultural backgrounds, individual talents and professional disciplines, and personal interests. Given the incredible range of programs and activities within the Society, it's

fortunate that we have such a varied group of members willing to step up and serve in these important leadership roles.

While most volunteers will never receive the accolades they truly deserve, there are tangible benefits to serving on an SME Strategic Committee or participating in the leadership of a section or division. Volunteers in these leadership roles usually find it rewarding to work and interact with other motivated professionals to achieve common goals for the betterment of the Society, its membership and the profession. The personal satisfaction of believing you are making a positive impact to the industry and creating value for others is a powerful motivating factor for many. Other perks often associated with participation include the acquisition of new professional skill-sets, engaging in a wide range of networking opportunities, or simply the ability to learn and get exposed to new technologies and processes.

In this regard, SME is currently looking for the next group of exceptional leaders to serve on strategic committees, the board of directors and as the 2022 SME president. The nomination process is relatively painless and straightforward. It begins in April of each year with a formal solicitation to the general SME membership for nominations. Members are strongly encouraged to nominate individuals whom they believe have the skills and abilities to contribute to these leadership positions and are motivated to roll up their sleeves and get involved. This might include people who have impressed you by their willingness to volunteer to do the

Safety share: According to the American Academy of Orthopedic Surgeons, every year nearly 500,000 people are treated for ladder-related injuries, and approximately 300 of these incidents prove to be fatal (www.ishn.com). A wealth of information can be readily found on the web on ladder safety, including how to correctly select and use the appropriate ladder for any given application. There are a few basic precautions, however, that greatly reduce the potential hazards associated with ladder use. While most of these precautions should be intuitive, it's important to take time to think through the task and what you're planning on doing before you actually do it. These precautions include:

- Use the right type of ladder with the correct rating for the specific application.
- Keep the ladder clean and in good working condition.
- Use the appropriate angle (~75 degrees: 4 ft vertical for each foot away from the wall).
- Don't ever stand on the top two rungs, and don't over extend when reaching .
- When climbing or descending, always face the ladder and use three points of contact.
- Make sure the ladder footing is on stable, level ground.
- Be careful of electrical lines and power sources.

These relatively simple safeguards can protect you from serious injury.

heavy lifting in a committee, or the achievers who often work behind the scenes to ensure that things get done and are successful. If you feel that you possess these types of traits and are motivated to participate, please nominate yourself. Nominations for the five Strategic Committees (Finance, Education & Professional Development, Outreach, Structure & Governance and Products & Services), the Audit Committee, the Education Grant Selection Committee, the 2021-2024 Board of Directors, and the 2022 SME President can be made by emailing Genny Homyack at homyack@smenet.org. Please include the name of the nominee,

(Continued on page 14)



President's Page: Now is the time to get more involved with your Society

(Continued from page 6)

the position for which they are being nominated, and their contact information with this email. Homyack will then reach out to these nominees to request additional information (photo, brief bio, résumé and concise summary) and confirm that each candidate nominated is, in fact, interested in serving.

The nomination process will close on July 1. After the close of nominations, SME staff will vet each nominee for eligibility (the requirements for each position can be found on the SME website) and organize the candidate information in a standardized format. Once the information for all the nominees has been compiled, it is forwarded to the Strategic Nominating Committee for review. Members of this committee then meet at the SME midyear meeting to discuss and evaluate each individual candidate relative to their nominated position. The committee

is comprised of members representing the general SME membership, the two outgoing board members and the incoming SME president. Having served on this committee a couple of times, I know it is a difficult and time consuming process. The successful candidates will be contacted by SME staff and then formally announced at the following SME Annual Conference. It is important to note that lobbying members of the Nomination Committee is strictly prohibited and all discussions within the committee are considered confidential. Once nominated, the nominee stays eligible in the system for three years.

It's also important to note that the nomination of SME, AIME, SMEF and division awards run concurrent with the nominations for the SME leadership positions. A listing of the Society's awards can be found on the SME website under the Membership tab. You should also receive several notices on how

to nominate someone for an award by email, on the SME Community and in *Mining Engineering*. Please remember the nomination process for most of the awards closes on June 1. This is a great opportunity to publically recognize the tremendous accomplishments and achievements of so many of our members and to honor the legacy they have established. Please give serious consideration to nominating individuals that have made a positive impact on you, the Society, and/or the industry. Again, this is the good stuff.

As I've indicated previously, I would like to encourage everyone to get involved in whatever capacity fits your interest, time and expertise. As an organization, SME has an incredible range of programs and activities, where there should be something that everyone can find personally rewarding. The local Sections are a great place to start. Take care and be safe. ■

Mining program returning to Michigan Tech; Mining engineering program was the first department at the school

MICHIGAN Technological University announced that it is reviving its mining engineering program.

The Mining Engineering Department was the first department established at the school in 1885 when the school was formed as the Michigan Mining School. However, the program was suspended in 2004 because of shrinking faculty and enrollment.

"At the time it was suspended, it was a real slap in the face to the history of Michigan Tech," John Gierke, chairman of Michigan Tech's Department of Geological & Mining Engineering & Sciences (GMES) told the *Daily Mining Gazette*.

The outcry was immediate, and the process to bring back the mining engineering program began and the mining engineering bachelor's degree will return to Michigan Tech this summer.

The proposal to restore the program has been approved by the

Tech Senate and the administration.

On the wane in the late 1990s, the program had been moved under the umbrella of the Geological Engineering Department in "something of a forced marriage," Gierke said.

At the time it was discontinued, the program had four faculty and a handful of students. At the time it was eliminated in spring 2004, no mining engineering courses had been scheduled for the next year.

Soon after Glenn Mroz became university president in 2004, talks to reinstate the program began, both within GMES and with a panel of industry members and academics.

A report with recommendations for a new program was submitted in 2013. Two faculty members came on board.

Assistant professor Snehamoy Chatterjee has stayed with the university. The other eventually left but was replaced this year with lecturer Nathan Manser, an alumnus of the

program.

With faculty in place, the department finalized the proposal and submitted it this year.

Rather than resurrect the 15-year-old curriculum, they started from scratch in devising the curriculum, taking department and university strengths into consideration, Chatterjee said.

With the requirements in accreditation for mining programs, it wound up overlapping with the old program by about 80 percent, Chatterjee said.

Five students are expected in the program for this fall, including three current Michigan Tech students switching their majors.

With a full year for recruiting students, enrollment could double next year, Gierke said. Within three or four years, he thinks, they could have 20. ■

Remembering Sunshine: Lessons learned continue to shape the mining industry



Hugh B. Miller
2019 SME President

It's been an extremely hectic few months since the SME Annual Conference & Expo in which I've had the honor of representing the Society during visits to several local sections and a host of technical conferences. As with most professional functions, the best part of this experience has been the ability to meet and develop personal relationships with a wide range of people from different industry sectors around the globe, many of whom possess ideas, expertise and insights that are very different from my own.

As I started drafting the outline of this column, I had intended to focus on intellectual property and the impact that theft and piracy has had on research and technology development. This was a topic of discussion at a meeting last month for engineering professional societies on Capitol Hill. I found the talk both fascinating and disturbing, particularly given how pervasive the practice is and the magnitude of its global economic impact. While thinking through the subject, I began contemplating some of the conclusions a speaker recently made at the Canadian Institute of Mining Conference in Montreal a few weeks ago. The basic premise of his talk was that most mining companies are inherently risk adverse, where the motivation for implementing new technologies is rarely financial, but instead the product of external factors that force companies to examine alternatives to the way they normally operate due to some perceived or emerging threat. In crafting support for this premise, the speaker elegantly weaved his argument around issues such as shortages in skilled labor, the exploitation of lower grade and more complex deposits, and the promulgation of new environmental regulations. While I found elements of the talk thought-provoking, the thing that really bothered me was that he didn't address the impact of occupational safety and health as a major driver in process or technical innovation.

To many mining professionals of my age or older, the Sunshine Mine fire serves as a stark reminder to the way things were and how far the industry has come. The Sunshine Mine is

Safety share: Heat stress is often overlooked and can result in a range of disorders including heat stroke, exhaustion, cramps or rashes. Heat can also increase the risk of injuries due to accidents as a consequence of physiological responses to elevated temperatures, such as dizziness, lack of mental awareness, or the ability to concentrate. For mining operations, the prevention of heat stress in workers is imperative. Employers should provide training to all their workers so they understand what heat stress is, how it affects their health and safety, and how it can be prevented. Individuals at greater risk for heat stress include those who are 65 years of age or older, are overweight, have heart disease or high blood pressure, or take certain medications that may increase their susceptibility to be affected by elevated temperatures. Heat-related illness can affect anyone not used to hot weather, especially when it's combined with high humidity. Responses to heat stress and related illnesses are dependent upon the victim's symptoms. These can range from moving the victim into the shade in a sitting position and providing cool water to calling for emergency medical help. Learn the symptoms and what to do. There are numerous resources available on the web, including those by the National Safety Council and CDC NIOSH.

located east of Kellogg, ID and was the largest underground silver mine in North America for decades. Highly dependent on skilled miners using labor-intensive stoping techniques in steeply dipping narrow veins, the "Shine" was the crown jewel of the Silver Valley. On May 2, 1972, a series of tragic mistakes, poor judgement and deficient management practices contributed to the worst hardrock mining disaster in modern U.S. history, where 91 miners died from carbon monoxide poisoning and smoke inhalation. The cause of the fire is a matter of some debate but evidence indicates that it originated in a stoped out section of the mine that had likely been smoldering/burning for a long period of time before attempts to evacuate the mine began. While the list of contributing factors for the accident is very long, each factor has translated in some way to significant changes in the processes, design,

(Continued on page 17)

President's Page: Lessons learned from the Sunshine Mine

(Continued from page 6)

technology and training common to all in U.S. underground metal/nonmetal mines today. Paramount among these was the promulgation of the 1977 Federal Mine Safety and Health Act and the development of a prescriptive structure of regulations and regulatory oversight intended to facilitate minimum standards of compliance for safety and health at the nation's operating mines. Through these regulations, the Sunshine disaster led to major improvements and innovations related to miner training, employee workplace tracking, personal protective equipment, ventilation and gas monitoring, emergency response procedures and escape ways, refuge chambers, mine rescue practices and equipment, internal shaft design and operations, and hoistman training, just to name a few. Most importantly, it changed the mindset of the entire hardrock industry and the way safety was viewed. The old belief that fire represented an insignificant hazard to modern underground metal mines under the long-time adage "what can burn in a hardrock mine" changed overnight. In addition to fire, a similar transformation occurred relative

to other potential hazards, where companies began reevaluating their operations relative to perceived risks, however minor. The creation of strict liability associated with the Safety Act further encouraged this change by transferring responsibility, and ultimately culpability, for accidents from the miner to the company. This translated into a new safety ethic where everyone in the company became accountable for safety, regardless of status or title.

I remember early in my career as a summer intern, an old miner told me to "watch yourself because nobody else will." At the time, it was great advice, but it's fortunate that times have changed. Today, industry's commitment to employee safety is usually viewed as a non-negotiable value, where best practices now include risk management programs and a managerial commitment that far exceeds any minimum standard mandated by law or regulation.

While the Sunshine disaster represents just one of several notable accidents that have spurred the development of government regulations and the implementation of new processes and technologies

oriented toward safety, the influence of this single event on the operating environment today is unparalleled in the hardrock industry and can't be overstated. As we mark the 47th anniversary of the fire, most young mining professionals have little knowledge or appreciation of what occurred or the transformation that took place in the industry as a consequence of the disaster. Whenever possible, I try to include the lessons learned from Sunshine into several of my courses in hopes of promoting a deeper understanding of safety as a dynamic, proactive, and continuous process critical to the design and operations of every facet of our business. Elaine Cullen and her colleagues at NIOSH Mining did a truly outstanding job in the production of the video titled "You are my Sunshine." I use this video often as a starting point to facilitate discussion. If you haven't seen the video, I strongly encourage you to do so.

I appreciate the opportunity to share these thoughts. I wish you all the best and again, please don't hesitate to get involved in the Society in whatever capacity that you find interesting. Take care and be safe. ■

New tailings rules could be coming to Minnesota Legislators consider following Canadian safety guidelines

MINNESOTA STATE lawmakers are proposing new rules for tailings basins and dams that could add another hurdle before the state's first copper-nickel mines can go into production.

The *Star Tribune* reported that the state's administrative rules on metal mining have not been updated since they were written in 1993.

The new rules under consideration by legislators would require metal-mining storage structures to be designed to Canadian safety guidelines, with an independent panel of engineers approving the design. Companies would have to create an

operations manual for managing the tailings dams and submit to annual safety inspections.

It's too late in the 2019 legislature for action on the bills, but they have bipartisan support from eight members of the House and Senate and will be taken up in the fall.

Sen. Paul Anderson, R-Plymouth, chief author of the proposal in the Senate, called the proposal a conversation starter, but the state's Department of Natural Resources (DNR), which oversees mine permitting in Minnesota, is cool to the proposal in its current form.

DNR Assistant Commissioner Jess

Richards said the bill lacks definition in many areas "and includes language that would conflict with existing mining and dam safety laws."

"The DNR would be available to discuss dam safety in Minnesota," Richards said. "However, this sweeping proposal begins with a single solution, rather than a broad and inclusive conversation that involves the full range of affected stakeholders."

Frank Ongaro, executive director of the industry coalition Mining Minnesota, called the proposed rules unnecessary. The state's existing rules are thorough and comprehensive, he said. ■

Education sustainability: Understanding the threats to higher education



Hugh B. Miller
2019 SME President

Over the last decade, there have been a number of outstanding articles and commentary published in *Mining Engineering* that have discussed the significant challenges facing academic departments in mining engineering, economic geology, extractive metallurgy and mineral processing. In many cases, these challenges have translated into bona fide threats to the very existence of specific academic programs offering degrees in these mining-related subjects. Between 1982 and 2019, the number of universities offering accredited undergraduate degrees in mining engineering plunged from 25 to 13. Of the remaining programs, several are considered “at risk” due to low student enrollment, the high amortized cost per student, the limited number of core tenured/tenure-track faculty, and/or the loss of support by university administrators and program constituencies. Sadly, the latest casualty is the mining program at Southern Illinois University, whose last graduating class will receive their degrees in May 2020. That said, there has been some encouraging news from Michigan Tech, where efforts are currently underway to resurrect the mining program beginning next fall.

I’ve been asked on multiple occasions — why does the fate of these departments matter? I find this lack of understanding of the role that universities play in industry more than a bit disheartening. As some have pointed out, however, academic programs themselves may be partially to blame for this due to poor communication and limited engagement with their industry constituencies and alumni. As a consequence, I’ve decided to devote a couple of my president’s columns to focus on some of these daunting issues, including faculty scarcity, declining student enrollments and the changing nature of academia, as well as outline what SME is trying to do to address these challenges. These articles are not intended to serve as a platform to complain, criticize or be overly negative but, rather, provide a means of creating a better overall understanding of these threats and the basis for continuing dialog on how to mitigate them. This month’s article is intended

Safety share: Being aware of your surroundings can significantly reduce safety incidents. Be sure to follow the S.A.F.E Model of Safety DNA at your workplace: Stays in control, Aware of surroundings, Follows rules and Exhibits caution. To increase your awareness of your surroundings, always survey the area before performing any tasks. Here are a few tips to keep you safe:

- Before performing any task, think through it to make sure that you know the correct procedure and understand potential hazards.
- Ensure that all the safety features are in good working order before use.
- Prior to starting any task, communicate with co-workers on the work status and potential hazards.
- Look for hazards in your work area.
- Identify items that require lockout/tagout procedures.
- Make sure that you have enough space to perform your task.
- Be aware of your body position in relation to machinery, equipment and other objects.
- Be aware of equipment blind spots and communicate with equipment operators in your work area.

Submitted by Ali Lashgari

to “set the table” in terms of providing the foundation for upcoming discussions.

The ability to recruit quality employees is an important driver in the success of any company whose core business is heavily dependent upon skilled labor utilizing highly mechanized technology and working in dynamic operating environments. Nowhere is this truer than the mining industry, where economic viability extends beyond a good orebody and is usually the product of well-managed operations, sound engineering and geologic practice, and a highly trained and motivated workforce.

Unfortunately, the aging demographic of professionals in the mining industry is contributing to an attrition rate that has been outpacing the capacity to develop qualified replacements. When coupled with the shortage of midcareer mining professionals due to the

(Continued on page 14)



President's Page: Industry and academia can partner for solutions

(Continued from page 6)

as well as the steep decline in the number of new engineers graduating from U.S. academic programs, the resulting scarcity of young professionals represents a genuine threat to the mining industry. This is only further compounded by the long-term loss of degree-granting programs over the last 30 years.

Fortunately, most companies understand the importance of maintaining a critical mass of academic programs, and the relationship between the health of these programs and the available supply of young engineers and geologists. These companies often take a long-view strategy in how they support “partner” universities, where they invest resources into these departments to promote student recruiting, education and professional development, as well as to foster personal relationships with the faculty and students. In many cases, these progressive companies provide support to these academic programs regardless of their short-term employment needs under the rationale that when they do need to hire, there will be qualified graduates available. In my opinion, this type of philosophy is insightful and indicative of well-managed, forward-looking companies.

Unfortunately, this view is not universally held. While serving as an interim department head a few years ago, I was approached by an international mining company that had little to no previous presence on campus and indicated they needed to hire 30 entry-level mining engineers by that summer. When I tried to

explain that we were only graduating 33 undergraduates that May and that our entire graduating class had already accepted employment offers, the response from the company’s human resources representative was simply “why aren’t you graduating more students?” It was obvious that she hadn’t been working in the mining industry very long and didn’t understand the inherent constraints associated with student recruiting and operating an academic department. But it did raise a good point.

From the perspective of most college administrators, one of the fundamental weaknesses of mining programs has been low student enrollments. This is particularly true in large universities or where programs are heavily dependent upon tuition revenues. It is not uncommon to have student/faculty ratios in mining programs of 12:1, as compared to other majors like mechanical engineering and physics that often have ratios exceeding 30:1. Compounding this situation is the declining number of B.S. and M.S. students graduating from U.S. mining programs since 2015, despite graduates obtaining near full employment at high comparable salaries. With the exception of China, India and Iran, similar trends are being observed at mining universities on a global basis.

Another paramount concern is the absence of a viable means to address the looming faculty shortages that have been created by retirements and attrition over the last two decades. Put simply, the inability to replace retiring faculty with viable candidates who possess applied professional experience, the capacity to effectively

teach core courses, and have the requisite skills to someday achieve tenure, represents an immediate threat to most mining programs. There have been several studies conducted over the last 15 years that have analyzed the demographics and numbers of U.S. mining faculty and have provided quantitative evidence of this crisis. The situation facing the remaining U.S. extractive metallurgy and mineral processing programs appear to be even more dire as a consequence of the limited number of key faculty keeping these programs viable.

While this topic will be specifically discussed in a later article, SME and the SME Foundation have been working collaboratively with industry constituencies to strengthen the long-term sustainability of the remaining degree-granting programs by creating fellowships and grants used to recruit and develop high-quality faculty. Through the generous support of industry partners and individual donors, the Ph.D. Fellowship and the Career Development Grant programs were initiated in 2015. To date, the results of these programs have far exceeded all expectations. On behalf of SME, I am truly grateful for all the individuals and companies who have stepped up and contributed time, effort, and resources to tackle these problems. We are making a difference toward ensuring that there is a continued supply of new graduates with the fundamental knowledge and skills necessary to be successful in industry.

I look forward to discussing these and other critical topics affecting mining and minerals education over the coming months. Take care and be safe. ■

Uranium: Withdrawn and protected areas could be reviewed

(Continued from page 12)

domestic production would put iconic Western landscapes and sacred tribal lands at risk.

The Commerce Department report recommended that both the Bureau of Land Management and the

Forest Service review all areas that are currently withdrawn — or protected — from development and assess whether those restrictions should be lifted or reduced to allow for critical mineral development.

It also proposed altering how the

U.S. Department of the Interior and its agencies review mining projects under the bedrock National Environmental Policy Act, urging expedited environmental studies and identifying minerals that can be excluded from environmental reviews. ■

Work/life balance: For many professionals it can feel like a pursuit in futility



Hugh B. Miller
2019 SME President

As my family and close friends can attest, the entire concept of trying to balance work with other important elements of my life has been a struggle for most of my adult life. I grew up in a time and place where a person was largely judged by old school values like work ethic, initiative and the responsibility to always do the right thing, whether you wanted to do it or not. The unwritten rule was to always do what you said you'd do, but more importantly, to do it well; the intent was to exceed the expectations of others even at the expense of your own wants and needs. God forbid if you ever said no to someone asking

for help or your assistance to do something. This is only compounded by the social norms common to engineering and many base industries, like mining and heavy construction, where the definition of being a good employee or a hard worker is directly tied to the number of hours you put in and how productive you are in accomplishing assigned tasks. These factors usually contribute to a work environment that is in a constant state of crisis and where key employees are always over-committed. Sadly, conventional wisdom is that the only hope of ever getting caught up is to increasingly devote more hours to the tasks at hand. Unfortunately, this becomes a vicious cycle. Since there is only a finite amount of time in a day, this means a continuing re-evaluation of priorities associated with work, where time normally devoted to family and friends, and on luxuries like vacations, weekends and sleep, often become casualties because they are the easiest things to postpone or eliminate.

I know this situation is pervasive throughout our industry, where I have numerous friends, former students and colleagues that are employed by a variety of operating companies, suppliers, consultants, and contractors that work incredible hours on weekly basis. For many, locations and types of jobs, long commuting times and extensive travel only exasperate the situation. While somewhat counter-intuitive, the effective work day often gets progressively longer as one's career progresses because of increasing responsibilities and issues related to being on call, production meetings between

Safety share: Summer is coming up and many people are taking to their boats, powered, unpowered and sailing. When on the water, wear a life vest, also called a life jacket; they save lives. Many states require that children under 12 wear one. Too often the children in a boat are wearing life jackets but the adults are not. We can only imagine what regard these children have toward adult use of a jacket. Bow riding, where children sit astride the bow of a power boat at high speed, can be deadly. If the boat hits a wave or wake from a passing boat, the bow rider may be pitched off to pass under the boat to be chewed up by the propellers. Do not bow ride. Be safe on the water and enjoy it to the max. I do.

Submitted by Lee Saperstein

shifts, project supervision, regulatory and business oversight and the dreaded meetings with shareholders, board members and potential investors. In my opinion, one of the largest impacts on time has been our dependence on cell phones and emails. While these technologies have certainly had an incredible impact on society and our daily lives, it's also made it nearly impossible to get away from work. Most industry professionals are now accessible 24/7. Norms and expectations have changed in terms of when it's acceptable to call someone and how fast you need to respond to an email or message. This is particularly true in companies whose managerial structure depends on only a few decision-makers or where every issue, however minor, is perceived to be an emergency.

Corporate environments have, for many years, also encouraged employees to increasingly view workplace responsibilities as priorities through a variety of wage and bonus schemes, promotions and advancements, and recognition and award programs. As a young engineer, I was once told by a mentor to watch my supervisors and try to arrive before and leave after them in order to make a positive impression. Ironically, I was later given some advice by a boss when I first had employees directly reporting to me that I should set a good example by working longer hours than the people I was supervising. It instantly occurred to me, based on the advice from these two seasoned veterans, that none of

(Continued on page 16)



President's Page: work/life balance difficult to achieve

(Continued from page 6)

us were ever going to leave work.

So what's the problem? If the focus of this life balance is too heavily oriented toward work priorities, there are a host of potential negative consequences to both the employee and the employer. Put simply, this situation is simply not sustainable over a long period of time. Employee burn-out and stress can have significant impacts related to their health, mental acuity, depression, family problems, substance abuse, absenteeism and loss of productivity or purpose. From an employer's perspective, none of these are good. Furthermore, employee attrition is a major concern for most companies, particularly at a time when there are numerous other employment opportunities available. In these situations, people will simply gravitate to a better job with less stress and a superior quality of life.

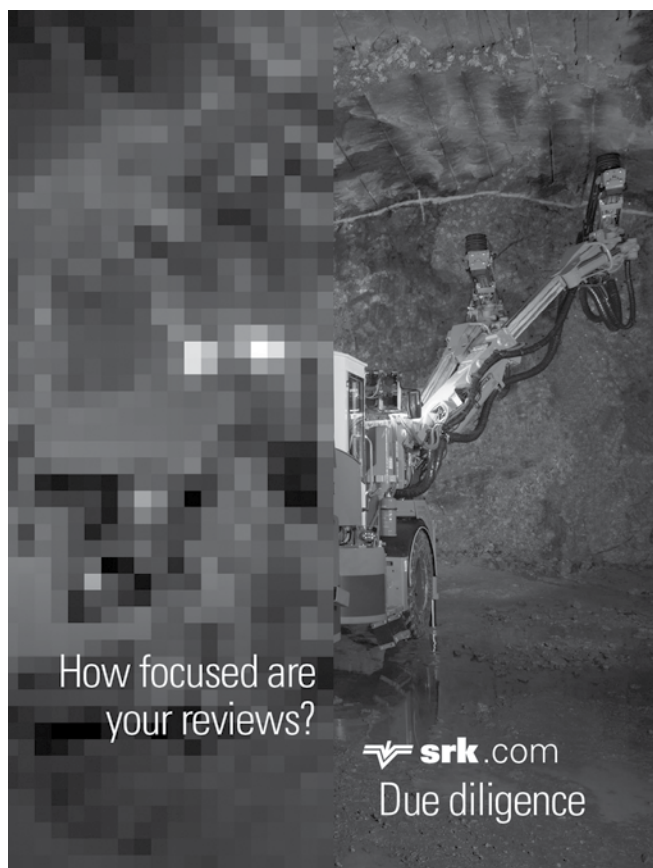
Unfortunately, there are still a few companies that view employees like commodities and try to maximize the number of work hours out of them like you would for a piece of equipment. I had a student once accept an offer as an engineer for a large company on a small exploration project. After the second week on the job, I received a call from the student who indicated that they moved a cot into his office, and he wasn't sure what message they were trying to send him. It eventually became clear, when the student quit and accepted a job outside the industry. As bad as this sounds, it isn't the first time I've heard of this happening. As a professor, one of my concerns is the changing expectations that many students have regarding employment and the potential impact this might have on recruiting and our ability to provide the talent needed by industry.

students primarily focused on specific mining sectors, career opportunities and salary. Most didn't care where the job was or had concerns about issues related to vacation time and benefits. Today, many students are solely interested in where the job is located, whether flex hours and other perks are available, and the amount of vacation that can be accrued. It's interesting how times have changed, and I wonder if this has some direct relevance on why mining enrollments in academic programs are dropping throughout the developed world, despite near-guarantees of employment and high salaries.


Fortunately, there are many truly outstanding companies, executives and managers who understand these concepts and the importance of promoting and fostering employee development and a healthy work-life balance. This includes minimizing excessive overtime and responsibilities related to being on-call, encouraging social and family oriented events outside of work, mandating required vacations, and creating work schedules that provide for extended weekends and days off. Many have also implemented policies and programs concerning employee and family wellness, as well as counseling on how to cope with stress regardless of its source.


While I'm definitely not the poster child on how to achieve a proper life balance, I do understand some basic realities; our kids grow up fast, life is short and marriage takes time and effort to work. Make sure you regularly assess your priorities and focus on the stuff that's important to you. I sincerely hope this prompts some thought. I wish everyone a safe and productive summer. Take care and be safe. ■

In the 1980s, my objective coming out of school, like most of my classmates, was simply to get a job in the industry with little consideration to the mining sector, position, salary or location. We just wanted a paying job and an opportunity to gain some experience. When I first entered academia in the early 2000s, the employment market was significantly better, and



How focused are
your reviews?

 **srk.com**
Due diligence



Mining
engineering

- ARTICLES
- ADS
- ARCHIVES

me.**smenet.org**

The changing nature of academia: Realities are much more complicated than many realize



Hugh B. Miller
2019 SME President

In the July edition of *Mining Engineering*, the President's Page was devoted to introducing several of the most significant challenges currently facing academic programs in mining, extractive metallurgy and mineral processing. The sheer number of responses received on this topic has been truly inspiring, and the overwhelming majority have been extremely positive, insightful and constructive. These comments demonstrated the genuine passion that many members hold for students and individual academic programs, and they show a clear understanding of what is at stake in the event that additional departments fail. I was

also impressed by the outstanding ideas and commentary provided by professionals from all sectors of the Society on a range of subjects critical to the discussion. Thank you to all who contributed to this discussion.

This month's article will focus on the changing nature of academia.

When I first entered academia from industry, I quickly realized that I had a very naive view of how academia worked and didn't understand the realities that drive university decision-making or policies. With time and the kind assistance of colleagues, I eventually began to understand these nuances and how the dynamics vary greatly from one academic program to another. What I originally thought was poor management and general disfunction, actually started to make sense once I began to understand the constraints and challenges in which these departments operate. Unfortunately, most alumni and industry professionals hold a similarly distorted view of academia. They are unaware of the current realities driving these departments and don't understand the precarious situation the departments are in.

From an industry perspective, the overall focus of academia should be straightforward — recruit and educate undergraduate students with the fundamental skills and knowledge necessary to be successful as new professionals. While true, the overall picture is much more complicated. Many industry constituencies view students as the primary work product, where everything else, including research, publication and community/

Safety share: I recently had the opportunity to visit some close friends in a rehabilitation center in Southern California who were involved in a serious car accident nearly 18 weeks earlier. The dynamics of the accident were truly unfortunate. These friends were riding in the back seat of car on their way to dinner with another couple, when the vehicle was struck by an impaired driver. The vehicle subsequently rolled. Unfortunately, neither of the passengers in the back seat were wearing seatbelts which was a major contributing factor to their injuries.

This accident emphasizes the importance of wearing safety belts whenever riding in any vehicle. Unfortunately, many of us fail to buckle-up when we ride in taxis, limos and other ride-hailing services, like Lyft and Uber. The law firm of Thompson & Wedeking indicates that taxi accidents have a higher incident rate for serious injuries as compared to passenger vehicles. The ASIRT, an advocacy association for road safety, published data that shows that the U.S. experiences approximately 37,000 roadway fatalities annually making it a major risk, particularly to young adults less than 30 years of age.

Regardless of the circumstance, wear your seatbelt when you're a passenger in any moving vehicle. If the car or bus doesn't have a belt, find another option.

professional service, is often perceived to be peripheral without tangible benefits to student education. In reality, this is far from the truth.

It's important to understand how student education is funded. Contrary to popular belief, in-state tuition doesn't cover the full cost of educating students at most public institutions. Furthermore, state support for public higher education has continued to decline significantly over the last decade. This is particularly true for universities in many mining states, including Kentucky, Colorado, Alaska, Missouri and Arizona, where the erosion of state funding exceeds double digit percentages. This reduction in state support has effectively pushed universities into becoming tuition dependent enterprises. Many states have further compounded this situation by restricting the ability of universities to increase revenues by placing caps on the rate of tuition growth and limiting the total number of out-of-state students who can be accepted into a university. The

(Continued on page 16)



President's Page: Multiple factors add to challenges for mining programs

(Continued from page 6)

combination of these economic factors has truly been detrimental to smaller departments perceived to be high cost with low student/faculty ratios, degree programs that require a high number of credit hours for graduation, curriculums that are heavily dependent on laboratory facilities, and small student enrollments. In most universities, this situation forces school administrators into evaluating whether these small departments are viable and provide value to the institution. This is exactly the predicament mining and mineral processing programs face today.

Another reality often not well understood is how departments are generally evaluated by university administrators. This directly effects how university resources are distributed, the allocation of classroom space and labs, and the ability to hire staff and faculty. Performance based criteria are often universally used without regard to academic discipline as a means of comparison, and focus heavily on the course credit hours taught, Ph.D. graduation rates, research volume, and publication record in high impact, peer-reviewed journals. In some universities, the total amount of philanthropy and external support raised is also measured. Unfortunately, small mineral engineering departments are at an inherent disadvantage compared to other engineering programs because of low undergraduate enrollments and the limited number of Ph.D. students graduating from our departments.

Individual faculty evaluations for promotion and tenure, as well as salary increases and annual performance reviews, generally follow the same criteria as departments, with the addition of course teaching evaluations.

The combination of these economic factors, coupled with how universities evaluate departments, has several important ramifications related to program risk. For example, a mining department may produce outstanding undergraduates that are in high demand by industry and may be viewed as one of the top educational programs in the world, yet still be considered as dysfunctional and underperforming by its own administration due to deficiencies in the other performance criteria. While information on student placement rates and average salaries are collected by every university, rarely are they used as a gauge for comparative performance between departments. As such, mineral programs are forced to straddle a fine line between all the different groups to whom they have responsibilities, including the students, industry constituents and employers, faculty (tenure, promotion and workload), and the university administration. Each of these groups usually have very different priorities and expectations.

The other critical piece to this puzzle is that research not only provides needed resources to help offset the financial short-fall created by reductions in state funding and discretionary university distributions, it is a necessary part of maintaining

a stable faculty population with important implications regarding tenure and promotion. Most departments are also heavily dependent upon research expenditures for maintaining labs, staff and essential aspects of the educational process. Simply put, without research, departments would simply fail to exist and the supply of undergraduate engineers would subsequently cease.

So what's the solution; a couple key concepts include the need for departments to work inside their own academic system to make themselves relevant, collaborate with other academic programs to expand educational and research opportunities, develop strong relationships with industry partners, seek long-term support and endowments to fund faculty positions, labs, and operating functions and educate constituencies on the challenges individual programs are facing. SME has a role in this process and will be discussed in a future article. I'd like to thank Rick Honaker for all his help and valuable insights related to this article.

I would also like to extend my sincere appreciation and best wishes to Steve Kral, who will be retiring from SME after 36 years of service. Steve has been a tremendous part of the Society and one of the reasons for its success. You will definitely be missed. Thanks for everything and congratulations.

As always, I appreciate this opportunity to share these thoughts with you. Take care and be safe. ■

Former iron mine could reopen as a cobalt mine

A FORMER IRON mine that has been inactive for more than 40 years could reopen as a cobalt mine in Frederiktown, MO.

Missouri Mining Inc. announced plans to reopen the Madison Mine that it purchased in 2018. The mine has been part of a Superfund site since the 1960s.

St. Louis Public Radio reported

that Environmental Operations, a Missouri Mining subsidiary, plans to begin cleaning up the site this winter. Missouri Cobalt, another Missouri Mining subsidiary, could hire as many as 400 temporary workers and 250 permanent workers to rebuild and operate the mine.

The U.S. Environmental Protection Agency (EPA) expects the cleanup to

be completed in March 2022. Because of the cleanup efforts, less than 2 percent of children in the area have elevated lead levels in their blood, down from 27 percent in 1996, EPA officials said.

The site was a part of the EPA's Superfund Redevelopment Initiative, a program that aims to reuse Superfund sites. ■

The US National Academy of Engineers: What is it and what does the organization do?



Hugh B. Miller
2019 SME President

I suspect most of the SME membership is aware of the National Academy of Engineering (NAE) but few probably know what this prestigious organization does or the important role it plays. To provide a brief overview of the NAE, Corale Brierley, vice president of the U.S. NAE and a member of SME, has graciously agreed to serve as a guest columnist this month.

Several dozen SME members, including the mining industry's most eminent executives, technology leaders and recent SME presidents (Jessica Kogel and John Marsden), are elected members of the NAE.

Some of SME's most prestigious awards were established by or in recognition of industry leaders who are or were also NAE members. Most, if not all, of the 30-40 current SME members who are NAE members are awardees of SME and/or AIME medals and some are SME Distinguished Members. These joint SME/NAE members actively participate in NAE committees and activities and serve on boards, studies and other activities of the National Academies of Sciences, Engineering, and Medicine.

So, what is the U.S. NAE? What is its mission? What does election to the NAE mean? What do members do?

The NAE arose from the advocacy of 10 engineers who were members of the U.S. National Academy of Sciences (NAS) and 15 distinguished engineers who were not NAS members. These 25 engineers, among them Antoine M. Gaudin, a professor of metallurgical engineering at MIT, believed that the NAS neglected engineers and they wanted to establish a new academy that would support engineering interests in the nation. A "Committee of 25," which included Gaudin, negotiated with the NAS to establish the NAE under the charter of the National Academy of Sciences, which was founded through a congressional act of incorporation in 1863 and signed into law by President Abraham Lincoln, with the mandate to advise government on scientific matters. Also instrumental in founding the NAE was Frederick Seitz, a theoretical metallurgist working in crystallography, who was NAS president (1962–

Safety share: We all know it's inherently a bad idea to use our cell phones while driving. We lecture this to our kids, many companies have policies that prohibit or restrict cell phone use on mine properties or while operating equipment, and more than 30 states currently have bans in place on texting while driving. That said, the use of cell phones and texting by drivers is pervasive throughout our society and across all demographics. The ramification of this is downright horrifying. At any given time throughout the day, approximately 660,000 drivers are attempting to use their phones while behind the wheel of an automobile (Edgar Snyder). As a result:

- The National Safety Council reports that cell phone use while driving leads to 1.6 million crashes each year.
- Nearly 390,000 injuries occur annually from texting while driving.
- 1 out of 4 car accidents in the United States is caused by texting and driving.
- Texting while driving is six times more likely to cause an accident than drunk driving.
- In 2017, more than 15,300 drivers aged 15-29 were involved in a fatal crash due to distraction or cell phone use.

Given the magnitude of these risks, please use common sense and protect yourself and those around you by refraining from texting and use only hands-free calling when driving. If you must use your phone, find a safe place to pull off the road away from traffic. In addition, exert pressure on your family, friends and colleagues to do the same.

1969) at the time. The NAE was established in 1964 with the Committee of 25 as its founding members. Gaudin served on the council (the governing board) of the fledgling Academy from 1964 to 1969.

The NAE is a private, independent, nonprofit, nongovernmental institution whose members provide engineering leadership in service to the nation. Its mission is "to advance the well-being of the nation by promoting a vibrant engineering profession and by marshalling the expertise and insights of eminent engineers to provide independent advice to the federal government on matters involving

(Continued on page 22)

Barrick Gold announces new discovery in Nevada; Drilling intercept near Fourmile project

by William Gleason, Editor

NEARLY ONE YEAR to the day that Barrick Gold announced its merger with Randgold Resources at the Denver Gold Forum, Barrick president and chief executive officer Mark Bristow returned to the conference to provide an update on what has happened in the past year and to announce a new discovery in Nevada.

Speaking to a full room at the Hyatt Regency in Denver, CO as part of the Denver Gold Forum Americas conference, Bristow said Nevada Gold Mines, the joint venture formed in 2019 between Barrick and Newmont Goldcorp Corp., could be adding another tier one mine to its portfolio. Bristow announced a new discovery hole 2 km (1.2 miles) from the best ever drilling intercept at the Fourmile Project in Nevada.

“We are very excited about this discovery,” Bristow said. “Goldrush Fourmile is one mile from our recent

Cortez Mine expansion and I have no doubt that we are going to find more discoveries like these.”

In a release, the company said Barrick did not include Fourmile in the recent combination of its Nevada assets with those of Newmont Goldcorp to create the Nevada Gold Mines joint venture, but has the right to bring it into the joint venture for full market value provided certain agreed investment criteria are met.

Bristow said diligent exploration and detailed geological modelling had led to effective targeting at Fourmile. The intercept is of a new orebody 1 km (0.6 miles) north of Fourmile. It increases the strike length of the mineralized Goldrush-Fourmile trend to more than 6 km (3.7 miles). Mineralization is open in all directions and significant resource growth is expected from continuing the step-out drilling program.

“Discovery is fundamental to value

creation and the latest results from Fourmile confirm the potential for further high-value discoveries in the greater Cortez – Carlin region, which has been a prolific source of gold discovery and production for 150 years and still holds an untapped wealth of geological endowment,” Bristow said.

Since the merger with Randgold Resources a year earlier, Bristow said the business was generating significantly higher profits and free cash flows as it is supported by six profitable Tier 1 assets with tangible prospects for future value creation, and Barrick now boasts one of the strongest balance sheets among its industry peers.

“We’re well positioned to achieve our targets for the year. Production is trending toward the top end of the 5.1 to 5.6-million-ounce guidance range while costs are likely to be at the lower end of the cost forecasts,” he said. ■

(Continued from page 22)

workforce trends in various industries, vaccine safety, the many dimensions of national security, the nation’s future in space, agriculture, gene editing and many more. Following is a sampling of studies that have involved SME/ NAE members and are relevant to the interests of SME:

- Monitoring and Sampling Approaches to Assess Underground Coal Mine Dust Exposures
- Emerging Workforce Trends in the US Energy and Mining Industries: A Call to Action
- Uranium Mining in Virginia: Scientific, Technical, Environmental, Human Health and Safety, and Regulatory Aspects of Uranium Mining and Processing in Virginia
- Improving Self-Escape from Underground Coal Mines
- Coal: Research and Development to Support National Energy Policy

- Minerals, Critical Minerals, and the U.S. Economy

In summary, the National Academy of Engineering, National Academy of Sciences, National Academy of Medicine, and National Research Council convene the nation’s most knowledgeable engineers, scientists, health professionals, and other experts who volunteer their time on initiatives that guide the development of federal laws and regulations, improve the effectiveness of government programs, shape the direction of research fields, and inform public knowledge and dialogue about issues of critical importance. NAE members, who number about 2,100, are highly accomplished engineering professionals in business, academia and government and are elected to membership by their NAE peers. They provide leadership and expertise for numerous projects involving engineering and technology, and those who are also members of SME serve on boards, committees and panels that oversee a wide range of earth resource

and science issues. They identify opportunities for advancing research and engineering, understanding of earth resources and science information for policy decisions, applications of earth resources and science to important societal issues, and the overall health of research and education programs related to earth sciences and resources.

President’s note: I’d like to extend my sincere thanks to Corale Brierley for her outstanding guest column and all her efforts in serving NAE and SME. Published proceedings that chronicle the presentations and discussions of NAE and its sister academies can be found online at National Academies Press (www.nap.edu/). I would also like to personally acknowledge and congratulate the three new SME members who were recently elected into the NAE; they include Red Conger, Jessica Kogel and John Spear. This recognition is well-deserved and we’re extremely happy for all of you. Take care and be safe. ■

What happened to civility in debate?

Remembering valuable lessons to resolve problems



Hugh B. Miller
2019 SME President

I suspect many of you will agree, it's become increasingly difficult over the last few months to watch television, listen to the radio, or read any article that deals with politics or addresses any news subject that can potentially be formulated into a partisan issue. Regardless of your position on any particular issue, I find it disheartening to watch or engage in any debate where emotion supersedes rational dialog and meaningful discussion. A couple of recent examples that underscore my frustrations with the news include two attorneys from opposing political parties screaming at each other during a national newscast over the potential legalities

of specific legislative activities, or the on-going political mudslinging over the potential legalities of several alleged activities involving both parties and local activists in the Pacific Northwest using violence and the destruction of private property to protest political extremism. These are just two of numerous occurrences that we are bombarded by daily in which emotion appears to be the driver for conflict at the expense of anything rational, where nothing productive or positive can possibly come from these events. It often seems that many of these occurrences are staged for the purposes of entertainment through the media or to advance some alternative agenda; definitely not to find potentially viable solutions to facilitate positive change. It makes me seriously wonder what happened to civility, professionalism, and compromise in solving complex, social challenges.

Early in my professional career, I was fortunate to have a truly outstanding boss who regularly provided me with valuable insights on how to deal with people, regardless of their positions or role in a company. One of those morsels of wisdom dealt with never falling in love with a property or a project, and that professionalism meant keeping emotion out of the decision-making process, maintaining perspective on what was important. A follow-up outcome to this was to always keep an open mind, where changing a position on a subject for good reason was not a sign of weakness, poor management or indecision but rather maturity. The exception to this, of course, included anything contrary to a set of non negotiable values related to safety, ethical behavior and the law. This fit

Value share: To be a successful mine safety and health professional, you must possess a wealth of professional knowledge and experience to effectively perform your duties and keep others safe. The Certified Mine Safety Professional (CMSP) credential indicates to your peers and prospective employers that you have the experience, knowledge of domestic and international best practices and that you are dedicated to elevating safety and health standards on the job.

SME is proud to announce that a CMSP review course has been developed and will be offered for the first time Nov. 14-16 at SME headquarters in Englewood, CO. It will also be offered Feb. 21-23, 2020 in Phoenix, AZ, ahead of the MineXchange 2020 SME Annual Conference & Expo. This three-day course is designed to provide a high-level review of the *CMSP Body of Knowledge* which covers five primary domains:

- Fundamental knowledge of science and engineering.
- Leadership, organization and culture.
- Safety, health and risk management.
- Management systems, regulations and assurance.
- Professional skills, conduct and ethics.

To learn more about the course visit www.smeemsp.org

very nicely with the values I grew up with. My parents stressed the fundamental concepts of the Golden Rule, to think rationally, to never act impulsively and to try to understand the perspectives of people that have differing views from your own. The intent is to always find the win-win solution that resolves the problem and creates a reason to develop trust between opposing parties. This philosophical approach has proven to work well in a variety of situations, ranging from conflict resolution to business negotiations. The fundamental premise is that people generally respond positively when they feel they're being treated with respect in an honest and trustworthy manner. Intuitively, it definitely makes sense.

(Continued on page 19)

President's Page: Healthy debate can lead to viable solutions

(Continued from page 6)

It's important to remember that civility means more than just being polite. Just as critical, civility also doesn't mean "rolling over and playing dead." To be successful in our society, one cannot simply avoid tough issues because they're unpleasant to deal with or difficult to address. In addition, nearly every issue in a diverse society has alternative sides to it with differing interests and perspectives. The concept of civility recognizes that thoughtful and competent professionals will often have differing opinions, interests or views on how to best accomplish something, and that concept represents constructive dialog based upon available facts and verifiable information, compromise and an understanding of the opposing positions in order to achieve a satisfactory outcome for all parties. This type of effort requires that the parties involved are negotiating in good faith, are motivated to find a viable solution, and have legitimate standing. Like most technical applications, factual disagreements over the interpretation of technical information and data are common. These conflicts can usually be resolved

through a prescribed process. What can't be overcome, however, is the deliberate distortion of information or the absence of good faith to find a solution. These are killers to the process.

In regard to my earlier examples involving a few of the political and social challenges currently facing our society, I'm simply at a loss on how they can be resolved since the parties have competing agendas, are not tolerant of opposing views, and don't want to engage in constructive dialog. I'm afraid the only mechanism for change will be when the general public has finally had enough and will focus its frustrations at public officials through elections and other political/social means. It's a monumental issue that continues to have a fundamental impact on our country. I want to thank all of you for the opportunity to share a few of these ideas and thoughts.

Before I conclude this month's article, I'd like to briefly recognize the tremendous accomplishments of Dr. Bill Hustrulid, who passed away a few months ago. Bill was internationally renowned for his many books and publications and was an innovative researcher in mining technology

"To a good engineer, a problem is a challenge and a potential opportunity. To a poor engineer, a problem is just a problem."

William Hustrulid

and applied rock fragmentation for decades. He influenced the careers of countless young engineers while teaching at several universities in the United States and Sweden. In addition, he was one hell of an engineer, was an SME Distinguished Member and a member of the National Academy of Engineering. Beyond all else, Bill was steadfastly committed to students, and was a tremendous advocate of teaching the fundamentals, the importance of ethics, and "always doing the right thing." Despite being well known for his strong convictions and opinions, Bill would often challenge students to convince him to change his position on a particular issue and subject. While I still carry the scars of those discussions, he made me a better engineer. I wrote this article with Bill in mind, and I know he'd enjoy the debate. Take care and be safe. ■

Copper mine in Peru adds overland conveyor system; Equipment will access one of the world's largest copper deposits

THE QUELLAVECO Mine in Peru contains one of the world's largest copper reserves at approximately 6.8 Mt (7.5 million st) of copper in ore reserves — enough for 80 million homes or to equip 90 million electric vehicles.

To access the ore, the mine has installed an overland conveyor system from thyssenkrupp that will move 116 kt/d (127,500 stpd) using new Siemens' gearless drive technology. With the rugged landscape in Quellaveco, transporting the primary crushed ore requires durable and efficient technology systems.

Sections of the overland conveyor must traverse from one valley to another

through a 3.2-km (2-mile) long tunnel. After exiting the tunnel, the conveyor will pass over hilly terrain before feeding the stockpile.

Compared with the combination of high-speed motor and gearboxes otherwise used in belt conveyor systems, the gearless drive solution offers a range of benefits. The size of the motor is not limited anymore by the size of gearbox, thus eliminating the necessity to install multimotor drives. The required belt driving power can be provided with one drive per drive pulley. This means that the number of switchgear enclosures could also be scaled down, saving space and weight within the e-house.

The elimination of a whole series of mechanical and electrical components increases the reliability and efficiency of the overall system by between 3-4 percent.

thyssenkrupp's overland conveyor is 4,700 m (15,400 ft) long, 1,830 mm (72 in.) wide featuring Siemens' dual 5.5 MW gearless drives operating at a design tonnage of nearly 10 kt/h (11,000 stph). Siemens also provides the e-house with MV and LV power distribution and the cooling system for motors and e-house. The automation of the conveyor system as well as for the complete mine will be realized with the process control system Simatic PCS-7. ■

Declining student enrollments: A cyclical challenge



Hugh B. Miller
2019 SME President

In the last eight months, I've written two articles as part of a continuing effort to underscore some of the significant challenges facing the long-term sustainability of academic degree programs in mining, extractive metallurgy and mineral processing. This month's article will address the challenges associated with declining student enrollments in mining engineering throughout much of the developed world and the profound implications this has on the availability of new professionals entering the industry.

Since 1982, the number of U.S. universities offering accredited undergraduate degrees in mining engineering has plunged from 25 to 13. Of the remaining programs, a significant percentage are considered at risk due to low student enrollments, the limited number of core academic faculty, the lack of institutional resources and/or a combination of other inter-related threats. During this period, total undergraduate graduation rates in the United States have fallen from nearly 600 students annually to fewer than 225 (SME statistics). Looking specifically over the last five years, data collected during SME mineral department heads meetings has shown that the overall undergraduate student enrollment in U.S. mining departments has dropped from 1,489 in 2015 to an estimated 874 in 2019, a reduction of more than 40 percent. Similarly, student graduation rates during this same period have declined from 390 in 2015 to a projected 219 this year. Ironically, this decline has occurred during a period where graduating students have enjoyed nearly full employment with high starting salaries as compared to other STEM disciplines. The United States isn't alone in experiencing these daunting challenges. Engineers Canada, a national licensing organization, indicated that between 2015 and 2016, Canadian undergraduate mining engineering programs experienced a 12 percent drop in enrollment, which represents the largest decline of all engineering disciplines. This trend greatly compounds the scarcity of talent that already exists in the country. The Canadian mining industry will require 145,000 new workers (both professional and hourly) by 2023. This implies that nearly half of the country's mining workforce will turn-over due to retirements and

Safety share: With winter fully engulfing many parts of North America, it seems prudent to discuss one of my biggest pet peeves, completely scraping ice and snow off the windows of your vehicle prior to driving. I used to regularly chastise my sons for only scraping small areas of the windshield and side windows prior to driving, in hopes the defroster would clear the rest while en route. Like driving while looking through a porthole, you simply can't see anything while hunched over the steering wheel at a precarious angle trying to peer out the small area cleared of ice. This practice not only represents a hazard to you but to others as well. Take the time to fully clear off the ice from all your windows, mirrors and head and tail lights. For those of you not accustomed to cold weather, never pour warm water on a frozen windshield. Only bad things will happen.

attrition in three short years. Unfortunately, the situation in Australia is even more dire. According to the Mineral Council of Australia, the total number of mining engineers graduating from Australia's eight mining universities could drop from the nearly 300 graduates that were produced annually just a few years ago to just 50 per year over the next four years, despite nearly guaranteed employment and high wages.

Given these declining enrollments and graduation rates, the implications for both academic programs and industry are alarming and have long-term ramifications on the ability of universities to supply the necessary talent needed by industry, as well as keeping the existing degree-granting programs sustainable. In addition, as these numbers decline, there is a real threat to mining engineering as a distinctly recognized discipline from the perspective of accreditation and professional licensing. Interestingly, these types of trends have occurred repeatedly over time. Dr. Charles Fairhurst, an icon in mining education and research from the University of Minnesota, graciously sent me a wealth of information that included a historical narrative of efforts by AIME and MMSA to assist in stabilizing mining enrollments that date back to the early 1960s. This only underscores the complexities associated with student enrollments and the viability of academic programs over time, including influences of the boom-and-bust

(Continued on page 22)



President's Page: Recruiting students must be a high priority

(Continued from page 6)

employment practices historically used by companies during market cycles, the displacement of talent as a consequence of new technologies, and the evolution of skillsets as job functions change.

So, given the situation, what are the underlying issues that are adversely impacting student enrollment and what can we do to mitigate them? While based mostly on conjecture, there seems to be a common consensus on a few contributing factors. Recruiting students into mining and minerals engineering is becoming increasingly difficult. Part of the issue is that we are no longer attracting students from historic mining areas or from mining families. I was told by a friend that during a western mining conference several years ago, a speaker asked an audience comprised of mining professionals how many would encourage their sons or daughters to go into the mining business.

Unfortunately, only a couple of hands were raised. If we can't successfully recruit students from our own communities, it's hard to see how we can attract kids that know little to nothing about the industry. Today, the vast majority of our mining students come from suburbia and have never seen a mine or built anything with their hands, but they are extremely proficient in the use of software and video games. These students have a very limited view of mining before reaching college and have to overcome the negative public image (perception) of what the industry represents. Selling the idea of mining being a viable and positive career option to the parents of prospective students is often the biggest hurdle.

Fundamentally, it appears that the interests and priorities that drive high school and college-age kids today are simply different than they were just a decade ago. The current generation of post-millennials seem focused on careers that allow them to live in

major cities, work in controlled environments, and enjoy flexible schedules that provide what they believe is an advantageous work-life balance. Employment in fields heavily

oriented toward computer applications, software development and technology is the new norm. Unfortunately, most mining jobs struggle to appeal to many of these young prospective professionals despite our heavy dependence on technology and diverse, interdisciplinary skillsets. While I'm not an advocate of changing the course curriculums of mining-degree programs in order to appeal to prospective students, we definitely need to market the degree and career opportunities differently. This entails better ways to educate and recruit high-quality students into our programs through scholarships, meaningful internships and novel educational experiences. This can't be done without industry involvement; they have a responsibility to create stable employment opportunities that will attract and retain graduates. Mentoring, continuing education, revised labor and talent management practices, and changes in how companies operate are all necessary. While some companies are making significant efforts in these areas, we have a long way to go as an industry.

I want to extend my sincere thanks to everyone who has contributed insightful comments, ideas and opinions regarding these challenges. It's much appreciated. I'd also like to wish everyone a wonderful holiday season and a safe, productive New Year. Take care and please be safe. ■

Zijin: Company will expand its copper and gold operations

(Continued from page 10)

million st) on an equity basis, while its gold resources would rise by 161 t (177 st), or 9.3 percent, to 1,889 t (2,082 st).

Development of the lower zone of Timok has not yet started, but Zijin said the deal would help with unified planning, construction and operation of the project. Production from the upper zone is expected to begin in 2021, it added.

Zijin will also acquire Freeport's interests in five exploration licenses in the surrounding area, which are currently held by a Zijin-Freeport joint venture and have "favorable potential for prospecting," the statement said.

Zijin expects the transaction to be completed no later than Feb. 29, 2020. ■



How NIOSH fulfills its mission; The completed research has made mining much safer



Hugh B. Miller
2019 SME President

While most of us are aware that the National Institute of Occupational Safety and Health (NIOSH) carries on the legacy of the U.S. Bureau of Mines in health and safety research, it is all too easy to overlook the continuing impact that NIOSH has on our industry. The ultimate mission of the NIOSH mining program is to eliminate mining fatalities, injuries and illnesses through relevant research and the facilitation of impactful solutions. To fulfill this mission, the NIOSH research portfolio spans a broad range of focus areas with the goals of reducing occupational illness and disease, reducing injuries and fatalities, and disaster prevention and response. While a discussion of the major contributions of NIOSH mining would exceed the space allocated for this column, I thought it important to emphasize a few prominent examples of what NIOSH does.

Reducing occupational illness and disease. NIOSH has made significant contributions to improving miner health by advancing research in areas such as hearing loss prevention, respiratory hazard exposure monitoring and hazard mitigation through engineering controls. NIOSH also focuses on fatigue, heat stress and ergonomics, as well as a host of other health-related challenges common to mining. NIOSH received the inaugural 2018 SME Robert E. Murray Innovation Award for two novel technologies designed to address miner health: the continuous personal dust monitor (CPDM) and the Helmet CAM. The CPDM provides an underground coal miner with a wearable, near-real-time instrument to monitor mine dust levels and empowers the individual miner to make immediate changes to reduce exposure to respirable coal mine dust. The Helmet CAM provides the ability to tie workplace activities (via video) to worker exposure (noise, dust, DPM), providing input for environmental and behavioral changes in the work environment.

The Dust Control Handbook for Industrial Minerals Mining and Processing, a collaborative effort between NIOSH and industry, has proven to be an invaluable tool for operators and health and safety professionals. Other NIOSH research

Safety share: While most company safety programs emphasize workplace hazards associated with slips, trips and falls, these continue to represent a significant source of lost-time injuries and fatalities. According to an analysis performed by the National Institute of Occupational Safety and Health, nearly 21 percent of all nonfatal injuries that occurred between 2012 and 2016 were attributed to slips and falls. Furthermore, U.S. Mine, Safety and Health Administration data shows that trips and falls accounted for approximately 11 percent of all fatalities from 2006 to 2015. These are alarming statistics that can largely be prevented by following some fairly simple precautions. Think about the environment where you're working, identify potential tripping hazards by inspecting the area and use the appropriate footwear and PPE. These same safeguards can be effectively used at home and outside of work as well. We all know friends and family that have been hurt slipping on ice, tripping over items left on the floor or falling down stairs. Always evaluate the potential hazards around you and use appropriate care. A severe fall isn't a trivial matter and can have long-lasting adverse implications on your quality of life. Be safe and take care.

activities with significant impact include roof bolter air curtains and dust bags, extended-cut ventilation, continuous miner and jumbo drill noise reduction, and DPM measurement.

Reducing injuries and fatalities. While NIOSH has extensive programs that encompass a range of subjects related to machine design and human factors engineering, such as proximity detection, it is best known for its ground-control software, based on both empirical and numerical methods. The U.S. Mine, Safety and Health Administration (MSHA) utilizes NIOSH pillar design and roof-support programs for regulatory approval. NIOSH's work on seismic monitoring for ground control continues to lead the field, and recent projects on shotcrete have led to significant advancements in application and use. Unique facilities, such as the underground coal mines and the Mine Roof Simulator at the Pittsburgh Mining

(Continued on page 19)

President's Page: Take some time to see what NIOSH does for you

(Continued from page 6)

Research Division and the High-Energy High-Displacement Frame at the Spokane Mining Research Division, have contributed greatly to insights into support design and application.

Disaster prevention and response.

The best method to prevent propagation of dust explosions in underground coal mines work is through the proper application of rock dust. A recent review concluded "NIOSH findings dispelled decades of mistaken beliefs on best practices for applying and maintaining rock dust" leading to significant regulatory changes and enhanced mine safety. NIOSH has also developed and commercialized a Coal Dust Explosibility Meter to obtain rapid measurements of the incombustible content in mine dust. NIOSH has funded the development of a treated anti-caking rock dust and foam rock dust slurry that could be sprayed on rib and roof surfaces, enhancing adhesion and the evaluation of seal designs for abandoned areas of underground coal mines. The Mine Improvement and New Emergency Response (MINER) Act of 2006 mandated refuge alternatives in underground coal mines and NIOSH's

work has been critical in evaluating capacity and usability of these shelters.

Extramural contracts and grants.

Under the MINER Act, NIOSH was given authority to award contracts related to the development and implementation of new mine technology and equipment, resulting in the issuance of more than 160 contracts focused on worker health and safety. Among other innovations, these contracts were responsible for many of the communications and miner tracking systems currently in use in underground mining. The contracts program was expanded with an academic Capacity Build Program in 2009 and 2011, directed toward developing university tenure-track faculty and facilities and supporting graduate students in the areas of mine ventilation and ground control. Under this Capacity Build Program, 34 five-year contracts have been issued to recipients from 12 of the 13 current ABET accredited U.S. mining engineering programs. To date, the first four contract cycles of this program have funded 103 masters and 81 doctoral students. The scope of this program was recently expanded to cover mine systems design.

The NIOSH Mining Program

remains fully committed to its vision — Safe Mines, Healthy Workers — and maintains a worker-focused, highly diverse research portfolio to achieve this objective. I strongly encourage SME members to visit NIOSH's facilities in either Pittsburgh, PA or Spokane, WA and open a dialogue with their researchers on any safety and health issues you might have. Only through collaboration can we continue to make advances to ensure the safety and welfare of everyone in our industry. This needs to be a priority and a non-negotiable value for us all.

I'd like to extend my sincere thanks to several contributors to this article who wish to remain anonymous. Their passion for worker safety is truly inspiring. Given the focus of this article, it's also fitting to acknowledge the life and contributions of Tom Falkie, who recently passed away. Besides being a true giant in the mining industry, he was a consummate professional and an outstanding gentleman. Falkie held numerous positions in industry, government and academia and served as an SME President and the Director of the U.S. Bureau of Mines. He'll definitely be missed. See page 67 for his obituary. I wish you all the best. Take care and be safe. ■

Great Debate: Your vote counts in this age-old mining debate

(Continued from page 18)

to donate. Watch for periodic updates in *Mining Engineering* and check the museum's website (mininghalloffame.org) frequently for updates during the challenge to keep abreast of sector rankings. The two finalists will hold a final smackdown debate at the National Mining Hall of Fame Induction

Banquet in the fall of 2020 where the winner will be announced. "The National Mining Hall of Fame and Museum invites members of the mining industry's sectors to have fun writing persuasive, inspiring and even humorous arguments about why their sector is the most important," coaxed NMHFM

executive director Stephen Whittington.

Visit the NMHFM website at <https://mininghalloffame.org/page/great-debate> for more information on the 33rd Annual National Mining Hall of Fame Induction Banquet where tickets are still available for this phenomenon. ■

Where did the time go?

A word of thanks and a crucial look ahead for SME's future



Hugh B. Miller
2019 SME President

It's difficult to believe that my term as SME President is quickly coming to an end. Barb Arnold and several past presidents warned me how fast the year would fly by and not to be overly ambitious in terms of the initiatives and strategic objectives I hoped to accomplish. It was sage advice to which I should have given more credence; but, as with most things in life, time always seems to be the limiting factor. I'll give the same advice to Bob Schafer and hope he heeds the lessons learned by others better than I did.

While it's convention for the president's last article to primarily focus on the major highlights and accomplishments of the past year, I thought I would deviate a bit and instead address what I see are the future challenges facing the Society and give formal recognition to the volunteers and staff that make SME so relevant, productive and vibrant to the industries it represents. A recap of this year's accomplishments will be presented during the awards banquet on Wednesday night (Feb. 26) at the MineXchange 2020 SME Annual Conference & Expo in Phoenix, AZ and discussed in the 2019 SME Annual Report.

I have thoroughly enjoyed this past year and feel honored for the opportunity to serve the Society. The breadth of activities and professional disciplines represented by SME is immense and ever-increasing in response to the changing nature of the industry, the perceived needs of the membership and opportunities to create additional member value through growth and expanded services/benefits.

Much of the focus this year was devoted to the development of the 2020-2025 SME Strategic Plan that incorporated a strengths, weaknesses, opportunities and threats (SWOT) structure of analysis for the organization using data derived from numerous constituencies within the Society. Overall, SME is doing extremely well despite modest growth in membership, and it continues to be well-positioned to capitalize on new opportunities and to address any conceivable threat to the organization. It is important to emphasize that SME leadership has elected not to concentrate on growth as a strategic objective, but rather on improving products, services and

Value share: Regardless of the industry sector or one's career path, a truly outstanding aspect of the mining industry is the transfer of wisdom and knowledge from one generation to another through mentorship. Throughout my adult life, I've been blessed to have had several influential individuals beyond my dad and other family members who have helped me navigate the myriad career choices and opportunities common to any professional in the mining industry. For this, I am eternally grateful to those individuals and have made a concerted effort to pay it forward by doing the same for students and young professionals who have recently graduated. Think back to those influential figures who positively impacted your career, and I'd like to encourage you to find a way to either formally or informally give back by mentoring a student or someone new to the industry. There are plenty of ways to get engaged, and SME local sections are often a great place to start. As seasoned professionals, you have a lot of knowledge and wisdom to pass along to the next generation that can only be derived from experience.

member value as the primary drivers that will facilitate member growth organically. Growth needs to be strategic and not done without due consideration of the total direct and indirect impacts on the organization and existing members.

A major challenge that SME has been struggling with for several years is expanding its footprint internationally. While the mining industry is global in scope, and international growth represents a natural progression of SME's technical mission, it comes with some apprehension due to financial inequities and the ability to adequately provide international members the same benefits and services at an acceptable cost as those available to members in North America. That said, it's exciting to see the rapid growth in student and professional membership in Latin America thanks to a group of very committed members and the excellent work of EngineZone, SME's contractor in Latin America. Similarly, potential collaborations in India, Asia, the Middle East, Africa, and those countries represented by GMPA sister organizations will, and do, provide avenues for SME to broaden its influence and make

(Continued on page 18)



President's Page: 2019 a year of strategy and analysis for SME's future

(Continued from page 6)

substantive contributions on a global scale. As most would expect, a large number of prominent challenges facing SME are also closely aligned with those of the mining and underground construction industries. Among these include how to effectively address the negative perception of mining and tunneling to a general public that fails to understand the importance of minerals and infrastructure to our standard of living. It's hard to convey our value to those who are predisposed to an inaccurate image based upon legacy issues and historic practices. Other dire issues are the recruitment and retention of talent, the significant threats facing academic degree programs in mining and mineral processing, the continued onslaught of detrimental regulatory and political risks and workforce diversity and inclusion. SME has attempted to integrate these issues into its strategic plan and, with the help and guidance of many, formulate initiatives to make meaningful advances to address these challenges.

As the scope of SME programs and services expand, some of the burden associated with finding ways to fund them falls on the SME Foundation (SMEF). The SMEF represents an incredible group of people devoted to soliciting the resources from companies and individual donors needed to

financially sustain activities ranging from academic accreditation and professional licensure to minerals education and outreach. The Ph.D. Fellowship and Career Development Grant programs represent a tremendous commitment to develop the next generation of faculty and keep these degree-granting programs sustainable. I extend my sincere thanks to the volunteers and staff engaged in these efforts and the many companies and individuals who have generously contributed in support of these activities.

During my travels this year, I was privileged to meet many people with professional backgrounds I probably wouldn't have met otherwise. I strongly believe that the best part of SME is the personal relationships you develop and the people you meet. I think it was Tim Arnold who once said there is something unique about folks in the mining industry that bonds us together. I totally agree and suspect the tunneling industry is much the same. I want to personally thank everyone who selflessly volunteers to make SME the organization it is today, from the individuals who work behind the scenes at the local sections to those who do the heavy lifting in the divisions and the countless committees that comprise the Society. I sincerely appreciate all the insights, comments and suggestions I received from concerned members with ideas on how

to make SME better. This input has been immensely valuable. I also want to thank the SME and SMEF boards and several of the past presidents, including Barb Arnold, John Mansanti and Tim Arnold; it's been an honor to have worked closely with them over the past three years. I look forward to the upcoming presidential terms of Bob Schafer and Bill Edgerton and hope they relish the experience as much as I have.

I would be grossly negligent not to expound on the professionalism, talent and devotion of the SME staff. They are simply the best, and I am forever indebted to many of them for their help, guidance and friendship. The success of SME as a volunteer organization stems from its leader, Dave Kanagy. Last year, I spent nearly as much time with Dave as with my wife, and through this experience have developed a true appreciation for his contributions to SME. I cannot emphasize how fortunate SME is to have Dave as its executive director. He is an outstanding professional and an even better person.

It's been a distinct privilege to serve as the 2019 SME President and I've enjoyed the experience. I hope that SME is able to provide you and other members of the Society with value that exceeds your expectations and the benefits needed to achieve your career objectives. Thanks again and I wish you all the best. Take care and be safe. ■

PolyMet Mine: Minnesota's first copper-nickel mine on hold

(Continued from page 8)

several issues, including those of tailings at the project, should have been vetted in an administrative trial known as a contested case hearing.

One set of issues involves the tailings basin PolyMet has proposed to hold mine waste. The proposed dam uses an upstream design, he noted, which the DNR's own research indicated is the least robust of three possible dam construction methods. Cleary cited the tailings dam collapse at the Mount Polley

Mine in British Columbia in August 2014.

The judge also noted that PolyMet hadn't chosen a waste storage technique known as dry stack storage.

Finally, Cleary noted there are valid factual questions about whether PolyMet's financial assurances are sufficient to cover future environmental cleanup costs, and whether Glencore's increasing equity interest in PolyMet requires that its name be on the state permit.

"We remain firmly committed to putting people to work in northern Minnesota and will continue pushing forward on the project," PolyMet said. "The NorthMet deposit is abundant in metals that address climate change in the way of renewable and clean energy technologies. We are confident that we can produce these high-demand metals responsibly, with Minnesota workers and in compliance with all applicable regulations." ■



SME President
Barbara J. Arnold
VOL. 70 NO. 3 – VOL. 71 NO. 2

March 2018: VOL. 70 NO. 3

An interview with the 2018 SME President

April 2018: VOL. 70 NO. 4

Important issues do not change with time; A look to the past helps us to prepare for the challenges of tomorrow

May 2018: VOL. 70 NO. 5

Honor a member; Nomination season is here, help recognize deserving members

June 2018: VOL. 70 NO. 6

SME teams with Springer for new journal; *Mining, Metallurgy & Exploration* journal to debut in 2019

July 2018: VOL. 70 NO. 7

One giant leap for mankind; 50 years after the Moon landing, where is the next Moon shot?

August 2018: VOL. 70 NO. 8

Life at the midpoint of the SME presidency; Organization, discipling and team work in the middle of it all

September 2018: VOL. 70 NO. 9

What does being the best mean to you?; It's time to evaluate the SME strategic plan and vision

October 2018: VOL. 70 NO. 10

The amazing life of Ellen Swallow Richards; A look at one of the most respected women of science

November 2018: VOL. 70 NO. 11

A time for thanks to SME's volunteers; The Society could not function without the help of many members

December 2018: VOL. 70 NO. 12

Celebrating Saint Barbara; Patroness of miners and mine safety in December
J. Steven Gardner's OSM withdrawal

January 2019: VOL. 71 NO. 1

A new year full of promise for SME; There is a lot to celebrate at the SME Annual Conference

February 2019: VOL. 71 NO. 2

As a whirlwind term comes to a close a look to the future brings promise and excitement

March 2018
VOL. 70 NO. 3

OFFICIAL PUBLICATION OF SME

Mining engineering



Barbara J. Arnold
2018 SME President

SPECIAL INSERT:

T&UC

me.smenet.org

Barbara J. Arnold;

An interview with the 2018 SME President

Tell us how you got involved in mining and about your career path.

My dad was a coal miner and my uncle was a metallurgist, so when I enrolled at Penn State's New Kensington Campus, I chose the College of Earth and Mineral Sciences — exact majors didn't get picked till the end of your sophomore year. Penn State New Ken had an associate degree in mining program and one of the guys in my carpool was going to take Mining 30 in the evening and the other guy (mechanical engineer) was also able to take an evening class. I didn't want to break up the carpool, so I took Mining 30, complete with essay tests. I could write, so I did well, and the professor said I should go into mining engineering. Fast forward to the end of the next term at University Park, and I realized there wasn't enough chemistry in mining. Switching to metallurgy would have meant another term at that point, so Dr. Lovell, my advisor, trotted me down the hall and to the next building and said I was a mineral processor. That stuck. I was a summer student at U.S. Steel Research between my junior and senior year and they paid for my master's degree — all about clay and macerals in coal flotation. During that time, the steel industry tanked, and I thought a Ph.D. would be a good idea — I could always teach at the university level if I had those credentials. The Electric Power Research Institute had a Coal Cleaning Test Facility in Homer City, PA, and I conducted my Ph.D. research on rate and residence time in conventional coal froth flotation cells there and at a local cleaning plant. I went to work at the test facility in 1987 (later CQ Inc.) and stayed there until I started PrepTech Inc. in 1997. PrepTech offers some consulting services for coal cleaning plants and sells mineral processing equipment, mostly to coal companies. I can't believe it's been 21 years.

And what about your SME career?

Of course, I was a student SME member at Penn State. We used many of the SME books in class, so who wouldn't want the student discount? While in Homer City, I became involved with the Appalachian Plateau Subsection of the Pittsburgh Section. We'd hold quarterly meetings with interesting speakers and had good attendance. I was the secretary. I'm still the secretary ... and also get the bank statements. We'll need to close that out some time, but I guess I've been hoping for resurgence in the Indiana/Cambria/Somerset area.

I started attending the SME annual meet-



ings in 1983 (Atlanta) as a graduate student. Dr. Frank Aplan took the rest of his graduate students to Los Angeles, CA in 1984, while I held down the fort. We all went to the New York meeting in 1985, and I have been privileged to attend every annual meeting since. In the early- to mid-1990s, the Coal Division saw that I was a regular attendee. Chris Bise, the long-time division secretary, was ready to go through the division chairs, so they asked me to become secretary. In addition, as a young, female, coal division member (I checked off a lot of boxes), I served on the Strategic Planning Committee in the mid-1990s, which allowed me to meet much of the SME leadership at the time.

The division changed its bylaws at some point and I was on my way through the chairs, serving as the Coal & Energy Division chair in 2003. At that time, that meant service on the SME Board of Directors as well.

2018 SME President's Interview

After that, I was on the first nominating committee under the new structure. And, then I was appointed to the SME Foundation and served as Foundation president during my second stint on the SME Board of Directors. And, of course, I need to mention service on the board of my home section, the Pittsburgh Section. I've helped with their annual meeting planning committee for several years now.

And, here I am, the 2018 SME President. It was probably foretold. Dr. Aplan gave me all of his books after he retired, including a pretty good set of AIME (or SME) Transactions. Somehow, I have three copies of the 1918 volume.

What is your view on the health of the mining industry?

When I've been asked about the coal industry this past year, I say that there is now a glimmer. How could it be worse than 2016? A change in the administration in Washington, D.C. has helped. The need for coking coal internationally has helped as well. Pennsylvania has some of the best coking coal in the world and, of course, some of the best anthracite. There are

some new mines and new plants opening with a few more cautiously on the drawing board. For the coal-fired power sector to revive and be able to provide economical, baseload power, we need to have a real understanding of the variables that affect climate. The models have all over-predicted temperature increases. In my reading on the subject, deforestation could be a bigger driver in the CO₂ increases in the atmosphere. And, until recently, the models didn't account for Sun cycles. We're heading into a period with minimal sunspot activity (I follow spaceweather.com). Some are predicting another Maunder-like Minimum. I also recommend reading about the search for the Northwest Passage in the late 1700s and early 1800s. They were looking for the passage in wooden, sailing ships until the British Navy took over. That Arctic Sea Ice had to be minimal for the search. Let me know if you'd like to read some accounts from the *Edinburgh Review*. I can send the links.

But, I digress. I think there is the beginning of a feeling, even with the public, that we need to be cautious about the lack of our own supply of critical minerals and metals and that it's not ac-

Arnold adds SME President title to an already impressive resume

Dr. Arnold holds a B.S., M.S., and Ph.D. in mineral processing from The Pennsylvania State University, where she specialized in coal froth flotation, fine particle processing, and coal petrology. Her research and development experience has included projects for government and industry funding agencies, as well as private companies, and has covered the development of a coal-cleaning simulator, coal handling, coal blending, coal cleaning characterizations, flowsheet evaluations and rare earth elements. Her experiences with U.S. Steel and the Electric Power Research Institute (EPRI) have provided her with insight into coal properties and their effect on industrial processes. As a consultant to Roberts & Schaffer, she provided assistance for projects in China, India, Australia, Poland and Canada. She currently provides technical assistance to Millcreek Engineering for projects in India.

Since 1997, Arnold has been the president of PrepTech Inc., which

provides engineering consulting services to coal companies and others in the area of coal cleaning. PrepTech is the United States representative for Multotec Process Equipment (South Africa), PrepQuip (South Africa), TH Minerals (Spain), SizeTec (Ohio), and CLIMAXx Equipment Co. (Pittsburgh). Opportunities in other minerals/materials have also been investigated for these equipment manufacturers, including heavy minerals, copper, frac sands, aggregates and incinerator waste.

With SME, she has served a two-year term as SME Foundation President (2011-2013) and a three-year term on the SME Board of Directors (2010-2013). She previously served on the SME Board of Directors from 2002-2005. She received the 2013 Frank F. Aplan Award from AIME and the 2014 Percy Nicholls Award from SME's Coal & Energy Division and ASME's Power Division. She was the first woman chairperson of SME's Coal & Energy Division (2003).

Arnold also serves as secretary

of the Coal Preparation Society of America and served as Secretariat for the International Coal Preparation Congress (ICPC) held in Lexington, KY in 2010. She is the United States representative to the International Organizing Committee for the 2019 and 2022 ICPCs.

Arnold has been an active alumna of Penn State, serving in various alumni board and advisory board roles at Penn State New Kensington and with the College of Earth and Mineral Sciences. She was named a Penn State Alumni Fellow in 2011 and received the Penn State College of Earth and Mineral Sciences Alumni Achievement Award in 2008 and the Robert Stefanko Distinguished Achievement Award, Penn State Mining Engineering, in 2007. In 2017, she received the Penn State New Kensington Distinguished Alumni Award.

Arnold serves on the Industrial Advisory Boards for Penn State's Mining Engineering Program and Montana Tech's Metallurgy Department. ■

ceptable to rely on other countries for the bulk of that supply. The U.S. Department of Energy (DOE) is investigating rare-earth elements, critically needed in many high tech products. With some international copper mines closing, some of the exploration activities in the southwest United States should pay off. And, if U.S. manufacturing is to get a boost, we can't be held hostage by other countries for raw materials. The U.S. mining industry has to have a place at the table in discussions of national security, sustainability, energy policy, etc.

And the health of SME?

While we saw a drop in membership last year, SME is still financially healthy. "The presidents," Tim Arnold (2016), John Mansanti (2017), Hugh Miller (2019) and I, met with staff in early December 2017 to take a deep dive into revenue opportunities. We think that cutting more means cutting benefits to our members. And we don't want to do that. So we wanted to look at the revenue side to see how we can expand our offerings of products and services. We identified a few opportunities and will see how those can move forward.

What are your SME goals?

We developed a Strategic Plan in 2015 that identified our values, and all of the presidents use that as a guide. John Mansanti is big on acronyms and used HELPS — **H**ealth of the society, **E**ducational sustainability, **L**ocal sections, **P**ublic perception and **S**afety. We've made strides in all of those areas. As I mentioned, the Society is certainly healthy financially. We think we need to improve in a few areas — the website, our portal to the world, needs some TLC even though we just saw a major revamping. This will certainly help our members connect better as we continue to look at new membership opportunities abroad and strive to be the premier resource and advocate for the mining community we serve.

The SME Foundation's Ph.D. Fellowship and Career Development Grant program is well underway to help with educational sustainability but could use continuing financial assistance from corporations and individuals to continue the program. Tim Arnold began monthly calls with the local section leadership, Mansanti has continued with quarterly calls, and I'll continue the same. We need to have that link between the local members and the national organization. Our Local Section Ad Hoc Committee has developed some documents to help the local section leadership engage their members. Public perception is one that we have yet to fully develop. Some activities, like Move Mining, have

identified ways to improve the public perception of mining through a children's book and add-ons to Minecraft, for example. This year we saw Move Mining Next Gen, a K-12 online competition

that had more than 100 three-minute videos submitted telling the viewer why mining is important in our lives. Watch the videos at movingnextgen.org. Our safety initiatives have gotten a boost with the addition of the Certified Mine Safety Professional certification program. Look for me to continue safety shares or value shares in my column this year.

And, I plan to add a big "I" over all of John's letters. Innovation, one of the core values in the 2015 plan, will be the key to finding the next big idea in mining. We'll build on the 2018 Annual Conference theme, *Vision, Innovation, and Identity: Step Change for a Sustainable Future*. But, "I" can't just be applied to mining technology. We need to look for innovative ways to grow SME, to sustain our mining educational opportunities, to address local section needs, to ensure that the public has an improved understanding of the contributions that mining makes to their daily lives, and to make sure everyone gets home safely every day. We need to make sure our members are well-served.

Any closing thoughts?

In this era of Big Data, the Internet of Things, Industry 4.0, SME and the mining community need to bring innovative thinking to all of its endeavors. That old cliché, "think outside the box," means more now than it ever did. We need to think big. Apply new technology. Mine for minerals and coal, but also mine our data. Can we find the next big deposit? Do we know when it's really time to change that motor? Is there some better way to predict mine subsidence? Do we use drones to survey? Can facial recognition software monitor froth bubbles and help us change reagents to improve recovery? Can we mine our SME database to improve the member experience?

And, just finishing our annual conference in Minneapolis, I want to thank our exhibitors, speakers, session chairs, SME staff, SME leadership and all of our volunteers. And thank you to everyone that participated in Vision, Innovation, and Identity: Step Change for a Sustainable Future. Let's kick off a year of innovation in SME and in the mining community. ■

Value Share - Innovation:

The vast majority of human beings dislike, and even actually dread, all notions with which they are not familiar... Hence it comes about that at their first appearance innovators have generally been persecuted and always derided as fools and madmen.

Aldous Huxley

Recovery of valuable elements from Chinese coal byproducts

by Maoming Fan, Yuemin Zhao, Zhanyuan Long and Wenxuan Liu

Coal is mainly composed of energy-producing elements carbon and hydrogen. In addition to these elements, coal usually contains many other valuable elements, including iron, aluminum, silicon, rare earth elements, lithium, gallium, germanium, vanadium, uranium, titanium, scandium and phosphorus. These coal-associated elements are significantly enriched in coal combustion byproduct fly ash because the majority of the main components, carbon and hydrogen elements, being removed.

Table 1 provides the chemical composition range of the main element oxides in 12 Chinese fly ash samples collected from coal power plants located in Northeast China, Northwest China, Southwest China and Southeast China. It can be seen from Table 1 that the major mineral components of different ashes are similar, but the bulk chemistry of different fly ashes may vary due to the changes of ratios of the mineral components in different coals. The major mineral components in various Chinese coal combustion fly ash are silicates, iron oxides and unburned carbon.

Chinese coal fly ash usually contains about 5 to 15 percent of unburned carbon, which are generally chars with irregular shapes and wide particle size distribution. In addition to unburned carbon, XRD analysis of four Chinese fly ash samples from Liaoning, Shanxi, Guizhou and Shandong provinces indicates that the fly ash samples are composed of minerals such as quartz (SiO_2), mullite ($3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$ or $2\text{Al}_2\text{O}_3 \cdot \text{SiO}_2$), hematite (Fe_2O_3), maghemite (gamma form of hematite, $\gamma\text{-Fe}_2\text{O}_3$) and magnetite (Fe_3O_4). The mullite and quartz particles are usually present as spherical particles because they are formed by melting clays, feldspars, quartz, calcite and other common minerals in coal during coal combustion. The silicate particles

have usually entrapped gas to yield hollow spherical particles because their lower melting point facilitates gas entrapment.

The iron oxides are usually spherical also. The magnetite (Fe_3O_4) is derived from pyrite (FeS_2), hematite (Fe_2O_3), siderite (FeCO_3) and limonite ($2\text{Fe}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$) in the coal. Maghemite ($\gamma\text{-Fe}_2\text{O}_3$) is formed by

Table 1

Chemical compositions of Chinese fly ash.

Element oxides	Mass (%) range	Mass (%) average
SiO_2	36.5~61.7	50.7
Al_2O_3	18.1~39.6	28.1
Fe_2O_3	1.4~20.2	7.4
CaO	0.5~9.6	2.2
MgO	0.4~1.7	0.9
K_2O	0.4~2.3	0.8
Na_2O	0.3~1.2	0.5
SO_3	0~0.9	0.4
Loss on ignition	2.8~24.5	8.6

dehydration of the mineral hydrohematite ($\gamma\text{-FeO}(\text{OH})$) and/or oxidation of magnetite (Fe_3O_4) during coal combustion. Maghemite ($\gamma\text{-Fe}_2\text{O}_3$) and magnetite (Fe_3O_4) are strongly magnetic, so they are recovered from Chinese coal fly ash and widely used for coal processing in China (Fan et al., 2005, 2000).

More than 272 Mt/a (300 million stpy) of fly ash are produced in China. Chinese companies have been developing recovery processes for iron, carbon, alumina, strategic metals, rare earth elements and scandium. This article presents various process technologies for recovering valuable elements from Chinese coal combustion by-products. These whole processing technologies preferably include recovering iron and unburned carbon from fly ash using dry separation steps prior to wet separation to recover aluminum, rare earth elements, lithium, gallium, germanium, vanadium, uranium, titanium, scandium, phosphorus and silicon because:

1. Some valuable elements such as gallium (Ga oxide species), germanium (hexagonal- GeO_2 and GeS_2) and vanadium occur as water soluble.
2. Water is expensive where most coal power plants are located.
3. The costs for product filtration and drying are high.
4. The water pollution could be severe.

M. Fan, member SME, is senior process engineer, Eriez Manufacturing Co, Erie, PA, **Y. Zhao**, is professor China Univ. of Mining & Tech., Xuzhou, China; **Z. Long**, is senior process engineer, Guizhou Shuicheng Mining Co., Liupanshui, Guizhou, China and **W. Liu**, is senior process engineer, Datong Coal Mine Group Co., Datong, Shanxi, China, email mfan@eriez.com.

Important issues do not change with time; A look to the past helps us to prepare for the challenges of tomorrow



Barbara J. Arnold
2018 SME President

While I look forward to the next year as SME president, I have also taken a look back into the American Institute of Mining Engineers (AIME) proceedings from 1918 and 1919. World War I would end in 1918, but the Spanish flu pandemic was taking a toll. What were the AIME issues? How were they addressed?

Local sections

The 1917 AIME President, P.N. Moore, presided at the 1918 Annual Meeting of the AIME held in New York. The first topic in his report was "Stimulation of the Local Sections."

It seems that the idea of sections had been around for 30 years but only implemented five years prior. President Moore visited all but two of the sections and "the failures came through no fault of his, but through infrequency of their assemblings." He traveled some 30,000 miles. He stated: "An effective body must have its centralized working board easily assembled, and able to speak with authority; at the same time, if its widely distributed membership, doing the real work of the profession in the mountains, mills and smelters, be not consulted actually, instead of nominally, if these men be not made to realize that they count, that their judgment is desired and has weight, inevitably loyalty lapses and yields place to indifference and criticism." The 1918 president, Sidney J. Jennings, also visited sections (six of the 15) and reported on a membership increase to 7,300. This was not an easy task, as many able-bodied engineers were in Europe during WWI. Jennings said, "I estimate, however, that there are at least 14,000 people in the United States who as members, associates or junior associates, should belong to our Institute. That is a figure that we should set as a mark and

Safety share: Fatal Accidents Alert: Two Mining Deaths within 24 Hours (<https://arlweb.msha.gov/Alerts/January-Coal-MNM-Fatal-Alert-2017.pdf>) On Jan. 25, 2017, a miner was found in an underground limestone mine after failing to exit the mine at the end of his shift. The miner was found under material that had fallen on him from a rib in an area of the mine that had been barricaded to prevent entry due to bad roof and rib conditions.

On Jan. 26, 2017, a coal miner was discovered entangled at a conveyor belt drive, also after failing to exit the mine at the end of his shift. In both of these instances, the victims were working alone and in restricted areas where there were hazardous conditions.

Best practices:

- Never enter hazardous areas that have been dangered-off or otherwise identified to prohibit entry.
- Develop and train miners on a method that clearly alerts miners not to enter hazardous areas.
- If possible, do not work alone. If working alone, communicate intended movements to a responsible person.
- Before beginning any task, identify known and potential hazards.
- Never perform work on a moving conveyor belt.
- Ensure equipment guards are adequate and secure to prevent miners from contacting moving machine parts.
- Before working on equipment, de-energize electrical power, lock and tag the visual disconnect with your lock and tag, and block parts that can move against motion.

not rest content until it is achieved." And they did something about it in 1918, changing the name to the American Institute of Mining and Metallurgical Engineers. "With the change of name, the activities of a large and increasingly important part of your membership has [sic] been recognized. It is hoped that those who previously were unwilling to call themselves mining engineers will find themselves attracted to that scientific society that not only provides them with the class of papers they are interested in discussing but also recognizes them in its name."

Today, we are also focusing on our local sections, with quarterly calls with the president, visits to as many section meetings as possible (we have more than 50 sections today), and communication and archiving tools on the SME

(Continued on page 10)

Value share: "Imagination is not only the uniquely human capacity to envision that which is not, and, therefore, the foundation of all invention and innovation. In its arguably most transformative and revelatory capacity, it is the power that enables us to empathize with humans whose experiences we have never shared."

J.K. Rowling

What doesn't exist today that would transform mining? What can we imagine? We've convened an Innovation Task Force to help with that vision. Send your ideas. Email me at sme2018president@smenet.org.



Donlin Gold decision expected this year; NovaGold Resources waiting on final environmental reports

WHILE THE trials and tribulations of the Pebble Project in Alaska have been well documented here and elsewhere, *E&E News* reported on a potential mining success story in Southwest Alaska.

The Donlin gold mine, a partnership of NovaGold Resources Inc. and Barrick Gold Corp., has quietly progressed to the point at which the U.S. Army Corps of Engineers is set to release its final environmental impact statement on what is one of the largest undeveloped gold deposits in the world.

NovaGold and Barrick predict that the gold strike could hold at least 1.1 kt (39 million oz) of precious ore. “We can say with conviction that these are some of the finest intercepts any gold company has produced recently

— and in any jurisdiction,” NovaGold president and chief executive officer Greg Lang said in a project report.

In its 2017 financial report, Lang described the company’s drilling program as “better than expected,” with high grades of ore found not only in the original mine area but in regions well beyond the current site.

While the Donlin Creek project has progressed well, the Pebble Project, which is also located in southwestern Alaska, has faced a series of hurdles. The most recent was a decision by U.S. Environmental Protection Agency Administrator Scott Pruitt to reverse a decision that would have stopped Obama-era regulations, arguing that “any mining projects in the region likely pose a risk to the abundant natural resources that exist there.”

The Donlin gold mine has drawn objections from some Native villages and state environmental groups but has been staying out of the national spotlight.

Since 2012, regulators have held 29 meetings in 17 villages located near the proposed mine. Meanwhile, Donlin Gold has hosted site tours with local leaders, invested in community projects throughout the Yukon-Kuskokwim area, and has become one of the major donors for Alaska’s iconic Iditarod dog mushing race.

The company plans to produce an average of 30 t/a (1.1 million oz/year) of gold for roughly 27 years, although NovaGold recently said digging could continue well beyond that date, thanks to early signs that the site holds more ore than originally expected. ■

President’s Page: We should all learn from our history

(Continued from page 6)

Community. We want our sections to be vibrant, to create good networking opportunities for our members and to provide good technical content. We thank all of the section leaders for their hard work. And we want you to nominate your leaders for service and technical awards at the national level. We don’t want them to be unsung heroes. When it’s time to nominate for SME or AIME awards later this summer, we want to hear from you.

And we continue to embrace all aspects of the mining and tunneling industry today as we increase our focus on health and safety with the launch of the Certified Mine Safety Professional certification. The first test should be offered in August.

WAAIME

In 1918, WAAIME was one year old! “The president, Mrs. Sidney Jennings, said in her greeting, ‘it is a matter of congratulation that during

the past year, when the demands upon women for work of all kinds has been so large, our membership has grown from the 50 enrolled at the first meeting a year ago to more than 300 today.” They had committees on Americanization, Emergency, War Relief and Foreign War Relief. Our WAAIME division is seeking new members to support its scholarship program, not just financially, but by screening applications for scholarships. Women and men can be members. Learn about philanthropy. Suggest programming that can have an impact beyond our technical fields.

Young members

Interestingly, they also had a committee on junior members and affiliated student societies. We need to facilitate the transition of our student members to active professional members. We had a “mega issue” discussion of this at our March 1 board of directors meeting in Minneapolis, MN and developed new ideas and charges

for staff and volunteers. We’re also hoping to engage our past presidents in contacting CEOs and CTOs and explaining the benefits that SME membership can bring to their junior staff.

Wrap

To close, let me encourage everyone to understand our history as we charge forward with plans for including sessions and conferences on innovation, while keeping the SME values of member first, professional excellence, and innovation in sight. In this vein, we must recognize the Murray family for establishing the Robert E. Murray Innovation Award. We’ll recognize an industry innovator, listen to the inaugural innovation lecture at the 2019 Annual Conference & Expo, and award a \$5,000 scholarship to a worthy student. As many know, Bob Murray served as chair of the Coal Division of SME, SME president, and AIME president. Thank you, Bob and Ryan Murray. ■

Honor a member; Nomination season is here, help recognize deserving members



Barbara J. Arnold
2018 SME President

John Mansanti challenged us to “Be a member, get a member!” I’m going to challenge you to honor a member.

It’s that time of year when awards nominations and nominations for SME national leadership are open, and it’s time to honor those worthy of such recognition.

Awards

There are SME awards, SME-AIME awards, division awards and SME Foundation awards. We have awards for technical achievements, leadership, professional excellence, educational support and service.

These are given to some outstanding recipients each year. You can find the awards criteria and nomination requirements on the SME website under Membership and then Awards. We are blessed to be able to recognize so many worthy people.

Nominations are submitted online, usually with a deadline of June 1, though some are open longer (Distinguished Member, for example). Individuals and groups can nominate people (or groups, in some cases) for these awards. I encourage each local section and division to have a nominating committee that considers their members as potential recipients for all of these awards. Our awards committees should have large pools of candidates. And, award committee members, don’t be slackers. Solicit nominees or nominate candidates.

New this year will be the nomination for the Robert E. Murray Innovation Award. This is for practical application of innovative technologies. The recipient will address the keynote session and receive their award at the SME Awards Banquet on Wednesday night at the Annual Conference & Exhibition. This will be a key to recognizing our core value of innovation. In addition, a student will receive a \$5,000

Value share: SME core values: “Members First” and “Professional Excellence.”

“My meaning simply is, that whatever I have tried to do in life, I have tried with all my heart to do well; that whatever I have devoted myself to, I have devoted myself to completely; that in great aims and in small, I have always been thoroughly in earnest.”

Charles Dickens,
David Copperfield

Safety share: Serious Accident — On Feb. 8, 2018, a plant operator was shoveling material from around a crusher when a rock fell from the Surge Bin deck above, striking the victim on the head. The rock split the victim’s hardhat and the miner suffered a serious head injury.

Best Practices

- Install adequate guarding in areas where miners work to protect them from the hazards of falling or flying material.
- Keep walkways clear. Remove all loose materials and other hazards before working.
- Eliminate or minimize material spillage from belts, bins and hoppers.
- Be mindful of falling material hazards and the risks from rock that can fly out from the screening plant.
- Wear required personal protective equipment.
- Restrict access to areas prone to falling or flying material.
- Establish and discuss safe work procedures.
- Task train miners to recognize and eliminate all potential hazardous conditions and understand safe job procedures to eliminate all hazards before beginning work.
- Do not place yourself in a position that will expose you to hazards while performing a task.

**Submitted by U.S. Mine Safety
and Health Administration**

scholarship — applications for scholarships are called for shortly after school begins in the fall.

National leadership

It’s also time to nominate individuals for openings on strategic committees (Finance, Education & Professional Development, Outreach, Structure & Governance and Products & Services), the SME Board of Directors and for SME President 2021. Generally, these positions require some past national service, such as with a division or standing committee, so that the individual has an understanding of national issues and structure. Just as the SME Board of Directors considers members of the nominating committee that come from diverse interests, backgrounds, experience, education, geographic region, industry areas and specialties,

(Continued on page 10)



Electric vehicles expected to drive demand; Cobalt could see a boom as demand for clean energy-cars rises

THE EXPECTED demand for lithium-ion batteries to power the growing electric vehicle market has sparked a cobalt boom with multi-million dollar deals happening around the globe.

In North America, First Cobalt Corp. announced a friendly takeover of US Cobalt Inc., as the Canadian mine developer accelerates its push to first production of the battery metal on forecasts for a boom in electric vehicles.

Under the all-share deal valued at approximately C\$149.9 million (US\$115.74 million), First Cobalt will add US Cobalt's exploration properties in Idaho and Utah to its 50 mining properties in Cobalt, Ontario, alongside a mill and permitted cobalt refinery.

In another development, Glencore Plc, the world's biggest producer of cobalt, announced that it has agreed to sell around a third of its cobalt production over the next three years to Chinese battery recycler GEM Co Ltd.

Glencore will sell 52.8 kt (58,000

st) of cobalt hydroxide to GEM between 2018 and 2020 as demand for cobalt, a critical metal in lithium-ion batteries, soars on a forecasted boom in electric vehicle sales.

"The Idaho project is at a more advanced stage than our work in the Cobalt camp in Ontario. The appeal to us is that it is a faster pathway to production," First Cobalt chief executive Trent Mell told *Reuters*.

Prices for cobalt have spiked 60 percent over the past 12 months amid forecasts that demand will double in the next decade as consumers switch to less-polluting cars.

Nearly all cobalt, which prolongs battery life, is mined as a byproduct of copper and nickel, making it difficult for miners to increase output.

According to consultancy Wood Mackenzie, 64 percent of the 117 kt (129,000 st) of cobalt mined in 2017 came from the Democratic Republic of Congo.

A newly revised mining code in the Congo also has the potential to

seriously affect mining projects there.

Currently there are no cobalt mines in operation in North America.

Expectations of supply shortages have fueled a cobalt rally that has taken prices to around \$39 a pound, from nearly \$10 a pound in January 2016 and to their highest level since July 2008, before the financial crisis started.

According to the filing, GEM and its subsidiaries will purchase 13.8 kt (15,200 st) of cobalt hydroxide from Glencore in 2018. They will buy 18 kt (20,000 st) in 2019 and 21 kt (23,000 st) in 2020.

Glencore, whose cobalt is mined as a byproduct from its copper and nickel mines in the Democratic Republic of Congo, Canada and Australia, expects to produce around 39 kt (43,000 st) of cobalt in 2018 — equal to about 35 percent of estimated global production.

Glencore expects its cobalt production to rise to 65 kt (71,600 st) in 2019 and dip to 63 kt (69,400 st) in 2020. ■

President's Page: Now is the time to get more involved with SME

(Continued from page 6)

we want you to consider nominees for all of these positions with this same broad view. We're counting on division nominating committees to nominate their outstanding members to these positions. And we accept nominations from any member. Simply send the individual's name, affiliation, and contact information to Genny Homyak (homyak@smenet.org).

Would you like to get involved in SME national leadership some day? Start by getting involved in a division or on a standing committee. As we've reviewed committees over the past year, we know that there is something for everyone. Show up at their meeting

at the Annual Conference and say you want to get involved. Or check out the Bluebook under Membership on the SME website to find out who to contact.

Philanthropy

Many of you give generously to your division scholarship funds or to the SME Foundation. We recognize contributions in *Mining Engineering* each spring. Did you know you can make those contributions in honor or in memory of someone? We'll begin including that notation in the future. What better way to honor a mentor, a leader, a servant. So when you make your contribution this year, make a note that your contribution is given in honor

of someone. I'm sure we all can think of someone we'd like to honor in this way.

Wrap

It's an honor to serve as SME President. Please note that "serve" is an active verb. I don't think a day has gone by when there hasn't been something to address by responding to at least one email — usually there are several, not to mention conference calls and other discussions. Traveling to represent SME, writing a column, trying to break the website, and encouraging YOU to honor others — it's all part of a day in the life of the SME president. Don't forget John's challenge to as well: "Be a member, get a member!" ■

SME teams with Springer for new journal; *Mining, Metallurgy & Exploration* journal to debut in 2019



Barbara J. Arnold
2018 SME President

*"I'm so excited, and I just can't hide it
I'm about to lose control and I think I like it."*

Well, maybe I'm not quite that excited, but it's close. Paying tribute to a Pointer Sisters song is not crazy — I'm of the generation that cheered on the 1979 "We Are Family" Pittsburgh Pirates.

Mining, Metallurgy & Exploration (MME) journal.

I'm pleased to announce a new SME member benefit, the *Mining, Metallurgy & Exploration (MME)* journal that will launch in early 2019.

We'll build on the success of our *Minerals & Metallurgical Processing (M&MP)* journal that has been led for many years by Dr. S. Komar Kawatra with oversight from the Mineral & Metallurgical Processing Division (MPD). Under Dr. Kawatra's leadership, this journal has published four issues each year, full of high-quality, widely referenced papers. This effort will continue as part of the new journal, and we will be able to publish more papers to a wider audience. Dr. Kawatra will serve on the Journal Oversight Committee as the past executive editor.

We will be publishing our journal in partnership with one of the world's largest publishers, Springer, in an arrangement that will provide revenue to SME and streamline the publishing process. Through the Springer network, our journal will be accessible to up to 7,000 libraries worldwide and up to 20 million potential readers. Furthermore, all SME members will have free access to the journal in electronic form through a link to the Springer system on the SME webpage. This will effectively be an additional member benefit valued at \$109 per year.

The new journal will require some changes

Value share: Professional Excellence - "If a man is called to be a street sweeper, he should sweep streets even as a Michaelangelo painted or Beethoven composed music or Shakespeare wrote poetry. He should sweep streets so well that all the hosts of heaven and earth will pause to say, 'Here lived a great street sweeper who did his job well.'"

Dr. Martin Luther King Jr.

Safety share: Keep every corner clean, organized and clutter-free. Slipping and tripping are usually caused by scattered objects or spills on the floor. Make sure that your workplace is always clean and fresh. Keep the aisles clean, organized and clutter-free to ensure that nothing's in the way that can hurt those who are working.

This is just one, direct way that clutter influences your workplace negatively. However, there is another, more indirect way, also. Stress reduces the cognitive abilities in people. This means stressed employees will be clumsier, more prone to mistakes, accidents and decreased productivity. If you cannot handle de-cluttering your workplace, at least make sure you have a well-stocked first-aid kit ready.

Submitted by Alisco

to *Mining Engineering* and *SME Transactions*. We will publish summaries of the journal papers in *Mining Engineering* each month so our members will be able to follow the state of the art in their interest areas, and *Transactions* will cease publication at the end of 2018. Papers that would have normally gone to **M&MP**, *Mining Engineering* or *SME Transactions* will now be submitted to the new journal. In the middle of this year, Springer will launch a website for submissions to the new journal, and we will be publicizing it as soon as the website is ready.

We want this journal to be where leaders in the profession look to present their research results. The journal will start with six issues per year beginning with the February 2019 issue. We will be publishing at least 70 papers each year. All papers will go through a peer-review process, and papers should appear online 16 days after acceptance. There is no page limit for papers, within reason; no restriction on color figures; and no page fees. An Open Access option will be available to authors who want to make their papers freely available to the public. The papers will appear in OneMine two years after publication. Springer is also helping us to digitize back issues of **M&MP**, which will be available on the Springer system.

(Continued on page 14)



Wyoming coal mine might be brought back; Demand for export coal could provide lifeline to Youngs Creek Mine

CLOUD PEAK ENERGY is among the U.S.-based coal mining companies that see opportunities in the export market. It is now attempting to revise its permit for the Youngs Creek Mine in Wyoming which was initially issued in 1977, to provide more export coal to the Asian market.

The Youngs Creek Mine is on the border of Wyoming and Montana and near the company's existing Cordero Rojo and Antelope mines in Wyoming and the Spring Creek Mine in Montana. Cloud Peak is one of the few Powder River Basin companies exporting coal to Asian markets via a port in Canada.

The *Casper Star Tribune* reported that Cloud Peak hopes permitting will be complete by late this year. Potentially, Youngs Creek could produce coal by 2019, ultimately providing the firm with up to 907 kt/a (1 million stpy), according to Cloud Peak.

Domestic demand for coal has continued to slump in recent years. Nationally, coal plants have been

retiring early as demand declines. The Energy Information Administration (EIA) projects coal's portion of the national electricity mix could fall to 29 percent this year.

Wyoming coal producers have turned an eye toward the export market, and the proposal to bring Youngs Creek back online has the support of Wyoming gubernatorial hopeful Sam Galeotos, who noted Cloud Peak's strong safety record. He also plugged for the Asian markets.

Cloud Peak has only tapped Asia with its Spring Creek coal, just across the border from the Youngs Creek site.

"This proposed mine gives Wyoming the opportunity to extract high-energy coal for use in Asian markets via the Pacific Northwest," Galeotos said. "These markets are ripe for more coal imports."

Cloud Peak chief executive officer Colin Marshall noted in an investor's call that many hope the wave of coal-fired power plant closures is coming to an end. But Marshall and others acknowledge the structural decline in

the national coal market.

The hope to send coal elsewhere has only intensified for operators, miners and coal-dependent business owners in the Powder River Basin, who are desperate for new long-term customers.

There is a demand internationally. Though coal-burning plants continue to shutter in the United States, countries like South Korea and Japan continue to build. Middle Eastern countries like Iran and Pakistan also continue to add new coal-fired plants, according to the EIA.

But the economics remain a problem for Wyoming mines. Hotter value coal from Montana mines — which are geographically closer to ports — continue to be the Powder River Basin source for Asian-bound coal. And the economics of coal in Wyoming are currently less than ideal.

Cloud Peak is billing Youngs Creek as part of its Spring Creek mining complex, potentially adding higher heat Wyoming coal to its marginal Asian business in 2020 to 2021. ■

President's Page: Anthracite Region to prepare for a celebration

(Continued from page 6)

250th Anniversary of Anthracite

For those of you who don't know, I am a coal girl — I grew up with a coal furnace that allowed us to wear shorts in the house during PA winters and with a coal miner for a father (cmdaughter@comcast.net). So it is with great pleasure that I announce that in 2018 the Pennsylvania Anthracite Region is celebrating the 250th anniversary of anthracite's first use.

Pennsylvania anthracite coal's discovery and first uses, like many of the stories in the Anthracite Region, is the stuff of fable. Most Wikipedia accounts place Pennsylvania anthracite's discovery in the 1790s by various local legendary characters,

while its first known uses date back to the 1750s. There's a record of Fort Augusta, in today's Sunbury, using it at a source of heat in 1758, when a wagonload of "stone coal" came down the Susquehanna from Nanticoke.

So, why are we celebrating the 250th Anniversary of Pennsylvania anthracite this year? Blacksmith Obadiah Gore Jr. may have fashioned the first successful industrial use of our anthracite in 1768, and industry has been using it since.

The stories of the Anthracite Region relate a remarkable heritage involving working-class culture and innovative technology and corporate will. We were the envy of the world in the 1890s. Hundreds of thousands of hard-working miners in Northeastern Pennsylvania created modern

America by digging coal. In some 250 years, our industry produced more than five and a half billion tons of anthracite coal and altered America. It provided thousands of jobs and homes for immigrants escaping poverty and tyranny, producing a fascinating hardcoal legacy.

Scott Herring, the "Last Anthracite Photographer" decided we should celebrate the 250th this year and has enlisted some 200 groups to celebrate "Hardcoal Homecomings." Hundreds of individual local and regional events will commemorate the 250th anniversary at various events in their communities this year between Carbondale, Harrisburg and Philadelphia, the territory of the Penn Anthracite SME Section. ■

One giant leap for mankind; 50 years after the Moon landing, where is the next Moon shot?



Barbara J. Arnold
2018 SME President

Almost 50 years! Forty-nine years ago, this little girl was holed up inside watching TV and absorbing everything related to the Apollo 11 mission, going outside only to announce to my family that they landed on the Moon. Then that night, as I had fallen asleep on a chair in the living room, my mom and dad woke me up to see Neil Armstrong take those first historic steps on July 20, 1969. Wow! Cool! How could that not imprint science and engineering on an entire generation?

The Apollo program certainly spawned many giant leaps in technology (see NASA Facts, FS-2004-07-0020JSC, 2004). Moon boot material revolutionized athletic footwear and spacesuit fabric led to materials for retractable stadium roofs. We have chlorine-free pool purifiers, solar panels, heart monitors, cordless instruments, Dustbusters, kidney dialysis machines using “sorberent” dialysis, clocks with quartz crystals to keep missions and all of us on time, etc. It wasn’t all about Tang. (I just looked; you can buy it on Amazon.)

Where’s our moon shot now? When is our next giant leap going to happen? Prior to the SME midyear board meeting in Pittsburgh, PA, SME will host its first one-day THRIVE conference, highlighting hot topics, innovators, new technologies — some recently applied, some in dream mode. Attending conferences and reading journals and web news, sometimes, I just say Wow! Cool! So I’ve been tracking down presentations on these technologies for this conference, and I hope you’ll join me on Sept. 27, 2018 at Sheraton Station Square, Pittsburgh, PA. You can access registration information through the SME website: www.smenet.org.

We’ll fly into mines with drones, mine remotely below 609 m (2,000 ft) with horizontal

Safety share: Summer is upon us, so I thought I’d summarize some tips from the National Safety Council’s web post “Heat Illnesses Can Be Fatal; Would You Know What to Do?” (www.nsc.org/home-safety/tools-resources/seasonal-safety/summer/heat)

How to avoid heat-related illnesses?
“The best way to avoid a heat-related illness is to limit exposure outdoors during hot days. Air conditioning is the best way to cool off, according to the CDC. Also:

- Drink more liquid than you think you need and avoid alcohol.
- Wear loose, lightweight clothing and a hat.
- Replace salt lost from sweating by drinking fruit juice or sports drinks.
- Avoid spending time outdoors during the hottest part of the day, from 11 a.m. to 3 p.m.
- Wear sunscreen; sunburn affects the body’s ability to cool itself.
- Pace yourself when you run or otherwise exert your body.”

I can’t wear chemical sunscreen—I break out in a terrible rash. So I mostly cover up or avoid the sun. But, if I can’t, I rely on the mineral-based sunscreens with TiO₂ and ZnO.

drilling technology, use robots for mining flooded mines, and see how a pre-Autocad preparation plant was modeled with laser scanning technology to efficiently retrofit new circuitry, bringing it up to date. We’ll talk new reagent technology, artificial intelligence, communications, autonomous haulage, but, above all, safety.

We need to be innovators. Those 35 minerals deemed critical to U.S. national security and the economy won’t mine themselves (www.usgs.gov/news/interior-releases-2018-s-final-list-35-minerals-deemed-critical-us-national-security-and). These commodities were identified as those having a supply chain vulnerable to disruption and that aid in manufacturing products, “the absence of which would have significant consequences for the economy or national security.” (Personally, I’d be good if the

Value share:

- That’s one small step for a man, one giant leap for mankind.
- Mystery creates wonder and wonder is the basis of man’s desire to understand.
- Houston, Tranquility Base here. The Eagle has landed.

Neil Armstrong

(Continued on page 14)



Cobalt discovered near BMW plant; Mining could return to German region since Renaissance period

COBALT, a key component in the batteries that power the next generation of automobiles, might also be driving a revival of mining in Germany.

An ore deposit of cobalt was recently discovered in a forested section of Saxony's Eichigt municipality, near the the plant where the German auto manufacturer BMW makes its i3 electric city car, *Bloomberg* reported.

It is Germany's first detection of the metal in modern times and could revive mining in an area that last saw activity during the Renaissance era. The discovery could also help diversify raw-materials supply, said exploration company Lithium Australia NL.

Currently, about 60 percent of the world's cobalt is concentrated in the Democratic Republic of Congo, where

concerns over working practices and political strife have sparked a global hunt for alternative sources.

Lithium Australia plans to "become a major supplier of energy metals — lithium and cobalt in particular — into the European market," managing director Adrian Griffin told *Bloomberg*. The region "is the fastest-growing geographic sector for lithium-ion cell consumption outside China."

Production of battery cells, which are assembled into the packs that power electric cars, has so far been concentrated in Asia. That's set to change as European carmakers like Volkswagen AG and Mercedes-Benz parent Daimler AG ramp up offerings of electric vehicles. China's BYD Co. is contemplating a factory in Europe, while Stockholm-based Northvolt AB

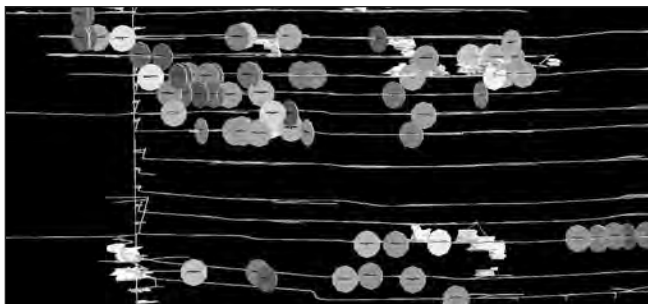
is set to develop a 4 billion-euro (US\$4.7 billion) plant in Sweden to rival Tesla Inc.'s Gigafactory.

Contemporary Amperex Technology Co., the manufacturer known as CATL that is China's biggest cellmaker, is nearing a decision to set up a facility in Germany.

To be sure, the journey from discovery to producing minerals takes years and often fails. Other prospectors have jumped on the cobalt bandwagon following a record price spike, to tout promising early stage projects in Canada and the United States. Any hopefuls face competition from established Congo mines owned by major producers such as Glencore Plc.

Eichigt is located on the Czech border about 130 km (80 miles) south of Leipzig, the largest city in Saxony and the site of BMW's i3 plant.

Lithium Australia bought the Sadisdorf lithium project, also in the eastern German state, from Tin International AG, underscoring its ambition to develop a European supply chain. Meanwhile, competitor Saxony Minerals & Exploration AG has gained a license to prospect for minerals there, including cobalt. ■



We see an additional 100,000 ounces of gold

Accurate structural geology interpretation can mean the difference between a money pit and a gold mine.

When our team of the world's best structural geology specialists analyse complex data sets you get insights that let you make confident, informed decisions.



Before you undertake your next mining project, let us give you a clear picture of the risks and rewards.

For a snapshot of 17 distinct services to the global mining industry, download our new mining brochure, available at:

 **srk.com**

>1,400 professionals • >45 offices • 20 countries • 6 continents

President's Page: SME will look for the next Moon shot at the THRIVE conference

(Continued from page 6)

cell phone went away some days.) Naturally, the list includes rare-earth elements used in high-tech applications. It also includes aluminum and uranium.

If we look to mine these critical minerals in the United States, how do we, focused on safety, sustainability and the environment, assist best in this endeavor? Do we have the best technologies, the best data to get us to Industry 4.0 in mining and processing, the best skilled workforce, the social license?

Do we need new mines? Do we know what's in the tailings left behind by prior generations of miners? Can we re-mine and re-process tailings and reuse sites to recover these critical minerals, creating other value-added products as we go?

The possibilities are endless ... Oh, the places we'll go. ■

Life at the midpoint of the SME presidency; Organization, discipline and team work in the middle of it all



Barbara J. Arnold
2018 SME President

August — the sixth month of the SME presidency — in the midst, the middle, the center, the midpoint. It's been my pleasure to meet many SME members and wave the SME flag at several conferences already. There are many more conferences and meetings on the schedule and I'm sure I'll be meeting even more members. I've learned that apparently, "president" isn't a sufficient title for some. I've been called the queen, queen empress and, my favorite, mother of the mother ship. Many have asked how I can do this and still run my business. Let me tell you that I had to pay someone to cut my grass for several weeks in May and June and

that my house needs a good cleaning.

An engineering professor at Penn State New Kensington told our statics class that to be a good engineer you need to be organized, disciplined and flexible (and be able to stand math). I've taken that to heart throughout my career and those principles certainly apply to my approach to the SME presidency, especially since I also have a high school class reunion, the Mortar Board Centennial and my niece's wedding this summer. And, of course, SME staff keeps everything on track.

SME participates in the Global Minerals Professional Alliance (GMPA) with other international mining societies. We share our best practices and discuss issues of relevance to our societies. The Canadian Institute of Mining, Metallurgy and Petroleum (CIM) hosted the GMPA at its annual conference in Vancouver in May, which I attended. Looking at the numbers from our benchmarking survey, I can say with great confidence that SME is well-positioned within the global mining society community. The depth and breadth of our publications, our support for education (student chapters, ABET, Ph.D. fellowships, career grants, the Minerals Education Coalition, etc.), our membership

Safety share: Watch your back — Prevent back injuries. Back injuries account for about one-fourth of the lost-time injuries in the mining industry. Many of these injuries could be avoided if miners practiced a few basic and simple rules for back conservation.

Because the lumbar region is the back area at greatest risk during normal work, it deserves to be the main focus of back conservation and maintenance attention.

Try to minimize the need to move materials manually. Proper planning and good job design can eliminate much lifting. The use of mechanical lifting aids can be a back-saver. However, if you must lift, remember that your body is not a crane; your back is not designed to "boom up", "boom down" or "boom to the side" with ease. If you must lift or carry a load:

- Examine the load for hazards.
- Know your limit and halve it.
- Plan your path and make sure it is clear.
- Consider how and where you will set it down.
- Stand close to the load.
- Do not twist your body to get into position.
- Squat down and tuck in your chin, while keeping your back as straight as possible.

Submitted by U.S. Mine Safety and Health Administration, full list of safety tips can be found online: https://arlweb.msha.gov/illness_prevention/healthtopics/HHICM01.HTM

numbers, financial strength and every other metric are top-tier.

So what can you expect in the next six months? You'll be hearing about a deep dive into our website. Is it logical? Can you find things where you think you should find them? Are there broken links? Is the information correct and updated? We'll also be completing our member satisfaction survey this fall. This one occurs every four years. And, next spring, we'll do a survey in preparation for our next round of strategic planning that will begin in the summer of 2019. We need member input to ensure that we serve you and meet your needs as an SME member. Please respond. Or contact me with any issues at any time.

As I mentioned last month, our first THRIVE conference will be held on Sept. 27, 2018, preceding the SME midyear board meeting. I'll welcome everyone to Pittsburgh,

(Continued on page 14)

Value share: For all my friends in the media who like quotes, mark this quote down. From this day on I'd like to be known as 'The Big Aristotle' because Aristotle once said, 'Excellence is not a singular act; it's a habit. You are what you repeatedly do.'

Shaquille O'Neal,
NBA Hall of Fame



Tesla to add electric vehicle factory in China; Demand for some commodities expected to remain strong

THE ELECTRIC vehicle market has sparked a boom for a number of commodities needed for the batteries of the vehicles, and the demand for those vehicles is not letting up any time soon. Tesla, the leading producer of electric vehicles, announced plans to build its first factory outside the United States in Shanghai, becoming the first wholly foreign-owned automaker in China.

Tesla said construction would begin in the near future, once official permits are obtained. It said production would begin two to three years after that and eventually increase to 500,000 vehicles annually.

Time reported that the announcement comes amid mounting U.S.-Chinese tension over technology and follows Beijing's April promise to end restrictions that required foreign automakers to work through

local partners.

China is the world's biggest electric vehicle market, but Tesla and other producers, including GM and Nissan Motor Co., had been reluctant to transfer manufacturing to this country due to the requirement to share technology with Chinese partners that might become rivals.

Tesla began selling cars in China in 2014, shipping them from its California factory, which added a 15-percent import duty to the price.

Despite that, China quickly became its No. 2 market after the United States. "Tesla is deeply committed to the Chinese market," the company said in a statement.

Tesla is among companies hit by additional 25 percent import duties imposed by Beijing in retaliation for a tariff hike by U.S. President Trump in a dispute over technology policy.

Tesla has discussed opening a factory in China since 2016. "Still need to see how it gets paid for, which has been a concern," Cowen

analyst Jeffrey Osborne said.

The new factory could increase demand for a number of commodities. According to Benchmark research and reported by *Mining.com*, Tesla's current gigafactory in Nevada, along with its Japanese plant, will consume about 16 kt (17,600 st) of lithium (hydroxide), 1.5 kt (1,650 st) of cobalt, 25 kt (27,500 st) of graphite and 17.5 kt (19,300 st) of nickel.

And it's not just Tesla. Automakers are pouring billions of dollars into developing electric car models for China.

GM, Ford Motor Co., VW, Nissan and other competitors have announced ventures with local automakers to develop models for China's lower-income market.

Sales of pure-electric passenger vehicles in China rose 82 percent last year to 468,000, according to an industry group, the China Association of Automobile Manufacturers. That was more than double the U.S. level of just under 200,000.

Beijing is using access to its market as leverage to induce global automakers to help Chinese brands develop battery and other technology. ■

Good operations design: \$31M
Great operations design: \$24M

Implementing a conventional design for this Nevada tailings facility would have run ~US \$31 million including up-front cash payment for reclamation bond costs.

Our double-lined, passive water management design delighted state regulators and expedited approvals and permitting.

The immediate reduction in long-term reclamation bond costs more than offset the higher capital costs for the double-lined passive closure design — saving the client ~\$6 million in short-term cash-flow obligations.

That's a 'green' solution you can take to the bank.

srk.com

>1,400 professionals • >45 offices • 20 countries • 6 continents

President's Page: Exciting things lie ahead for the remainder of 2018

(Continued from page 6)

PA. If you haven't registered, please visit the SME website to do so. I've compiled a terrific line up of new technologies that will fascinate you. Don't just survive, THRIVE!

We're also on track to launch our new journal at the 2019 Annual Conference & Expo in February. Our first issue will be in honor of the 90th birthday of mineral processing stalwart, Douglas Fuerstenau. I'll also update you on the results from our first Certified Mine Safety Professional exam. Look for that update in the December issue as I'll highlight St. Barbara's Day and mine safety in general.

All in all, it's been an interesting six months. But, stay tuned for my September column. I'll have a task for you, should you choose to accept it. ■

What does being the best mean to you?; It's time to evaluate the SME strategic plan and vision



Barbara J. Arnold
2018 SME President

The SME Strategic Plan begins with: Thinking and planning strategically to meet the needs of our members now and in the future ... Who we are. What we believe. Where we are going

SME's Vision: To be THE premier resource and advocate for the mining community.

There's a capitalized "THE" in there — THE premier resource and advocate. What does that mean? What does premier mean? What kind of resource or advocate? I suspect these words mean different things to different members, to different stakeholders, to different committees, divisions and local sections. What

does this vision statement mean to YOU?

I'm going to ask that question of the SME Board of Directors, SME Foundation Trustees, strategic committee members and division leadership when we gather for our midyear meeting in Pittsburgh, PA, Sept. 27-31. I'd like each of these groups to take 15 or 20 minutes from their meeting to discuss this from their perspectives. How will we know when we are THE premier resource and advocate for the mining community? We'll also start asking questions like:

- Are there things we are doing well?
- Are there things that we can do better?
- New things that we should do?
- Things that we should stop doing?

Why? Well, it's that time to start preparing for a new round of strategic planning. It will be a time to think about new strengths, weaknesses, opportunities and threats (SWOT) analysis. This fall, we'll be conducting a member survey, one

Value share: Innovation — Opinion: Six book recommendations that will make you smarter about artificial intelligence, from Nigel Duffy, marketwatch.com, March 21, 2018.

1. *The Quest for Artificial Intelligence*, Nils Nilsson.
2. *The Master Algorithm*, Pedro Domingos.
3. *Paper: Paging Through History*, Mark Kurlansky.
4. *Sapiens: A Brief History of Humankind*, Yuval Noah Harari.
5. *The Future of the Mind*, Michio Kaku.
6. *Thinking Fast and Slow*, Daniel Kahneman.

Safety share: First aid. This comes from LGSTX Services Inc. and its Monthly Safety Awareness Topics.

The September topic focuses on First Aid. Make sure you know the location of first aid kits so that they are easily found in an emergency. Know the basics of the Red Cross first aid procedures, which include:

- Checking an injured or ill adult.
- CPR.
- Unconscious choking.
- Head, neck or spinal injury.
- Conscious choking.
- External bleeding.
- Burns.
- Poisoning.

http://www.lgstx.com/wp-content/themes/lgstx/pdfs/Safety_Book.pdf

that will be quite comprehensive — not the one or two question survey on your dues bill. We really want to dig in and see what has changed during the past five years. Hugh Miller, 2019 SME President, will convene a strategic planning meeting in the summer of 2019 to develop our 2020 Strategic Plan. We want to ensure that we are relevant to our members and to the mining community.

Of course, I'd like to hear from you as well. What does that vision statement mean to YOU? Please email me at smpresident2018@smenet.org or respond to the SME Community posting. I'd like to feature some of the best comments in a future president's column.

PS: Just a postscript to let you know that we are doing a deep dive into the website. It's our face to the world and we've got teams reviewing this.

- Is it logical?
- Do the links take you to where you want to go?
- Is something missing?

PPS: Make sure you check out THRIVE2018, which will be held in Pittsburgh, PA, on Sept. 27, 2018, just prior to the midyear meeting. We'll hear about new technologies that will inspire new generations of mining advocates. Register at smethrive.com. ■

The amazing life of Ellen Swallow Richards; A look at one of the most respected women of science



Barbara J. Arnold
2018 SME President

I want to have lunch with Ellen Henrietta Swallow Richards. You know how they ask that question about what famous person you'd like to meet? I want to know how she made the time to do all that she did. As Frank Aplan and I researched her life for a nomination to the National Mining Hall of Fame (she was inducted in 2014) and for a presentation at the first TMS Diversity Summit that same year, I became amazed at this Renaissance woman.

In addition to her accomplishments in ore chemistry and the minerals industry, she did so much more. She created the Women's Laboratory at the Massachusetts Institute of Technology (MIT) after she found funding for the equipment. She founded the American Association of University Women. She founded ecology or the art of right living, as she termed it. In his 1973 book, Robert Clarke recognized Ellen Swallow as "The woman who founded ecology." She founded home economics from her experiments within the schools of Boston, MA with food chemistry and nutrition, and used her home as a model for proper ventilation. But she also read novels, attended the theater, corresponded with friends and relatives and was part of the Boston social and business scene, with guests in her home weekly and students as boarders. And she traveled, which was no small feat in the late 1800s.

Ellen Swallow was born in 1842 near Dunstable, MA. She got a late start on her career, as she helped her parents with the family business, not graduating from Vassar with her B.A. until 1870 when she was 28 years old. Then she became an experiment at MIT as its first female student. Since she was an experiment, the school waived her tuition. It really was the only way she could afford to continue her education. In a later letter, she indicated that if she had known that the tuition waiver was because she was a woman, she would have declined the offer. MIT was founded in 1861, and she graduated with

Safety share: For some of us, October means it's time to prepare for cold weather. Here is Caterpillar's take on cold weather preparations.

- Be aware of current weather conditions — Stay informed of potentially hazardous weather — monitor weather forecasts.
- Dress appropriately — Wear layers of loose fitting clothing — stay dry with water resistant clothing — wear windproof material as an outer shell — wear clothing with proper ventilation — keep a spare set of clothes on hand.
- Protect head, feet and hands — Keep head covered whenever possible — when head protection is necessary, make sure it is equipped with an insulated liner — protect feet with insulated socks, wear two pairs if feasible — protect hands with insulated gloves.
- Exposure guidelines — Restrict exposure time if temperatures reach -17° C (0° F) — restrict exposure time if wind chills reach -30° C (-22° F)

Submitted by Caterpillar
(<http://safety.cat.com/toolbox>)

her B.S. in chemistry in 1873. With that degree she became the first U.S. woman chemist. She then became the first female faculty member at MIT and founded the school's Women's Laboratory to teach women so that they could become science teachers in the public school system or continue with their science educations. Several of the 14 books written in the last decade of her life speak for themselves: *Air, Water and Food*, 1900; *The Art of Right Living*, 1904; *Sanitation in Daily Life*, 1907; *The Cost of Living*, 1899; *The Cost of Food*, 1901; *The Cost of Shelter*, 1905 and *The Cost of Cleanness*, 1908. And, FYI, you can get reprints of most of these on Amazon.

In 1872, while an undergraduate at MIT, Swallow isolated 0.02 percent vanadium from a sample of an ore, a very difficult analysis at that time. Her work on vanadium was recognized by Vassar with a M.A. degree in chemistry in 1873. That thesis, according to the Vassar College archives, was titled "Notes on the estimation of vanadium in an iron ore from Cold Spring N.Y."

Also as an undergraduate, she studied a sample of samarskite and identified an insoluble residue later identified by others as two new rare

(Continued on page 16)

Value share: "Most people are afraid of what will happen when they go outside the lines."

K. Melissa Kennedy,
"The Innovation Revolution:
Discover the Genius Hiding in Plain Sight"



President's Page: Remembering one of the trailblazers in mining

(Continued from page 6)

earth elements: samarium and gadolinium. While she was writing her master's thesis for Vassar, she completed her thesis for her B.S. in chemistry at MIT also in 1873. It was titled "Notes on Some Sulpharsenites and Sulphantimonites from Colorado."

In 1877, she published "A New Method to Determine Nickel in Pyrrhotites and Mattes." This likely earned her recognition as a fellow of the American Association for the Advancement of Science. In 1879, she became the first female member of the American Institute of Mining Engineers (AIME) and was the only woman member throughout her lifetime. AIME had only been founded in 1871. With all of this, she became a recognized international expert mineralogist and was sought out for her thorough and expert analyses.

After graduation with her B.S., she married mining professor Robert Richards. Ellen was fluent in German and translated German mining and metallurgy publications for professor Richards as both an undergraduate and later as his wife. This was when most significant mining and mineral processing publications were published in German. In an era of great expansion in mining in the western United States, she organized housing, tours and engineering experiments for Richards' MIT mining field camp each summer and participated in the camps, including underground mining experiences and including one as her honeymoon. She

taught his mining engineering classes while he recovered from typhoid pneumonia during a two-year period in the mid-1880s. SME's Mineral & Metallurgical Processing Division presents the Robert H. Richards award to recognize achievement in any form that unmistakably furthers the art of mineral beneficiation in any of its branches.

I'd like to focus a bit on what I think was one of Swallow Richards' major contributions to the mineral industry, all because of her attention to detail and thoroughness. No reference has the particular date when David H. Browne showed up at MIT with his ore sample from the Copper Cliff Mine in Sudbury, ON, Canada. However, it appears to be some time after Swallow Richards had developed her technique for determining nickel, so it would be in the early 1880s. At MIT, the copper ore sample that he brought in was given to Swallow Richards for analysis. Rather than simply analyzing the ore for copper content, she did a complete analysis, including using her technique for determining nickel. The other four assayers that Browne went to simply gave the value for copper. Ellen provided a complete analysis, including 5 percent nickel. Why is this significant? Copper Cliff became one of the first major nickel mines in Sudbury, kicking off the Sudbury nickel industry.

In the 1903 Report of the Bureau of Mines in Ontario, we read about the Sudbury nickel deposits and the development of mining in the district.

"Though nickel and copper were discovered in the Sudbury district in 1856 by Murray at what is now the Creighton Mine, undoubtedly the most productive existing nickel mine, no importance was attached to this occurrence as long as the region was inaccessible except by canoes; and the history of mining in the district dates from the construction of the Canadian Pacific Railway in 1882, when the ore deposit, later called the Murray Mine, was disclosed. In 1883, the orebodies of what are now the Stobie and Copper Cliff mines were found. But, at first, they were taken up for their copper contents, and it was only three or four years later, after a thousand tons of the Copper Cliff ore had been sent away for treatment, that its value as an ore of nickel was established."

I think this is when Swallow Richards made her mark.

As I'm sure most of you know, the Sudbury nickel deposits continue to be a major source of nickel for not only Canada but also the United States and many other countries. Why was nickel so important? It had been used for a long time as coinage and the United States still uses nickel in our nickels today (though maybe not much longer). But at that time, the era of "nickel steel" was beginning — nickel steel being less corrosive and stronger than ordinary steel. We'd see more stainless steel production as the 1900s began. Copper Cliff North and Copper Cliff South are still on the map in Sudbury. And just a note that Browne would go on to write several papers on processing nickel ores and their uses.

In 1910, Swallow Richards received an honorary doctorate from Smith College. This was a bit of a jab at MIT, as they didn't want a female to receive their first Ph.D. in chemistry, though she had certainly done the work and received international acclaim. Ellen passed away a year later having suffered from increasingly poor health over the last 10 years of her life. But what a life. So should we have lunch with Ellen Swallow Richards? I think it would be a blast. ■

SAVE the date:

SMART MINING

Resources for a Connected World
FEBRUARY 24 – 27, 2019 • DENVER, COLORADO

SME
2019 SME ANNUAL
CONFERENCE & EXPO

CMA
COLORADO MINING
ASSOCIATION
CMA 121st NATIONAL WESTERN
MINING CONFERENCE

A time for thanks to SME's volunteers; The Society could not function without the help of many members



Barbara J. Arnold
2018 SME President

November brings Thanksgiving in the United States, and I want to say that I am truly thankful for all of the volunteers, local and national, within SME. As I mentioned before, it's been an amazing experience meeting many of you this year.

SME volunteers give countless hours developing questions for the professional engineering (PE) exam, visiting universities for ABET accreditation activities, evaluating scholarship applications, planning programming, chairing sessions at local, regional and national meetings, sharing their technical knowledge, and reaching out to teachers and K-12 students to tell their mining

stories.

It would be excellent if even more members got involved locally or nationally. Many of our national committees are populated by division appointments. We'd like to begin to expand that reach, offering volunteer positions to the membership at large. In this day, when almost everyone carries a mini personal computer with them, we can certainly tie in many people to meetings virtually (though having some set ups in hotels can be prohibitively expensive). Be on the watch for calls for volunteers.

Of course, volunteering at some levels requires your time, talents and your treasure. We hope that your commitment to SME will, at times, extend to opening your wallet to contribute to the many programs that SME sponsors. The SME Foundation funds the PE exam, ABET, the Minerals Education Coalition, our K-12 education arm, activities with the Boy Scout merit badge and, most recently, Ph.D. and Career grants to increase the number of university faculty and provide new faculty research support. We hope that you will consider a donation to one of these programs or to the SME Foundation in general. The Foundation also has a silent auction at the SME Annual Meeting and is looking for some unique and

Value share: "Our wretched species is so made that those who walk on the well-trodden path always throw stones at those who are showing a new road."

Voltaire,
Philosophical Dictionary

Safety share: Daylight Savings Time ends on Nov. 4 this year. There have been many studies about how this affects sleep patterns and how changes in sleep can increase accidents. Suggestions to help workers adapt to the time change include:

- Remind workers that several days after the time changes are associated with somewhat higher health and safety risks due to disturbances to circadian rhythms and sleep.
- It can take one week for the body to adjust sleep times and circadian rhythms to the time change so consider reducing demanding physical and mental tasks as much as possible that week to allow oneself time to adjust.
- Remind workers to be especially vigilant while driving, at work and at home to protect themselves, since others around them may be sleepier and at risk for making an error that can cause a vehicle crash or other accident.
- Research found that men, and people with existing heart disease may be at risk for a heart attack after the time change.
- Circadian rhythms and sleep are strongly influenced by several factors including timing of exposure to light and darkness, times of eating and exercise and time of work. One way to help the body adjust is to gradually change the times for sleep, eating and activity.

Posted on March 9, 2016 by Claire Caruso, PhD, RN, FAAN, at <https://blogs.cdc.gov/niosh-science-blog/2016/03/09/daylight-savings/>

interesting items. In addition, our younger members should be on the lookout for a new campaign called 4K by 40. It will be a way of getting into the giving habit.

I also must make a pitch for funding of the SME Division scholarships. Many divisions hold fundraisers for their scholarship programs, such as silent auctions at the Annual Conference and Expo. I'm sure that they are looking for donations of items for the auctions. They will also take monetary donations at any time (see your dues bill or the SME website for details).

(Continued on page 14)



Letter to the editor;

Editor:

We are concerned by the tone and presentation of Mr. Kral's recent editorial ("EPA Eases Power Plant Regulation," September 2018, page 98). There is little doubt that our industry must be increasingly conscious of our relationship with society. We see this editorial as damaging to the society's public perception improvement efforts like the Move Mining initiative and others. Mr. Kral's tone needlessly alienates people who do not share the political views he expresses, and risks unnecessarily factionalizing SME members and our industry stakeholders. We believe that the mining industry and the SME can, and should, hold ourselves to a higher standard than this.

In SME's efforts to be our industry's advocate, we must not forget our society's Long Term Goals which state that we aim to "Improve the perception of mining industry among the public and key constituents." Our society must remember that we represent an industry which spans our country, and the world. In the United States alone, we represent coal mining in Kentucky, gold mining in California, aggregate mining in Texas, iron mining in Minnesota, and everything in between. We represent professionals in all phases of the mining lifecycle, from exploration and

permitting through closure and reclamation. Importantly, SME also represents seasoned mining veterans, early-career professionals, industry retirees, and aspiring students. It is not fitting of our society to suppose that our industry members hold homogeneous political views. If only for the sake of our industry's public image, we must refrain from partisan rhetoric which can only serve to drive distance between the people within the mining industry and especially between our industry and its community constituents.

Our concern is not about the topic, or even the endorsement of mining policy. An editorial on changes to the Clean Power Plan is unquestionably appropriate for this publication, but we believe it should be written in a way that avoids being divisive and needlessly provocative. Editorials should focus on educating readers about the policies' technical content and the impacts it may have on our industry. Our society's strategic vision states that we aim to be "the premier resource and advocate for the mining community." Indeed, we have the obligation to professionally inform our members and society at-large about the evolving regulatory environment our industry faces, and even endorse positions on proposed changes when appropriate. However, our society must hold ourselves to the highest level of discourse, especially within our publications; it is critical that we have these debates on the merits of policy, not the grievances of politics.

In the future, we implore Mr. Kral and our editorial writers to consider the tone and partisanship they display in our society's publications. The future health of our industry and its relationship with the public depends on it.

Sincerely,

Benjamin Teschner, Nick Gow, Thomas Rauch, Denise Levitan, and Lucas Rojas Mendoza, members SME



President's Page: It's the time of year to be thankful for your Society

(Continued from page 6)

Local sections also have several programs that require funding — teacher's grants, scholarships, Boy Scout programs, etc. See your local sections officers for details. If you don't know your local section officers, check out the new search button at the top of the SME website. You can access both local section and student chapter contacts. SME also funds a Local Section grant program. We'll be giving more than \$34,000 next year to worthy local section projects.

So, as you're getting ready to make your year-end charitable contributions in anticipation of tax time or just out of the generosity of your heart, I'd ask that you consider a contribution to your professional Society, locally or nationally. We will put the money to good use. And say a huge THANK YOU! ■

Celebrating Saint Barbara; Patroness of miners and mine safety in December



Barbara J. Arnold
2018 SME President

Way back when I was in graduate school at Penn State, someone posted an article from *Mining Engineering* on the door of the Mineral Processing office. Saint Barbara, the patroness of miners, was featured. You would think that being named Barbara and being Catholic, I would have known that Saint Barbara was the patroness of miners, but somehow that was skipped in my education. I, of course, read that article with great interest at the time and over the years have somehow amassed a small collection of Saint Barbara statues and other items. I also had the pleasure of attending the St. Barbara's Day Award Luncheon in

Denver, CO last December where they honored Marc LeVier (retired from Newmont) with the St. Barbara's Day Award for outstanding contributions to the mining industry.

Saint Barbara is the patroness of miners and armorers, artillerymen, architects, mathematicians and the Italian navy — things associated with explosions or with the tower that she was sequestered in or her bath house with three windows (for the Trinity). She became a Christian against her father's will. When he found out, he was very angry and tried to kill her with a sword. She ran away and he chased her. Legend has it that a hill opened up and she hid herself in a crevice. Her father condemned her to death by beheading, with her martyrdom taking place on Dec. 4 in the late third century AD. He was killed by a lightning strike. (An interesting tidbit is that my first knee replacement surgery was on Dec. 4, 2014 — I thought that was a good thing.)

With this celebration of Saint Barbara, we also take time to highlight mine health and safety. At the SME Pittsburgh Section/Pittsburgh Coal Mining Institute of America joint meeting in October, David Zatezalo, the Assistant Secretary of Labor for Mine Safety and Health, provided the latest statistics related to mine

Safety share: Aging - From the NIOSH product, Age Awareness — “From the first day of new miner training until the day they retire, mine workers will experience changes due to the normal aging process. It is an unfortunate fact of life that many age-related changes result in diminished physical, sensory or cognitive capabilities. Of course, workers also gain a tremendous wealth of experience, knowledge and insight as they age, making them a vitally important resource for their company. Effective leveraging of this precious resource requires both an appreciation of the changes that occur with age and an understanding of methods that can be used to reduce the injury risk that may result. The purpose of this training is to provide the information necessary to accomplish these objectives. Aging workers may not necessarily have a higher injury risk overall. However, the effects of a musculoskeletal injury (MSI) on older workers may be more extreme. MSHA data show that, not only does the percentage of MSIs increase when workers are over age 30, so does the number of days lost per injury [MSHA, 2005]. Protecting the safety and health of aging workers requires matching the demands of the job to worker capabilities. This means reducing or eliminating risk factors for injuries, such as heavy lifting, awkward postures, static postures, repetitive movements and/or vibration exposures. In other cases, it may mean improving visibility or streamlining processes. Designing jobs to accommodate the changing capabilities of older workers will not only reduce injury risk for older workers, it will have the added benefit of protecting younger employees as well.”

<https://www.cdc.gov/niosh/mining/works/cover-sheet637.html>

fatalities. The U.S. mining industry continues to reduce fatalities, but we still need to strive for zero. Reducing injuries goes hand-in-hand with reducing fatalities, and efforts are under way at the U.S. National Institute for Occupational Safety and Health and within other organizations to look to the use of new technologies to improve safety — think drones, automation, robots, etc. — many of the things that were discussed at the THRIVE conference in September. Some of the

(Continued on page 21)

Value share: “Our wretched species is so made that those who walk on the well-trodden path always throw stones at those who are showing a new road.”

— Voltaire, *Philosophical Dictionary*

employees imbedded in the work groups. The DRAFT EIS utilized text from previous EIS documents, as directed by OSM that was always appropriately cited.

Because the preliminary results of the EIS/RIA showed the SPR would result in significant mining job losses, OSM managers at the time asked for those results to be altered. I find it interesting that the article stated that I personally tried to sabotage the SPR. I take great offense at that characterization. I make no apologies for my role, but I was only one of a larger team that took a stand. My colleagues and I were labeled as “Whistle Blowers” and threatened with severe financial repercussions because we refused to alter the results of science and engineering-based studies. As a group, we took a stand to protect the honor of our respective professions. The full “Draft Documents” were never made public, just criticized for predicting job losses.

I believe that the DOI Inspector General’s report in 2013 served as a vindication. I have to say those who criticized the quality of the work were not privy to the full story. It was a draft document subject to further work and editing, i.e., it was not finished! Many former and current OSM employees who were part of the process defended the original EIS and RIA. Another

thing that was not publicized is that the contractors were always promised more time and budget to finish the EIS and RIA but were not given that promised opportunity when it was discovered the contractor group as a whole would not alter the results.

The new EIS and RIA were completed in 2015 for the 2016 SPR version. In the *Propublica* article, John Morgan (who was on both teams, 2010 and 2015) was quoted as saying that no one had a problem with his work in the early drafts. Mr. Morgan was part of everything that was produced and helped model the job loss numbers. It was Mr. Morgan’s firm as part of the later SPR work that inexplicably reversed the predictions of the earlier study. Also, Mr. Morgan stated that he did not see how I could lead an agency I had criticized. My criticisms were of the few people whose actions tried to force the report results to be altered. I know there were many in the agency who did not agree with the actions at that time and who expressed support of my nomination. A more accurate *Propublica* headline would be, “Nominee Refused to Alter Results of Science and Engineering Study for Politicians.”

I proudly served as 2015 President of the Society for Mining, Metallurgy and Exploration which is not an “industry group,” but a

professional society with individual members that includes numerous OSM personnel, as well as scientists, engineers, attorneys, economists and mining professionals from across many sectors. I believe the mission of OSM is NOT to stop mining but to work collaboratively with state government partners to insure mining is done responsibly for the common good of the public. I was particularly disappointed by a statement that former director Joe Pizarchik made to *E&E News* on Sept. 11, “Mr. Gardner’s decision gives the Trump administration an opportunity to select a director who will work to protect the people of coal country and not the industry or regulators.”

I would simply reply that as a licensed Professional Engineer I took an oath to protect the public health, safety and welfare and have dedicated my career to improving the performance of mining for the benefit of society. I live by that code every day with honor and integrity and that is how I intended to manage OSM. Now, I am moving on to complete my career to fulfill that personal mission.

I look forward to continuing to work with my colleagues in OSM on many more projects in the future.

Respectfully,
Steve Gardner

President’s Page: Keeping safety and health of miners at the forefront

(Continued from page 6)

presentations from THRIVE will be posted on the SME website, so make sure that you check that out.

We were also treated to a demonstration by the West Virginia University and Penn State mine rescue teams at the SME Pittsburgh/PCMLA meeting. I salute all who participate in these activities, both as collegians and in industry. This is important work.

Yes, your SME president gets around. On Oct. 25, I gave a presentation on coal beneficiation at the National Academy of Science’s

(NAS) workshop on Progress, Challenges and Opportunities for Research on Upstream Aspects of U.S. Coal Production. In addition to presentations on coal reserves, coal mining and beneficiation and reclamation, we heard a review of the NAS study on “Monitoring and Sampling Approaches to Assess Underground Coal Mine Dust Explosions.” Black lung or coal worker’s pneumoconiosis (CWP), was attacked vigorously starting with the 1969 Coal Mine Safety and Health Act, with incidence rates falling dramatically until about the year 2000. Since 2000, however, there has

been an uptick in the prevalence of CWP. What is causing this increase? Increased mechanization? Increased mining of the roof and floor that may contain more silica-bearing minerals? New technologies for measuring dust have been implemented since the 2014 Mine Safety and Health Administration’s dust rule took effect. More data, new technologies for both measurement and control of dust, and additional studies are required to assure that the recent increase does not continue.

We can ask for Saint Barbara’s intercessions to protect our miners every day. Let’s get to zero. ■

A new year full of promise for SME; There is a lot to celebrate at the SME Annual Conference



Barbara J. Arnold
2018 SME President

It's January. Just two months left as president (and only one more of these columns). Time has flown by as I was certain it would. We've all heard that time goes by faster as you age. One explanation for this has stuck with me. When you are five-years-old, a year is 20 percent of your life. When you're 50, it's only 2 percent. I'm just not sure how it can go any faster.

And now it's time to prepare for the 2019 SME Annual Conference and Exhibition (Feb. 24-27) in Denver, CO, a place that has become quite familiar to me and to those that attend these conferences regularly.

Dave Kanagy, Hugh Miller, Bob Schafer and I will meet mid month

to make sure we are prepared. There are many things to celebrate and many speeches for me to give (fortunately, SME staff will prepare the bones of many of those).

We'll celebrate the launch of our new journal, *Mining, Metallurgy & Exploration*, probably the biggest new member benefit since the launch of Onemine.org. We'll dedicate the first issue to mineral processing legend, Douglas Fuerstenau, on the occasion of his 90th birthday. The next edition of the *Mineral Processing Handbook* will be available, and we'll celebrate the conclusion of that long, arduous process and look forward to the next. Our third Move Mining contest will be a certain highlight. We'll welcome members of the Global Mining Professional Alliance (GMPA) to our conference as we host the next meeting of mining professional societies where we will share new programs, benchmark, and develop a true global partnership with like-minded organizations. I'll be honored to participate in the presentation of the inaugural Robert E. Murray Innovation Award and

Safety share: "It can never happen to me"

Captain E.J. Smith (Captain of the Titanic — quoted in the press just before sailing):

"When anyone asks me how I can best describe my experiences of nearly 40 years at sea, I merely say uneventful. Of course, there have been winter gales and storms and fog and the like but, in all my experience, I have never been in an accident of any sort worth speaking about. I have seen but one vessel in distress in all my years at sea, a brig, the crew of which was taken off in a small boat in charge of my third officer. I never saw a wreck and have never been wrecked, nor was I ever in any predicament that threatened to end in disaster of any sort. I will say that I cannot imagine any condition which could cause a ship to founder. I cannot conceive of any vital disaster happening to this vessel. Modern shipbuilding has gone beyond that."

From: <https://safetyrisk.net/famous-safety-quotes/>

Scholarship. And I'll get to present Hugh Miller with his president's pin at the Sunday board of director's meeting and then pass the gavel to him at our formal banquet on Wednesday night. A busy time for me, but a great way to review the year. Don't miss the State of the Society address at the Annual Meeting of Members on Sunday afternoon. I hope to see you in Denver.

Of course, I'm not done. I've already appointed myself as chair of our 2021 celebration of the 150th anniversary of AIME. We'll take a look back at our history, always with an eye forward seeking the next great innovations in mining, metallurgy and exploration. There are lots of surprises already in the works.

And what would January be without resolutions. I typically avoid such things. I've always liked the anonymous quote: There is no beginning or end. Yesterday is history. Tomorrow is mystery. Today is a gift; that's why they call it the present. But we can all resolve to live each today to the fullest. Let me wish each of you a fulfilling 2019. ■

Value share: "The patterns are simple, but followed together, they make for a whole that is wiser than the sum of its parts. Go for a walk; cultivate hunches; write everything down, but keep your folders messy; embrace serendipity; make generative mistakes; take on multiple hobbies; frequent coffeehouses and other liquid networks; follow the links; let others build on your ideas; borrow, recycle; reinvent. Build a tangled bank."

— Steven Johnson, *Where Good Ideas Come from: The Natural History of Innovation*

As a whirlwind term comes to a close a look to the future brings promise and excitement



Barbara J. Arnold
2018 SME President

As our *Mining Engineering* staff will tell you, I've always sent in my columns well in advance of the deadlines. This will also reach them by late December. I'm actually sitting at my desk on December 21 writing this — before Christmas, before New Year's Day — thinking back on the year and looking forward to the next. It's been a whirlwind. I've been able to meet many members at many venues where I've represented SME, given my stump speech, and been humbled by the response to my columns. That's the thing that has surprised me most about being SME president — people read the columns. As I write this final presidential column, I'm looking forward to the year as past president. This role requires less travel, thankfully (though I might begin to miss my premier access on United), but it will allow me to liaise with the Young Leaders and also be the chair of the Local Section Grant Selection Committee. The Young Leaders represent our future and the Local Sections are our rocks. And I've already established myself as the chair of the SME committee to celebrate the AIME 150th anniversary in 2021.

As I will detail in my State of the Society address during the Annual Meeting of Members (Sunday, Feb. 24) and during my farewell address at the SME banquet at the Annual Conference & Expo (ACE) in Denver, CO (Wednesday, Feb. 27), we have had a great year. We'll formally launch *Mining, Metallurgy & Exploration*, our new, all-encompassing journal. We will welcome papers covering the breadth of society activities and the audience for our authors will be greatly expanded through the association with Springer. We held the first two exams for the Certified Mine Safety Professional (CMSP) certification. This program adds to our role in credentialing our members and affiliates — we provide the

Safety share: What are the top five causes of fatal accidents at home? This is a question you can ask employees to lead off a training session. According to the Home Safety Council, the answer, in order of frequency, is: Falls, poisoning (ingesting or inhaling toxic substances), fires, suffocation (often involving choking on food) and drowning

Interestingly, the five leading causes of nonfatal injuries are not the same. Falls still leads the list, and poisoning is number 5. In between are striking or being struck by an object (No. 2); cuts (No. 3); and overexertion, such as sustaining back injuries and muscle pulls (No. 4).

Make the connection between home safety and work safety. The list of parallels between home hazards and workplace hazards is almost endless: tripping and falling, hazardous substances, electric shock, fire, power tools, falling and flying objects, eye injuries, back injuries, etc. Remind employees that they should take the same precautions against these hazards at home as they do at work, including reading labels, wearing PPE and removing tripping hazards. Make it a standard part of your safety presentations to discuss how safety training at work should be practiced at home, as well.

ABET accreditation visitors for our university programs and develop the professional engineers' Mining and Mineral Processing exam. In addition, our registered member program establishes special credentials for those who work on resource and reserve estimates.

We are in the process of reviewing our website, the face of SME to our members and to the world. A team of SME members has been working through the process of checking various links and making sure that the many parts can be found logically. I know I've struggled in the past to find some very simple things. Know that we are trying to make this our go-to place for all things SME.

I've also been highlighting our core values this year — innovation, professional excellence and member first — providing an appropriate

Value share: "Without change, there is no innovation, creativity, or incentive for improvement. Those who initiate change will have a better opportunity to manage the change that is inevitable. Learning and innovation go hand in hand. The arrogance of success is to think that what you did yesterday will be sufficient for tomorrow."

— William Pollard

(Continued on page 14)



China to step up control of rare-earths sector; Plans include crackdown on illegal mining and production

CHINA ANNOUNCED that it will increase its efforts to control its rare earths material production by eliminating illegal mining, production and smuggling of the materials while also encouraging more high-end processing.

The country's Ministry of Industry and Information Technology (MIIT) released a report with new guidelines. China is currently responsible for more than 90 percent of the global supply of rare earth elements.

Reuters reported that the country has spent the last decade trying to bring order to the sector by closing down illegal mines, restricting exports and domestic production. Small private firms have been shut down and control over the industry has been put in the hands of six state-owned mining groups.

Regulation and supervision in the industry had improved, but illegal

mining and production continued to disrupt market order and damage the interests of legitimate enterprises, the MIIT said in a notice.

MIIT said it would step up efforts to prohibit illegal mining and recycling of rare earth materials, and ensure that unauthorized facilities are completely eliminated.

It will also establish a "traceability system" to stop buyers from using illegal materials and ensure that producers do not exceed the output target, and will also suspend licenses of law-breaking companies.

The rare earth industry has contaminated large amounts of land and water in major producing regions such as Inner Mongolia and Jiangxi, and the ministry vowed to provide more support to clean up the industry and reduce waste discharges.

The ministry said it would work to support the development of high-end

rare earth products and establish a new research center to promote new applications and improve innovation and competitiveness.

China launched the crackdown on the rare earth sector in 2009, with authorities claiming that illegal activities drove down global prices and made it impossible to cover the huge environmental costs of production.

However, foreign governments accused Beijing of using its chokehold over global supplies to gain unfair economic and political leverage.

Beijing was forced by the World Trade Organization to abolish rare earth export controls in 2014, but it continues to cap domestic production on environmental grounds.

China's annual quota for rare earth mining stood at 120 kt (132,000 st) in 2018, with smelting and separation capped at 115 kt (127,000 st). ■

President's Page: Keeping safety and health of miners at the forefront

(Continued from page 6)

(at least I think so) quote with each column. We launched THRIVE, our first innovation conference, in conjunction with our mid year meeting. We will present the inaugural Robert E. Murray Innovation award and scholarship at the ACE. And we'll focus on Smart Mining, the theme of ACE in Denver — we're all about innovation. CMSP, of course, recognizes professional excellence in safety. And our new journal will be the

best member benefit since Onemine.org. I've continued the practice of providing a safety share with my columns. We need to make sure that everyone goes home safely every day and takes that safety message into their homes.

Is our work done? Of course not. We can always do more, do better. We'll begin the focus groups for our next strategic plan during ACE and have a formal planning session this summer. I hope that you took the

time to answer our member survey, as we really need to have input from everyone as we head into the third decade of the 21st century.

Thank you all for your support during my tenure as president. I give a special thanks to SME staff who shepherd all of the volunteers throughout the year. And, I look forward to the future as SME continues to be the premier resource and advocate for the mining community. ■



Mining
engineering

- ARTICLES
- ADS
- ARCHIVES

me.smenet.org

Correction:

In the January 2019 issue of **ME**, on page 20, a sentence about reserves should have been, "proven and probable reserves at OceanaGold's Haile Mine should exceed 85 t (3 million oz) gold."



SME President
John G. Mansanti
VOL. 69 NO. 3 – VOL. 70 NO. 2

March 2017: VOL. 69 NO. 3

An interview with the 2017 SME President

April 2017: VOL. 69 NO. 4

Lessons from mining's history; Tragedy from 100 years ago provides valuable lessons

May 2017: VOL. 69 NO. 5

SME has some great leaders; Submit your nominations for the Society's leadership

June 2017: VOL. 69 NO. 6

The next industrial revolution is here; The mining industry must innovate to survive

July 2017: VOL. 69 NO. 7

EPA Financial responsibility rules; Up for review

August 2017: VOL. 69 NO. 8

Back to school; A broad-based education plan will pay dividends in the future

September 2017: VOL. 69 NO. 9

Immigration and mining in America; The nation and the industry were built by many diverse hands

October 2017: VOL. 69 NO. 10

Education sustainability; Looming faculty retirements are a clear danger to mining industry

November 2017: VOL. 69 NO. 11

Mentoring young professionals; Mining concentrates on extraordinary people

December 2017: VOL. 69 NO. 12

A personal perspective on safety; Staying focused on the four P's provides a solid foundation

January 2018: VOL. 70 NO. 1

Growth is important for the Society; A New Year's resolution for all SME members

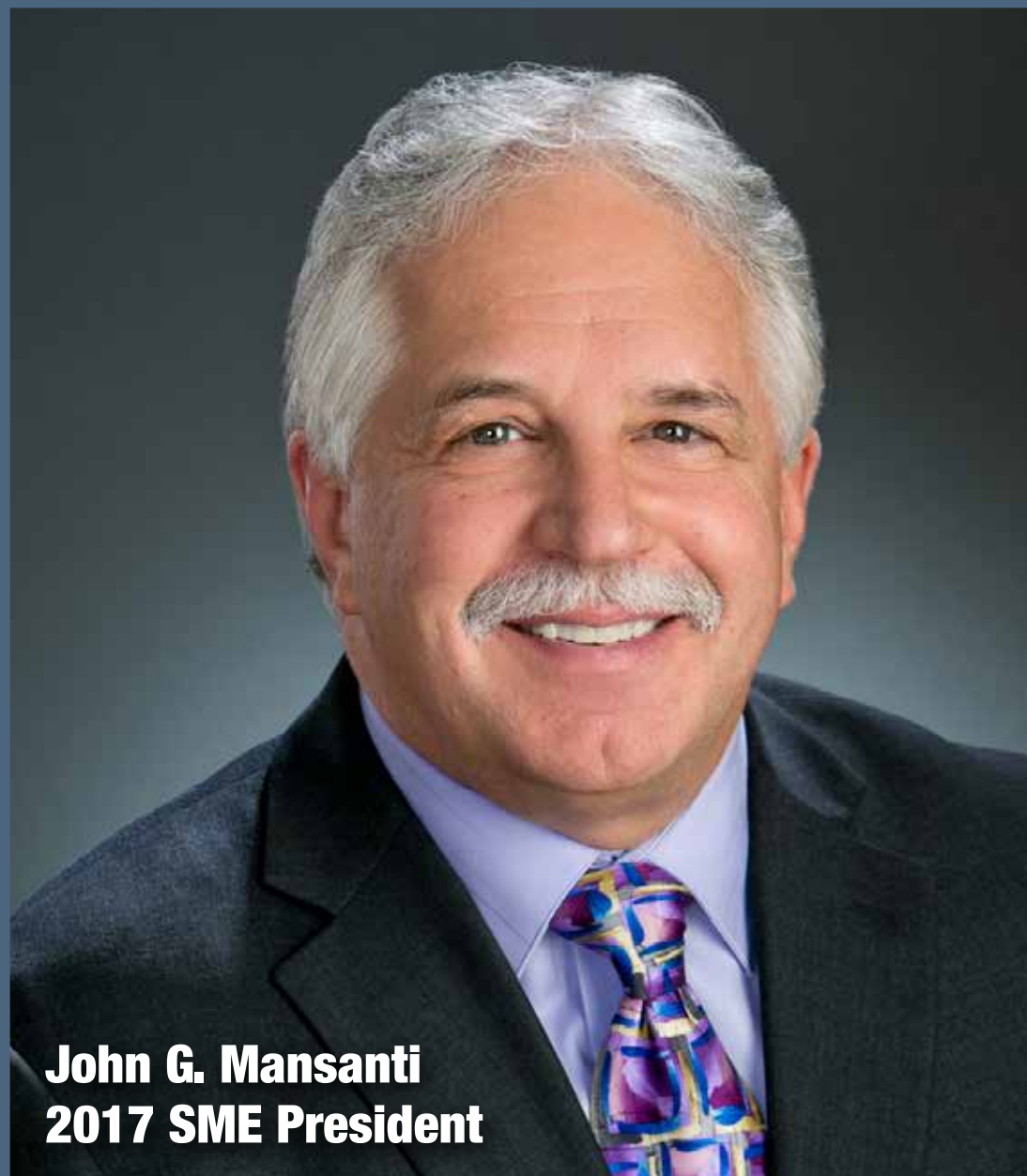
February 2018: VOL. 70 NO. 2

The importance of my SME experience; Networking at local sections was the start of a great journey

Mining engineering

OFFICIAL PUBLICATION OF SME

March 2017
VOL. 69 NO. 3



John G. Mansanti
2017 SME President

Special Editorial Supplement: **Tunneling & Underground Construction**

www.miningengineeringmagazine.com

John G. Mansanti;

An interview with the 2017 SME President



What is your history and how did you get involved in mining?

Like many SME members, I came from a mining community with a family history in mining, in my case Walkerville, MT. Both of my grandfathers were underground miners. My father was a miner for a short time. He later sold drinks to the miners. Unfathomable by today's standards, my dad would pick up the miners' checks at the pay office and have them cashed and waiting with a shot and beer for the miners when their shift ended. My mother was a nurse, who from time to time, would patch up an unfortunate miner. I remember walking past multiple picket lines on the way to and from grade school, watching homes being boarded-up. I grew up with a deep respect for the critical relationship between labor and management.

I had no intention of going into mining and initially set out to pursue a career in chemical engineering. But I attended my first two years of engineering at Montana Tech, due to the proximity and affordability. This is where I met Dr. Tom Finch, a mining professor who taught statics to the engineering students. After a coaching session in a hallway, half way through my sophomore year, I switched to mineral processing engineering. In his colorful way, Professor Finch advised me that, "You do not want to make #@*!! erasers and #@*!! Jell-O the rest of your life ... go talk to the guys in mineral processing." He was

very persuasive and here I am today.

How about your involvement with SME?

I encountered SME out of school and a little later in my career. Terry Maio and Jim Arnold invited me to local section meetings in the Missouri Lead Belt. That was my first exposure to the technical programming and relationship building that was possible at the local level. After Ozark Lead shut down and I relocated to Nevada, Rich Johnson, Scott Barr and Dave Collins encouraged me to attend my first annual meeting in Salt Lake City, UT. I joined SME at that time and was fortunate to be engaged by members like Art Schweizer and Jim Arnold, and I soon began the leadership progression for the Mineral & Metallurgical Processing Division. Since then, I have supported SME at the national and the local level serving in multiple roles and capacities.

What is your perspective on the SME?

Maybe this is answered better with another question — Where do you spend your time, your talent, and your treasure? For me, SME is one such place. I think SME is a great society and serves its membership well. As a Society, SME has an enviable brand and is internationally sought out. It has members in nearly 100 countries. SME's magazines and Onemine.org are highly valued.

Don't get me wrong, SME is not perfect and has notably experienced growing pains from time to time, as we attempt to adjust to new membership needs and the integration of new technologies. SME also supports an industry with recognized commodity cycles — that bring about another set of challenges — impacting the affordability of service levels. There are always opportunities for improvement. SME has a very talented executive director in Dave Kanagy as well as a talented staff that has consistently served and supported the membership through the inevitable commodity cycles.

What are your thoughts on the health of the mining industry and SME?

There are others who are better suited to speak in detail about the broader health of the industry. However, I can tell you it is a tough time to be a U.S. potash producer which has experienced close to a steady 55-percent reduction in product pricing between December 2011 and December 2016, closing the year at \$215/t (\$195/st). I believe all commodities are currently priced lower than their previously established pricing peaks. There appears to be

some relief within the construction or consumer based metals. Year-end iron ore pricing at \$58/t (\$52/st) is up almost 40-percent over the year while copper remained relatively flat and showed some signs of recovery by year-end, closing near \$2.50/lb. Zinc pricing is showing improvement as well and is up almost 60-percent over the year closing under \$1.20/lb. Gold is still well below a high of almost \$61/g (\$1,900/oz) witnessed in late 2011; prices weakly rose and then fell throughout the year closing at about \$37/g (\$1,145/oz). Coal production decreased 37-percent compared to 2015 and was at the lowest production level since 1978 — mostly as a result of low natural gas prices. Over the next two years production is expected to be flat or increase slightly until new gas-fired power generation comes online.

Despite a strong stock market, the current economy is ambiguous. Everyone is attempting

to read the tea leaves and predict what the new administration will mean to our industry and to commodity pricing, especially the impacts to the coal and aggregates sectors. Right now, the only certainty about the current administration is uncertainty, and I have to believe that will be good for gold.

Financially, the Society is in good health. SME operating budgets sustained a loss of \$160,000 during FY2016. Overall, including all entities, revenues and expenses, SME realized a surplus of \$2.4 million, most of which was due to a member gift and earnings from our investments. Compared to our international peer societies, SME was the only society that developed any type of surplus in 2016. Total assets remain strong at greater than \$33 million.

SME's functions are strongly supported by corporate sponsorship, especially the SME

2017 SME President's career took off from Montana Tech campus

John G. Mansanti started his mining career as a metallurgical engineer and shift boss at Kennecott's Arthur and Magna concentrators outside of Salt Lake City, UT. He recalls being told at the time of his interview that the concentrators were operating museum pieces, relics from the early 1900s, vestiges of the days of Daniel Jackling and his first openpit. This was not far from the truth and the experience was invaluable. Mansanti is currently the senior vice president of Strategic Initiatives and Technical Services at Intrepid Potash, the United States' last producer of MOP, Muriate of Potash. Prior to Intrepid, and with the exception of the copper experience and a two-year assignment to Kennecott's Ozark Lead, Mansanti spent the majority of his career in precious metals. Starting with Freeport-McMoRan at Jerritt Canyon, he then worked for Gold Fields, Santa Fe, Newmont Mining, Getchell Gold, Placer and Barrick. His last assignment in precious metals being the general manager at Barrick's Goldstrike Mine. Most of his experience is in operational management, supplemented with roles in technical services, construction management and environmental management. Starting out as a metallurgical engineer and remembering a close associate share,

"My ribs will have to be showing before I would even consider going underground," Mansanti broadened his experience with openpit assignments and came to love the underground, a beckoning of his ancestry.

Mansanti attended the Montana College of Mineral Sciences of Technology (Montana Tech), graduating with a degree in chemistry and, under the watchful eye and support of Dr. Larry Twidwell, a masters in mineral processing engineering. A strong advocate for Montana Tech, Mansanti believes it was and remains a hidden secret as one of the best bargains in education. He believes his experience at Montana Tech provided him the foundation necessary to be a strong contributor to the mining industry. He has served on its foundation and department advisory boards. Supportive of education, Mansanti also served eight years on the Humboldt County School Board.

Mansanti has been a member of SME since the early 1980s. He has served through the Mineral & Metallurgical Processing Division and has experienced a broad cross section of SME serving on multiple standing committees. He is a Professional Engineer and served two terms on one of the hardest working committees in

the SME - the PE Exam Committee. He has been recognized for his service to SME, receiving the MPD's Young Engineer Award, the AIME's Robert H. Richards Award and was recognized as an SME Distinguished Member. In addition to SME recognition, he has been recognized with company achievement awards and managed operations that received environmental distinction awards or Sentinels of Safety Awards. Recently, Mansanti and his co-chair from the oil and gas industry were recognized by the U.S. Department of the Interior for the collaborative work that was done in support of the co-development of natural resources in the Permian Basin.

Thirty-nine years ago, he asked the "little red haired girl from Virginia Street" to a graduation dance. Four years later he asked her to marry him. No one has ever accused him of making hasty decisions. Fortunately, she said "Yes." He would like to recognize his wife, Margie, and their children Stephanie, Meghan and Johnny, who supported him during the long hours and the rural lifestyle most often associated with a career in mining. Blessed with two wonderful sons-in-law, Ryan and Sal, and five precious grandchildren, they put the fire in his soul, the skip in his walk and the twinkle in his eye. ■

Foundation, meetings and programming. Consolidation in the industry will continue to concentrate the burden of sponsorship on fewer companies, and SME will need to be creative in developing other sources of revenue to support our operations.

Our membership has declined to 13,002 members, a 12-percent reduction compared to last year and a 15-percent reduction compared to the recent high of 15,260 members in 2013. By comparison, SME fared better than its sister associations in Canada, Australia and South Africa. International and student membership, the areas of the most recent membership growth, experienced minimal declines, approximately 1 percent. The average age of SME membership is about 55 years.

Where do you see SME needing to focus in 2017?

A recognized strength of SME is its process for developing and executing strategy. Another is the continuity of executive leadership. Like many roles within the SME, the president position is a step-by-step progression. The strategies and goals of the Society are the product of a succession of presidents and board members.

As I share SME's key focus areas for the upcoming year, I offer a memory aid in the form of an acronym. The acronym is H-E-L-P-S, an appropriate acronym for a service association, and it surely trumps S-H-L-E-P. The focus areas and the details behind them are:

- H** – Health of the society
- E** – Educational sustainability
- L** – Local sections
- P** – Public perception
- S** – Safety

Health of the Society. Our Society cannot survive by indefinitely offering services at a deficit. Financial discipline will be critical until we witness an upswing in key revenue sources, e.g., meeting revenues, membership fees, advertising and publications. With a goal of sustaining services in good times and bad, a well-run nonprofit will set aside reserves in the good times to carry the organization through the down times. With 11 years of considerable surplus, SME has done just that. At some point, we may need to reconcile some of the services that we provide to our membership. But in the interim, we will weather the storm and pursue opportunities to increase membership and revenues. Also, should we elect to operate for a short period of time in deficit, it needs to be part of a bigger, well-defined strategy with a planned return on investment, say

as we expand into international targets.

Membership is the other metric for the Society's health. Our Society needs to understand the needs of our younger members and our younger nonmembers. We need to help them recognize that what we recognize as a threat to industry, a loss of senior experience, represents advancement opportunities at the junior level of the organization. We need to help them understand how SME membership can prepare them for this advancement. We need to ensure there are opportunities for them to participate in SME leadership.

International membership represents an important growth opportunity for SME. Indian, Peruvian and Mexican mining professionals have expressed interest in such opportunities. These opportunities come with their own set of issues — different languages, cultures, currencies, regulations and time zones. These will all present new challenges, as many of our multinational companies know. Developing and initiating a defined plan for international growth will be one of the main activities of my presidency.

Educational sustainability. The visionary work initiated by John Marsden during his presidency must continue. The Ph.D. and education grant programs need to progress as planned, and I look forward to working with Bill Hancock and the rest of the SME Foundation in support of this program.

Local sections. There have been some great coordination between local sections and headquarters this year; it is a good beginning and needs to continue. Tim Arnold needs to be recognized for this. Tim's model of "the member in Tonopah" has resonated throughout the Society as have his monthly presidential calls with local section leadership. These efforts have provided a much clearer view of the needs of our local sections and have improved support from headquarters. I will continue the communications and based on the group consensus will conduct quarterly calls while I am president. Also, through Tim's efforts, the Local Section Heroes program was reinvigorated. Due to better understanding and engagement SME provided more than \$15,500 in Local Section Grants in 2016, up almost \$5,000 from 2015.

By asking Barb Arnold, our new president-elect, to chair the Local Section ad hoc committee, I will pass the baton and continue a practice created by Steve Gardner in 2015, a practice of assigning the president-elect to chair an ad hoc committee on local sections.

As a matter of perspective, our membership

has been near 15,000 members for about the last five years. Of our 15,000 membership, only about a third attended and participated in the annual meetings. The math is simple, meaning that approximately two-thirds of our membership views SME from a local-section perspective. It is roughly estimated that somewhere close to 3,000 local section attendees/members do not belong to SME. Any efforts we make to ensure a favorable member experience and to support local sections needs makes a stronger SME.

At a staff level, there has been some excellent work in embracing social media formats and developing Local Section Communities. I believe there is much upside potential through the use of this forum, and more and more tools are being developed around this format as members become familiar.

Public perception. Moving public perception is expensive, and SME will not be able to spend its way into improved perception. Stated slightly differently, we may be able to spend our way into improved perception, we just can't afford the price. The cold, hard realization is we can barely afford to baseline public perception. Many of our members are passionate about this issue, and it was one of the top issues of concern identified during a recent membership survey. Better defining the role of SME relative to this key issue and managing the expectations of our membership is paramount.

As we define this role there is one thing we know: there is a strong volunteer ethic within the SME membership. A likely aspect of our role will be to continually identify and support the ongoing efforts in this area and help to mobilize support for these efforts, efforts such as those developed by local sections, companies, universities and trade associations. SME can become a clearinghouse of ideas and engagement opportunities. Most members are prepared to volunteer, they just need to have an outlet or a forum. At a minimum, SME can synergize and leverage efforts, mobilizing our membership to support the work of others.

There are two well-defined aspects of SME's role at this time. One is to provide resources, and the second is to create a platform for identifying and nurturing new ideas and creating a place where good ideas can germinate, grow and develop. The resources that are available through SME's Minerals Education Coalition, support information and educational materials, are world-class, recognized as high-quality and are highly sought after. We need to continue to fund and support this activity. Initiatives such as the Move Mining competition represent an exciting

new approach to outreach, and the creative products of these efforts will be a result of a nurturing and supportive platform, this must also be sustained.

Safety. Safety is integral to everything we do in mining, whether on a mine or construction site, in a tunnel, in an engineering office or on campus. It only makes sense that it becomes a more integral component of the SME. I pledge continued support to the newly formed Health & Safety Division, which has grown from 13 members since its formation to 118 members a year later. The timing of SME's asset purchase of the Certified Mine Safety Professional (CMSP) and Mine Safety Professional (MSP) certifications from the International Society of Mining Safety Professionals and its approximate 1,000 members is fortuitous. How many members overlap with the SME membership is unknown, and how many members are willing to move over to the SME is also unknown. But it does present a membership growth opportunity for SME.

More importantly, SME will provide a welcome home for safety professionals. True to SME's core services, we will preserve and sustain the important licensure for this group of professionals, the CMSP. Assimilating this society and creating a welcome home for its past members will be a big activity in 2017. Welcome ISMSP.

How does someone get involved in SME?

There are multiple ways to get started, whether at the local section level or at the national level. I would say don't be bashful. Let someone know your intentions. A current list of divisional leadership and standing committee members is detailed in the *SME Bluebook*. Approach the leadership in your division. Review and understand the nomination system, team up with a like-minded member and nominate each other, nominate yourself. Do good work, roll up your sleeves and jump in.

Any closing thoughts?

Yes, two. First I would like to personally congratulate the Woman's Auxiliary of AIME (WAAIME) on its centennial anniversary. Their 100-year history is impressive, from their formation to their war support, their literacy programs, and sheer level of fundraising and scholarships they sponsor in support of our industry.

Second, thank you for the time to share my thoughts on the SME and the industry. I feel privileged to be president of SME, and I look forward to an exciting year ahead. ■

Lessons from mining's history; Tragedy from 100 years ago provides valuable lessons



John G. Mansanti
2017 SME President

February 1917, the AIME membership was concluding its 114th meeting of the Institute in New York City. A double bed room at the Waldorf-Astoria cost four dollars, five dollars if a bath was important. The Institute had 5,904 members as of Dec. 31, 1916, there was approximately \$5,700 in the AIME treasury; annual membership dues cost \$12 — \$5 for junior members. In a telegram, the national societies of civil, mining, mechanical and electrical engineers and the United Engineering Society with a membership of 30,000 had just jointly responded to President Woodrow

Wilson's request to the societies for war preparedness with an "... offering to assist toward the organization of engineers for the service of our country in the case of war."

It was a good meeting by all accounts. Herbert C. Hoover was awarded an honorary AIME membership. He had recently stepped down as one of the Institute's six vice presidents in order to support the people of his war-ravaged homeland and to manage the Commission for Relief in Belgium. He had raised more than \$75,000 for the Belgium Kiddies Fund from just engineers alone. He was also recognized and honored for his work in the translation of Agricola's *De Re Metallica*.

There was particular focus on including the ladies at this meeting and "entertainment of ladies" included tours of the Henry Clay Frick (US Steel) art gallery and of the new motion picture studios. Events also included a tea and exhibition figure skating on the roof of the Waldorf-Astoria and a visit to West Point. It was a morning meeting at this New York meeting when the Woman's Auxiliary of the AIME was formed to provide war relief to soldiers and war victims in Europe. That meeting was followed by a tour of William A. Clark's art gallery. The Butte, MT copper baron and his wife then opened their home to the WAAIME for a pipe organ recital. The wealth associated with mining was on display in New York.

Woodrow Wilson had just won a narrow 1916 presidential election victory several months earlier, following a two-week recount of the votes in key states. It was a period of global nationalism and U.S. isolationism. Wilson was

Safety share: • At a surface mine site in Wyoming, the winter has taken a toll on the physical working environment, as well as on workers' attitudes and behaviors. With record snow fall and freezing temperatures, production has been slowed or even halted at times. After heavy snowfall and freezing, thaw results, creating significant amounts of mud leading to tripping hazards and ground conditions impeding the safe operation of heavy equipment. Employees have been working overtime hours which has further contributed to fatigue risk and poor morale. In fact, an increased number of suicides in the community has been attributed to this record winter. Companies must ensure that weather-related risks and unintended consequences are considered and controlled for in order to maintain both a safe physical work environment and safe states-of-mind for all workers. Applying the hierarchy of controls and utilizing human resources to respond to the negative effects of the changing seasons is key to maintaining a safe and productive operation.

Submitted by Lori Guasta

reelected on a platform of "keeping us out of the war" and "America First." There was no wall to isolate the United States and Mexico, and the Border War was ongoing between the two nations. President Wilson had stationed more than 100,000 National Guardsmen along the border to support the U.S. military. In February 1917, General Pershing and his Mexican Expedition had returned to the United States after being recalled by President Wilson. The Expedition did not succeed in its primary goal of capturing Pancho Villa in retaliation for 1916 raids into New Mexico, but it was successful in inflicting high casualties and breaking up the Villistas rebels. In an attempt to distract the U.S. support for the Allied forces, Germany became involved in U.S.- Mexican relations. The Zimmerman telegram from Germany to Mexico was intercepted by British intelligence and disclosed to the Wilson administration. Public sentiment toward war shifted when the content of the telegram was revealed to the American public, and they learned that Germany was attempting to entice Mexico to declare war against the United States and in return gain back Texas, New Mexico and Arizona.

(Continued on page 12)



Lundin looks to expand Eagle Mine; Company seeks permission to tunnel to second deposit

LUNDIN MINING Corp. is seeking permission from the Michigan Department of Environmental Quality (DEQ) to construct a tunnel at its Eagle Mine to a second ore body that would extend the life of the mine into 2023.

Lundin has asked DEQ to amend Eagle Mine's Part 632 mining permit and allow the company to finish tunneling to a nearby high-grade nickel and copper deposit called Eagle East.

Eagle Mine began constructing the Eagle East tunnel ramp in July but needs DEQ approval to advance the

tunnel all the way to the second ore body, *Michigan Live* reported.

The DEQ must decide whether the tunnel amounts to a significant permit amendment, and thus requires a more stringent public review with a hearing and comment period.

The company notified the DEQ of its tunneling plans last May and, on Feb. 16, formally requested its current and future tunnel development be included in its existing permit by amendment.

Another permit would be necessary to begin extracting Eagle

East ore, which is about 762 m (2,500 ft) below the initial deposit.

The deposit was discovered in 2015. Lundin bought the mine from Rio Tinto for \$325 million in 2013.

Presently, Eagle's permit limits the mine to hauling 1.8 kt/d (2,000 stpd). The mine says developing Eagle East would not require construction of a new tailings facility at the Humboldt Mill, a repurposed iron ore mill located about 24 km (15 miles) to the south. At the mill, nickel and copper ore is separated into concentrates before being shipped by rail. ■

President's Page: SME's H&S Division will focus on the future

(Continued from page 6)

War preparedness and Allied support was driving American industrialism, pushing the production of iron, steel, copper, rubber, etc. America's mines were responding to the industrial needs and the call to put Rocks in the Box was universal. Munitions plants were running at peak levels with several plant explosions. Meanwhile, ammunition depots were blown up by German saboteurs. Paper was in short supply and the AIME board advised its editorial staff to condense manuscripts as much as possible without losing technical clarity or content.

The citizenship of the United States was divided by the prospects of war, as was organized labor. Samuel Gompers, with the AFL, and almost all labor unions supported the war effort while the more radical Industrial Workers of the World (IWW or wobblies) strongly opposed the war and staged protests and violent labor riots resulting in multiple deaths. Ethnic tensions were high among new immigrants and, amidst the heightened push for production, Irish and Finnish miners sabotaged operations with the intent of impairing British and Russian interests in the war.

On April 6, less than 60 days

following the AIME meeting, the U.S. Congress would declare war against Germany and the United States would enter the World War. The Selective Service Act soon followed, and men were rapidly conscripted into the U.S. war effort, leaving farm, mine and manufacturing jobs to less skilled labor. Draft riots ensued, especially among immigrant groups along ethnic lines and past national interests.

1917 was much more complex than several paragraphs in an SME President's column, but this is a partial backdrop for the events that were soon to unfold in one of the country's more productive copper camps. In Butte, MT on June 8, 1917 the worst hard rock mining accident in U.S. history occurred when a fire was accidentally set in the Granite Mountain Shaft when the flame from a miner's lamp came in contact with oil-soaked cable insulation. The shaft rapidly became a chimney, and smoke and gases drafted up the shaft filling cross drifts and spreading into the adjacent Speculator Mine. When the disaster was over, 168 miners lost their lives, most of asphyxiation. Ironically, just months earlier, on Feb. 2, 1917 at the AIME's Montana Local Section meeting, L.D. Frink, superintendent at the Speculator Mine, provided a presentation on the ventilation of the

mine using various exhibits and flash-light photographs to highlight some of the newer advances in ventilation. More ironically, the shaft crew that started the fire was in the process of installing new electric cable for a shaft sprinkling system that could be used in the event of a fire in the shaft.

On February 2017, in an overcrowded conference room in Denver, CO, the new Health & Safety Division is meeting and planning. The energy in the room is palpable. A whiteboard with tasks and assignments could be mistaken for the project board for a multimillion dollar capital project. The division leadership is thinking strategically, preferring to keep an international focus as they consider the integration of the International Society of Mine Safety Professionals into SME. As they address the challenges of safety professional certification, they are thinking beyond the borders of the United States and about the safety welfare of miners all over the world. One hundred years is a long time. However, it seems fitting that on this 100-year anniversary of the Granite Mountain-Speculator Mine fire that SME is rapidly growing its safety membership and welcoming new members from the International Society of Mine Safety Professionals. ■

SME has some great leaders; Submit your nominations for the Society's leadership



John G. Mansanti
2017 SME President

Springtime, the snow is melting and the mud is starting to dry out. During my childhood, this was the time of year that we put away our snow gear and started to scour the local neighborhoods for a suitable vacant lot. After inspecting the nearby lots for the appropriate dryness and the absence of possible sinkholes and open works that might have opened up over the spring thaw, the neighborhood gangs would assemble with bat, ball, gloves and some pirated materials suitable of becoming home plate and three bases. This was before AYSO, Pee Wee League, YMCA, and Boys and Girls Club programs. There were no adults

around to organize our programs. They were rather glad we were outside and not underfoot, and we were left to fend for ourselves.

We could not have a game without a team, and we could not have a team without captains. This role usually fell to the bigger kids or the kids that brought both a ball and a bat. Choosing sides was next. "First pick" was usually established with a coin toss or the captains alternating hands as they raced to the top of the bat. I was generally picked toward the bottom of the selection process, the little guy with a mop of black hair and the big black glasses. SME also has a process for picking its teams and, despite some wonderment, does not involve flipped coins or baseball bats. SME has a nomination process. It begins in April of each year with an invitation for nominations that is open through July 1. Summary submittals are then provided for the nominees. During the midyear leadership meeting, the SME Nominating Committee reviews the summaries and then selects candidates for positions on five strategic committees, the audit committee, the SME board and the SME president. In September of this year, the Nominating Committee will select new committee members, two 2019-2022 board members and the 2020 SME president.

This is one of the more important things we can do as a member of the society. For something so important, it is relatively simple and a rather straightforward task. If there is someone who has impressed you with their leadership skills and their willingness

Safety share: • With the beginning of spring comes the beginning of allergies. Allergies can inflame your skin, sinuses, airways and digestive system which can cause sneezing, itching of the nose and eyes, stuffy or runny nose, watery, red or swollen eyes, congestion etc. These symptoms can have a significant impact on our daily lives causing things such as fatigue, irritability and distraction. Many of these things can cause workers to have slower reaction times and to be distracted causing other potential safety issues. A few tips to avoid the symptoms of allergies are:

- Keep car and house windows closed (use AC if possible) to avoid pollen getting in your house.
- Take a shower before bed to rinse off pollen accumulated during the day and avoid pollen and dust accumulation in your bed.
- Avoid drinking excessive alcohol (every additional alcoholic drink a week can increase your risk of allergies by 3%).
- Use local honey in your tea, coffee, etc. (bees use the local pollen to make the honey which can prepare you for allergy season).

More tips can be found at the Safety Share page at www.smenet.org/membership/groups/divisions/health-safety.

Submitted by Melissa Anderson

to jump in and get things done, simply email Genny Homyack, homyack@smenet.org, and provide her the name of the person and the role for nomination, e.g., strategic committee member, SME board member or SME president. Homyack is the executive assistant to Dave Kanagy. She will place your suggested person on the respective lists of nominees for 2017. Later, after the close of nominations, she will vet the candidates for eligibility and then follow up with you, requesting more information on the prospective nominee, providing templates, guidelines and deadlines to complete the nomination summary. Once nominated, the nominee stays in the system for three years.

The summary submittal is without doubt the trickiest part of the whole process. At 13,000 members, we have become a diverse group and not everyone knows everyone. The challenge is to establish a concise, informative nomination submittal that effectively communicates a

(Continued on page 13)

President's Page: Your nominations are needed by SME

(Continued from page 6)

communicates a compelling summary of why your nominee is the best candidate for the role. I emphasize that a summary is important and a long list of publications or accomplishments is more of a distraction than an aid to the nominating committee members attempting to discern between nominees. This challenge should not be intimidating, and I again encourage you to become involved in the nomination process.

It is also worth noting that the nomination openings for the SME awards and division awards run concurrent with the nominations for the strategic committees and SME board. A listing of the society's awards can be found on the SME website under the Membership tab. You may easily nominate your candidate using the online form. The SME Bluebook can also be found on the Membership tab of the SME website. The names of award committee chairs and members can be located in the SME Bluebook

as well as their contact information. The respective award committee can provide you with its nomination needs.

Having participated on award committees and the SME nominating committee, I can share that it is very fulfilling to be at the end of the nomination process and to share the sentiment when a fellow committee member opines, "Wow, that was tough. What a great group of nominees; I feel great about where we ended up." Let's give the committee members something to feel great about. ■

Twin Metals: Federal review could have a broad impact

(Continued from page 11)

a wider impact than just on federal lands. Gov. Mark Dayton has pledged to halt new mineral exploration on state-owned lands near the Boundary

Waters and within the Rainy River watershed. Geologists say about two-thirds of the known precious-metal mineral deposits in Minnesota lie within that watershed, and more than

half are controlled by the state and federal governments.

But outside the Rainy River watershed, other mining companies are moving ahead. ■



WE DESIGN, BUILD AND CONSTRUCT PLANTS THAT PERFORM — WE GUARANTEE IT!

- Engineering
- Project Management
- Operations Management
- Process Improvement
- Procurement
- Consulting
- Construction
- Systems Integration
- Design Build
- Performance Based Contracts



www.gototps.com

888-670-6795

jcvyskocil@gototps.com

The next industrial revolution is here; The mining industry must innovate to survive



John G. Mansanti
2017 SME President

The revolution is coming! Wait, the revolution is here! One of the roles of the SME president is to represent the SME at various events and functions. Recently, I had the opportunity to attend the Convocation of Professional Engineering Societies at the National Academy of Engineering in Washington D.C. Since this was my first convocation, I had to look it up and was pleased to see the event lived up to its definition. There were representatives from 44 other engineering societies gathered for the day of presentations and the evening's award ceremony. The agenda for the day focused on the new industrial revolution, robotics,

autonomous vehicles, artificial intelligence and ethics associated with artificial intelligence. Michael Murphy from Caterpillar represented our industry well, sharing his company's successes in the development and implementation of autonomous haulage. It was a good event for mining that evening, as Jessica Kogel, 2013 SME president, received the Joan Hodges Queneau Palladium Medal, and Mary Poulton, current SME board member, received The National Engineering Award.

The keynote speaker, Subra Suresh, president of Carnegie Mellon University, presented "Robotics and Artificial Intelligence: Technology Society and the Individual." He shared that we are currently experiencing industry 4.0, the Fourth Industrial Revolution, which could be characterized as the unprecedented convergence of the digital, physical and biological worlds. Industry 4.0 can also be characterized by an unprecedented speed of change. If you are like me, you missed 2.0 and 3.0 somewhere along the way and needed a refresher. Industry 1.0, which started in the 1780s, was based on mechanical advances and steam-powered production. Industry 2.0 started in the mid to late 1800s and was noted for mass production, the division of labor and the use of electrical energy. Industry 3.0 started in the 1950s to 1970s with the implementation of electronics, digital systems and IT to automate production. Which brings us to Industry 4.0, which is based on cyber-physical or cyber-biological systems.

Suresh said this new fourth industrial revolution can be characterized by robotics,

Safety share: • When working outdoors be sure to have a plan in case of lightning. The sound of thunder is your best indication that lightning is close enough to strike you, lightning has been known to travel 10 miles before it strikes. When lightning is in the area stop what you are doing and get to a safe shelter. Safe shelters - buildings that are enclosed and grounded or fully enclosed metal vehicles. If a safe shelter is not available avoid high grounds, tall metal objects (e.g. drill rigs, power poles or cell towers), bodies of water and tall isolated trees. Precautions inside of buildings should also be taken. Stay away from windows and outside doors. Don't touch electrical equipment that is connected to power or network receptacles. Surge protectors will not stop an electrical pulse from a lightning strike. Avoid plumbing. Don't use running water in a sink or take a bath or shower. Wait 30 minutes after that last thunderclap before resuming normal activities. If someone is struck by lightning or receives an electrical shock, call emergency medical services first. Move the victim out of a high risk area, if necessary (the victim is safe to touch, they are not electrically charged). Lightning often causes a heart attack. If the victim is unconscious and does not have a pulse, use an Automated External Defibrillator (AED) or begin CPR. Aggressive resuscitation greatly improves their chance of survival.

Submitted by Mike York, SRK Consulting

machine learning, artificial intelligence, communications, connectivity, big data and analytics. He especially addressed the need of innovation to sustain competitiveness in the future. Revolutions are synonymous with disruption. The disruptions and threats that he envisioned were social unrest, the blurring of national borders, privacy, cyber security, ethics, the role of labor and change in education required to support the rapid pace of this revolution.

Innovation and technology was also front and center at the annual CIM meeting in Montreal. I am pleased that our planning committee adopted the theme "Vision, Innovation and Identity — Step Change for a Sustainable Future" for the 2018 SME Annual Conference & Expo in Minneapolis, MN (Feb. 25-28).

During CIM's keynote discussion, the continuous trend of decreasing mineral grades for all commodities was recognized, and the ongoing discussion highlighted that executive leadership for the mining industry viewed technology as a critical opportunity to capture the cost savings required to compete in today's and tomorrow's markets.

Adoption of technology was a topic and a 2016 World Economic Forum observation was

(Continued on page 13)

President's Page: It's time to innovate or intubate

(Continued from page 6)

shared. Mining was identified as the sector that was most resistant to disruption, the disruption necessary to transition into more efficient operations. Quotes such as "It won't happen to us" were shared. Companies that manage big data and the analytics are leveraging their competencies and branching out into less conventional roles. Parallels were drawn with the automotive industry noting that almost half of the 23 companies working on autonomous cars came from a technology background, Google, Uber, etc., and did not have Big Auto origins. Our industry has witnessed the passing of many well-respected mining companies, I can recall Phelps Dodge, Anaconda and Homestake just to name a few. As technology companies

become more aware of sustainability issues, companies such as Apple are transitioning to solely secondary materials as the source materials for their products. Is it fathomable that due to the a deeper understanding of the cyber-physical connection and the strategic advantage of managing big data and effective analytics that companies such as Amazon or Google may be managing primary or secondary metals operations one day.

Since most my family is employed in health care, I believe the summary message is innovate or intubate. Enterprise survival and the robustness of the enterprise will become tied to a company's ability to adopt developing technologies. Companies that are not prepared to embrace this fourth revolution will be added to the list of

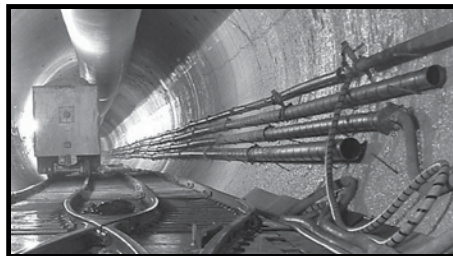
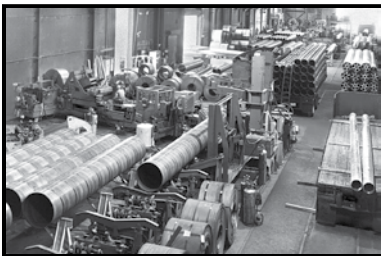
past companies.

In closing, I would like to share a statement from Klaus Schwab, founder and executive chairman of the World Economic Forum. I believe the statement adequately describes the role of innovation and is a good message to our industry. "Overall, the inexorable shift from simple digitization (the third industrial revolution) to innovation based on combinations of technologies (the fourth industrial revolution) is forcing companies to reexamine the way they do business. The bottom line, however, is the same: business leaders and senior executives need to understand their changing environment, challenge the assumptions of their operating teams, and relentlessly and continuously innovate." ■

NAYLOR PIPE

*Your Source for the Complete Line of
Spiral Butt weld and Lockseam Spiralweld Pipe Systems*

- | | | |
|---|---|---|
| <input type="checkbox"/> Temporary or Permanent Lines | <input type="checkbox"/> In-Plant Shipping | <input type="checkbox"/> Exhaust and Intake |
| <input type="checkbox"/> High and Low Pressure Air | <input type="checkbox"/> Bridge Crossings | <input type="checkbox"/> Foundation Piling |
| <input type="checkbox"/> High and Low Pressure Water | <input type="checkbox"/> De-Watering and Drainage | <input type="checkbox"/> Caisson Supports |
| <input type="checkbox"/> Ventilating Lines | <input type="checkbox"/> Well-Point Headers | <input type="checkbox"/> Tank Supports |



NAYLOR PIPE COMPANY

1270 East 92nd Street • Chicago, IL 60619

Phone: 773/721-9400 • Fax: 773/721-9494

E-Mail: sales@naylorpipe.com • www.naylorpipe.com

Since 1925

For more information on our Complete Line of Pipe Systems, Call or E-mail for our Brochure.

EPA Financial responsibility rules; Up for review



John G. Mansanti
2017 SME President

President's note: One of the great things about being president of the SME is that there are lots of very talented people willing to help me in my new role. This month I have turned this space over to Stuart Sanderson, president, Stuart A. Sanderson, LLC and retired president of the Colorado Mining Association (1994-2016) to get his thoughts about an issue that is important to all of us in the mining industry. Stuart is assisting SME as a liaison with the National Mining Association (NMA) and providing an important response relative to CERCLA 108b. I want

to thank Stuart for his involvement and especially for taking the time to pen this column, sharing his thoughts on the topic for *Mining Engineering* magazine.

The Trump Administration is reviewing the U.S. Environmental Protection Agency's (EPA) proposed rule to establish "Financial Responsibility Requirements for the Hardrock Mining Industry," and the rule may well be on the chopping block. Such an announcement would come as a relief to the mining industry, as the proposal would cost the industry — by the government's own estimate — \$171 million annually, while producing only \$15.5 million in savings. The rule is essentially a solution in search of a problem that federal and state agencies have already addressed through comprehensive laws and regulations developed and refined over the past 30 years. Thus, the National Mining Association (NMA) and its members are asking new EPA Administrator Scott Pruitt to withdraw the rule.

The controversy's roots stem from the enactment of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) of 1980, which directs EPA to "promulgate requirements that classes of facilities ... establish and maintain evidence of financial responsibility consistent with the degree and duration of risk associated with the production, transportation, treatment, storage or disposal of hazardous substances." These requirements are designed to ensure that sufficient funds are available to pay for response costs associated with cleanup efforts in the event

Safety share: • Sleep deficiency affects us all. Seven-19 percent of adults report that they don't get enough sleep, and 40 percent of adults report falling asleep without meaning to at least once a month during the day. Workplace safety statistics indicate lack of sleep is responsible for 274,000 workplace accidents each year (U.S. statistics). People with sleep problems are 70 percent more likely to be involved in work-related accidents and twice as likely to die (Swedish statistics). Sleep deficiency can have a fatal effect on our ability to drive. About 60 percent of Americans say they have driven while drowsy at least once in the past year. Drowsy driving is involved in 10-30 percent of auto accidents in European nations that keep these stats. Adults need 7-8 hours of sleep a day. After several nights of sleep loss — even a loss of just 1-2 hours per night — your ability to function suffers as if you haven't slept at all for a day or two. Some things you can do are: Go to bed and awake at consistent times. Keep your bedroom quiet, cool and dark. Get comfortable. During the day, spend time outside and be physically active. Two hours before bedtime, avoid caffeine, strenuous exercise, large meals and alcoholic drinks. And one hour before bedtime, do something relaxing.

Submitted by Daryl Hockley, SRK Consulting

of a release of hazardous substances.

Nearly 30 years elapsed since CERCLA became law before the EPA announced in 2009 that it would develop financial responsibility requirements for any industrial facility; singling out the hardrock mining industry as the first and only industrial class for regulation. The agency sought to justify its decision by citing the billions of dollars that the EPA expended historically to address legacy sites, ignoring the fact that modern mines operate under vastly different standards, which both state and federal agencies have strengthened during the past three decades.

The rapid evolution of modern mining technologies and best management practices has also reduced both the "degree and duration of risk" for the release of hazardous substances to de minimus levels. Since the 1990s, both the Bureau of Land Management and the U.S. Forest Service have reported that thousands of mine plan operations have received approval, and not one has been added to the National Priorities (Superfund) List (NPL), demonstrating the success of existing, comprehensive regulatory programs.

The technical foundation for the EPA's rule

(Continued on page 18)



President's Page: SME and NMA to issue key reports

(Continued from page 6)

is also flawed. The agency is relying in some cases on studies that are more than 25 years old, which do not reflect the progress made by the states in addressing and reducing the risks associated with mining. One report, for example, includes a listing of legacy sites added to the NPL in Colorado, but fails to mention that Colorado's current regulatory program for mining is one of the strongest in the nation. Following the Summitville Mine abandonment in 1992, the legislature amended

Colorado's Mined Land Reclamation Act in a complete overhaul that tightened permitting, performance standards and, yes, financial responsibility requirements.

The EPA rule not only threatens to impose additional burdens on industry, it would preempt the state laws that legislators and regulators carefully drafted over the past 37 years to reflect the geology, terrain and other conditions unique to those states. In its place, the EPA would impose a one-size-fits-all scheme that could unravel the environmental

protections that state laws currently provide.

At NMA's request, SME is performing an independent technical review of two key reports that the EPA used to justify the imposition of new financial responsibility requirements on the industry. SME expects to complete its review prior to the July 11 comment deadline. It is SME's aim to assist the new administration in ensuring, regardless of the outcome, that its decisions rest upon solid technical analysis. ■

Mountain Pass Mine sold at auction; Chinese-led consortium wins with a bid of \$20.5 million

MP MINE OPERATIONS, a consortium led by Chinese rare earths mining company Shenghe Resources, submitted a bid of \$20.5 million for the

Mountain Pass rare earths mine in California.

MP Mine Operations won the auction for the lone functioning rare earths mine in the United States by outbidding a consortium made up of ERP Strategic Minerals LLP, Swiss private equity firm Pala Investments and Peak Resources, an Australian rare earths company.

The Mountain Pass Mine was owned by Molycorp which looked to capitalize on reduced imports of rare earth oxides (REO) from China in 2010. Molycorp invested \$1.25 billion in a state-of-the-art processing facility when the price of REOs spiked. Investors flocked to Molycorp when shares became public, but when China eased its rules on exports the price of REO dropped, and Molycorp began a tailspin that would end with the company filing for Chapter 11 bankruptcy protection.

The Mountain Pass Mine was put into care and maintenance. At the time Molycorp listed \$1.7 billion in debt. Through bankruptcy proceedings Molycorp was restructured, allowing it to receive \$130 million in debt financing.

The sale of the mine still faces scrutiny from regulators, who may take issue with foreign ownership of a strategic asset. Rare earths are used in a number of important economic and strategic applications including magnets for green technologies like wind turbines and hybrid cars, aircraft engines and computer hard drives.

Mountain Pass was expected to be America's flagship source of rare earths. In 2010, Molycorp sensed an opportunity to capitalize on reduced rare-earth oxide exports from China — which supplies about 90 percent of the world's rare earth minerals. ■



**Committed to safety.
Committed to community.**

Proud sponsor of the Mining in Society
Merit Badge Booth at the Boy Scouts of
America National Jamboree.

contura
energy

Back to school; A broad-based education plan will pay dividends in the future



John G. Mansanti
2017 SME President

One of the positive perspectives of SME membership is that student membership has increased by 22 percent since 2010, to more than 1,650 students. As the calendar finds us in back-to-school mode, this month's column has a narrower interest and is directed to students, parents of students and mentors, which sounds like our membership base to me. When I reflect on my student years, I remember the frustration I experienced when having to take noncore electives such as the History of Western Civilization. My focus at that time was on classes in chemistry, engineering, mineral processing, graduating and getting a well-paying job — anything else was a serious distraction. I suspect many of our members can share similar feelings from their college days. Later in life, I came to appreciate these classes and wished I had a better appreciation for the subject matter at the time.

I remember feeling especially clever that, by pursuing a B.S. degree in chemistry and an M.S. in mineral processing engineering, I avoided technical writing as a required class, one of the more terrifying classes at Montana Tech. Later, and very early in my career, with the tutelage of several very patient supervisors, in particular Jim Arnold and the late D. Scott Barr, did I think otherwise. Only with such support, and with several 55-gallon drums of red ink, did I recognize the true folly of my cleverness.

I share this reflection as things have shifted since I was in college and have influenced current educational needs. For instance, college education has become increasingly expensive, and student debt is at unprecedented levels, especially for nonscience, technology, engineering and mathematics (STEM) programs. With advanced placement classes available to high school students, many students are entering college at a sophomore level. Our society communicates differently, and there is less tolerance for differing opinions — a sampling of cable news is evidence that persuasion has been masked by escalating volume, and deafening decibels have replaced true debate. The relationships between mine employer and mine employees have also changed; employment

Safety share: Back injuries account for about one-fourth of the lost-time injuries in the mining industry. Many of these injuries could be avoided if miners practiced a few basic and simple rules for back conservation. Back injury rates have decreased over the past decade; however, these injuries remain the leading cause of disability (lost work time) in mining. In interviews with heavy equipment operators at a coal mine, the findings are a lot of knee and lower back fatigue. Having a stretching program in place at your mine can help reduce the number of musculoskeletal injuries at the mine. Stretches should be done before the start of shift, during lunch or even after every break to get your muscles ready for work. Football players stretch before practice and games, so why wouldn't you do the same for work? Exercise your back regularly; back conditioning starts with body conditioning. The torso muscles are all interconnected; you must strengthen all of them to help your back. Concentrate on the exercises that strengthen each side equally, for example: low-impact aerobics, high-speed walking, rowing and swimming.

Submitted by Austin Timmons, Montana Tech

is more transient and the opportunity to have a fulfilling lifelong career with one organization is less likely. The globe is shrinking and a greater proportion of career potential opportunities are international, involving different cultures and different social mores. Jobs are continuously transitioning with the implementation of technology. The problems encountered in the workplace have become more complex, and often companies are seeing the benefit to team-based multidisciplinary problem solving.

While not an exhaustive list, what do these changes mean to today's student? They take us to the benefit of a broader-based education with an emphasis on good communication skills and teamwork. Former U.S. Secretary of State and retired Gen. Colin Powell and other prominent leaders have dedicated their energy to similar themes, stressing the ever-changing job market and the likelihood of multiple career changes for today's graduates. Recognizing the offsetting demands that college is expensive, but that it is also often more disruptive to return to college later in life, I encourage students to pursue a broader education while in college. As someone who did not study debate, I respect those who did and see value for today's engineers

(Continued on page 16)



President's Page: Studies should go beyond your chosen major

(Continued from page 6)

the workforce. I believe that a better understanding of social issues and/or a history of labor in our country will make stronger superintendents and managers for tomorrow. There are different versions of a similar quote by Santayana and Churchill "Those who fail to learn from history are doomed to repeat it," but the message remains the same. Again, I believe a good understanding of history will provide better chief operating officers and chief executive officers, especially those working in international companies.

An example of support for

broad-based education within our industry is the Harvey Scholar program. Hugh Harvey, co-founder of Intrepid Potash Inc. and his wife, Michelle, strongly support a broad-based science, technology, engineering, the arts and mathematics (STEAM) education program at the Colorado School of Mines called the Harvey Scholars. He and Michelle encourage these students to be involved in philanthropy and arts as well as science, and further, to gain new perspectives on life through international travel and study abroad programs. The program elements are designed to help these future

engineers connect, communicate and collaborate well with coworkers and audiences of all backgrounds and to use the benefits of their good education to "pay it forward."

Each path is different and obtaining a broader education today may not work for everyone. However, efforts made today will pay dividends tomorrow. At a minimum, in addition to core studies, invest time in developing good communication skills. Most importantly, remember education does not stop at graduation. Prepare to become a lifelong learner, stay curious and stay open to new ideas. And have fun. ■

NioCorp releases feasibility study; Rare-earth mine in Nebraska could produce \$17.6 billion

A **FEASIBILITY** study for a proposed rare-earth elements mine in southeast Nebraska shows the mine could produce \$17.6 billion over its lifetime.

NioCorp Investments Ltd. released the study as it continues to work toward making the mine a reality.

The Lincoln Journal Star reported that NioCorp has been working on the feasibility study for the proposed mine near Elk Creek in Johnson County for more than three years.

According to the study, NioCorp believes the mine has the potential to produce \$17.6 billion in revenue

over its 32-year life. Operating margin on that \$17.6 billion is predicted to be \$12.2 billion, and annual pre-tax earnings would be nearly \$390 million.

The study predicts the mine would annually produce more than 10 kt (11,000 st) of titanium, more than 6.3 kt (7,000 st) of niobium and more than 91 t (100 st) of scandium.

"After a little more than three years of intense work and detailed independent analysis by dozens of technical experts, the Elk Creek Project feasibility study significantly de-risks this project and positions us to advance to the next stages — project financing and eventual construction start," said NioCorp executive chair and chief executive officer Mark A. Smith.

"The primary goal of any project feasibility study is to de-risk the proposed project such that financing can be obtained," said Smith. "This feasibility study accomplishes that core goal. Coupled with the fact that we have commitments for 75 percent of our ferroniobium over the first 10 years — 50

percent going to ThyssenKrupp Metallurgical Products and 25 percent going to CMC Comets of New Jersey — and that we have in hand a major federal government permit, this project is significantly de-risked at this stage. In particular, it will allow us to continue ongoing discussions with potential institutional investors in Europe and elsewhere, including with the German government's loan guarantee program, for which the Elk Creek Project has already received in-principle eligibility."

The study predicts startup costs of more than \$1 billion, meaning it would take a little more than three years for the mine to break even.

For the project to become a reality, NioCorp still needs to secure upfront funding to pay for the mine and its infrastructure, but Smith said he believes the positive nature of the feasibility study puts the company on the right track.

NioCorp has previously said construction of the mine would take about two years. The project is expected to create up to 1,000 construction jobs and about 300 permanent jobs. ■

**SCOOP IT UP,
ONLINE!**



www.me.smenet.org

Immigration and mining in America; The nation and the industry were built by many diverse hands



John G. Mansanti
2017 SME President

“**B**uckley’s Boarding House, Butte, Montana” — these were the words scribbled onto a tattered and torn piece of paper that a young Irishman attempted to hand to the customs agent at Ellis Island, NY. This piece of paper was his ticket to prosperity, as he was seeking wealth in the copper mines of Butte, MT. A miner could get breakfast, dinner, a packed bucket for lunch and a bed at the boarding house. Marie Buckley worked at her mother’s boarding house. Her parents had immigrated to Butte. Her father worked the mines until his death from consumption, and Marie’s mother operated the boarding house to make ends meet. Marie Buckley was my maternal grandmother.

Even after her marriage to John Garbarino, she continued to work at the boarding house, as did her young daughter. Marie was occasionally irritated at her mother who would reward her granddaughter with a dime for cussing at the boarders in Irish, usually while placing a bowl of potatoes or rutabagas before them on the dining table. John Garbarino was a miner and she captured his heart. He was the son of an Italian immigrant, of which little is known. His mother was second generation to the United States and came from a family of Cornish tin miners that left the lead and zinc mines of Wisconsin for the siren’s song of copper in Butte.

Mary Galetti, my paternal grandmother, was the daughter of Italian immigrants that operated a dairy north of Butte. She married a miner as well. Lorence Mansanti left Italy at the age of 13 and worked the copper mines of the Upper Peninsula and the smelter at Trail, BC, Canada, before working the mines in Butte. He obtained his citizenship as part of his military service in WWI.

All of my wife Margie’s grandparents emigrated from Ireland. Julia Lowney, John Melvin, Maggie McCloskey and Charles McGee left their homeland in pursuit of a new life in America. This pursuit brought them to the copper camp in Butte.

This family tree could have been grown in any U.S. mining camp prior to the Great Depression. Industry grew and there was not

Safety share: Summer time means summer BBQ’s. It is important to take some safety precautions during the grilling season to avoid injury to yourself and family. Here are some grilling safety tips for the summer. Charcoal grills have some specific safety precautions versus gas grills. Never burn a charcoal grill inside a home, vehicle, tent, camper or any confined space. Ensure that the area that you are grilling in is well ventilated. Never store a charcoal grill inside with freshly used coals. Gas grills also have some safety precautions to take into consideration. Check that all the tubes that lead to the burners are not blocked. Check the hoses on the grill for cracking, brittle spots, holes and leaks and replace if necessary. If possible, make sure all of the hoses are as far away as possible from the hot surfaces or areas of dripping grease. Never keep the grill indoors. If the grill does not light after several attempts, wait and let the gas dissipate before reattempting. Take special precautions when opening the grill and the areas under the grill. Gas can build up in these areas and can cause injury if not careful.

Submitted by Melissa Anderson

one mine, mill, colliery, smelter, refinery or foundry that prospered without the support of immigration.

Immigrants contributed at every level of mining from unskilled labors to executives and owners of mining companies. Mining booms were built on the backs and brains of immigrants. Immigrant names predominately populated the death rolls of the great mine disasters of last century, e.g., Monongah, Stag Canyon, Darr, Granite Mountain. Immigrant names are also well represented in the list of inductees to the National Mining Hall of Fame.

Immigration to the United States has varied over the last two centuries, depending on the economic conditions of the emigrant-sending nations, the economic conditions of the United States, the desirability of other countries competing for immigrants, wars and military conflicts and revisions to immigration policy by government. Immigration as defined by Legal Permanent Residents (LPR) peaked in 1910 at 1.285 million people, Fig. 1. The annual number of LPRs decreased during the war years and the Great Depression but increased steadily

(Continued on page 14)

President's Page: Inclusion and diversity can strengthen SME

(Continued from page 6)

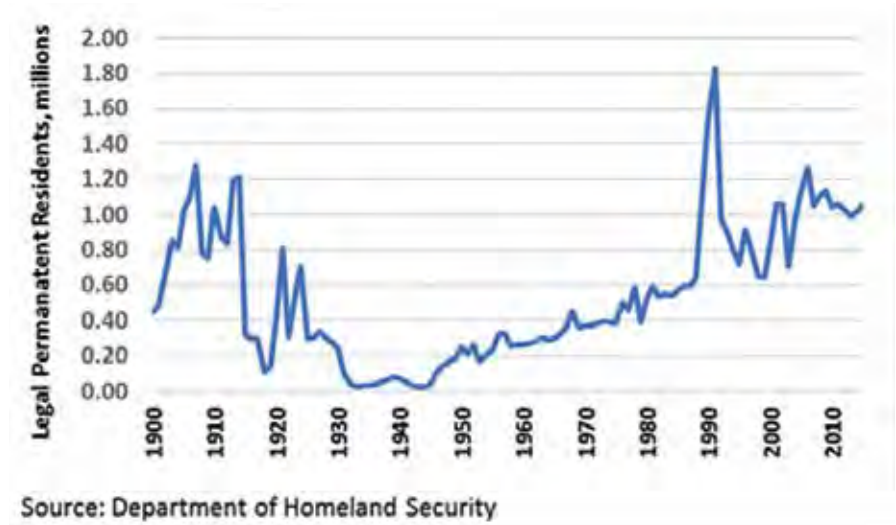
after World War II to its current level of 1 to 1.2 million LPRs per year. (Note the data in between 1970 and 1990 is not adjusted for the actual arrival year of the 2.7 million immigrants that were legalized under the Immigration Reform and Control Act and Special Agricultural Worker programs, and thus, 1991 is anomalous to the arrival pattern of immigrants). Per the Department of Homeland Security, 43.4 million or 13.5 percent of the U.S. citizens in 2015 were foreign born. The percentage of foreign born citizens fluctuated between 13 and 15 percent from 1870 to 1920, dropped to a low of about 5 percent in the 1970s. It has been steadily increasing since.

Immigration policy is based on four underlying principles, the reunification of families, the admission of needed skills, the protection of refugees and the development of diversity. Policy changed dramatically in 1965 when national restrictions were eliminated, especially prior restrictions on Asia and Africa, and a per-country limit level of seven percent of the worldwide level was implemented. Again, using Department of Homeland Security figures for 2009, approximately two thirds of LPRs granted to immigrants are family based, 13 percent are refugee based, four percent are diversity based and just 14 percent are employment skill based. Considering the history of immigration to the United States, it appears that there currently are enough immigrants to support national prosperity. The question is, do we have the right mix?

Thus, the debate over immigration reform. The national debate should be focused on the appropriate mix of skills, the desired values of our nation, who should be granted safe harbor and how we manage those who do not follow the policy. The tension in the debate is

Figure 1

Immigration trends in the United States, 1900-2017.



how to handle illegal immigrants, to decrease the backlog of family sponsored applications for LPR, to address the employers' need for unskilled labor and the desire to stay competitive through recruiting the best and the brightest and how to address asylum and refugee needs. As mine operators, we are familiar with conducting a needs assessment to target recruitment and employment programs. Any immigration reform should be based on attracting the skill sets needed to ensure a prosperous and competitive United States. That will be our ticket to prosperity.

Currently, immigration and immigration policy is not as critical to mining, but still very important as immigrant laborers are more likely to pursue jobs related to mining and mining construction. As a point of reference, MSHA's employment figures for coal miners dropped from a peak of more than 863,000 miners in 1920 to 81,500 miners in 2016. Today's emphasis is more on keeping miners employed than on finding labor. However, as mining has

become a global industry, with mining companies headquartered and operating throughout the world the competition to recruit the best and the brightest regardless of nationality is important. U.S.-based companies need access to all available talent to ensure competitiveness.

Studies have reported that host nations benefit from immigration. The infusion of new talent, the diversity of experience and thought and the required human resources to expand economies make a stronger, resilient nation. SME cannot change immigration policy. However, SME can change how its membership interacts with nondomestic talent. Both international and U.S. members will benefit from the inclusion of international memberships. The opportunities to expand knowledge bases and to share advances in mining technologies will make SME a better society and the mining industry a more robust and environmentally sustainable industry. That is where we are headed. Our future is bright. ■

Education sustainability; Looming faculty retirements are a clear danger to mining industry



John G. Mansanti
2017 SME President

As I begin this month's column, I would like to reference the March 2017 SME president's interview in which the acronym of H-E-L-P-S was introduced to define the key SME focus areas for 2017. This month's column will revisit the "E" part of this acronym, Educational Sustainability. Many members may remember that, in 2013, SME established an Educational Sustainability Committee (ESC) to help reverse the alarming trend of declining minerals education faculty. This committee was led by Hugh Miller, a mining engineering professor from the Colorado School of Mines, and Courtney Young, a

mineral processing and metallurgical professor from Montana Tech. Miller has kindly agreed to be a guest columnist this month and has provided the following commentary and update on minerals education faculty.

The ability to recruit and retain quality employees is an important driver in the success of any company whose core business is dependent upon skilled labor working in dynamic operating environments. Nowhere is this truer than the mining industry, where economic viability extends beyond a good orebody and is usually the product of well-managed operations, sound engineering and geologic practice, and a highly trained and motivated workforce. Unfortunately, the aging demographics of professionals in the mining industry are contributing to an attrition rate that has been outpacing the capacity to develop qualified replacements. When coupled with the shortage of mid career mining professionals due to the industry contraction in the 1980s and 90s, as well as the steep decline in the number of new engineers graduating from U.S. academic programs, the resulting scarcity of young professionals represents a genuine threat to the mining industry. Between 1982 and 2015, the number of academic programs offering accredited undergraduate degrees in mining engineering plunged from 25 to 14. Of these remaining programs, several are considered at risk due to low student enrollment or because of the limited number of core tenured/tenure track faculty.

Safety share: On the mine site, Stop Work Authority is the right of all miners, but how often is it used? And what inhibits people from exercising this important right? Some may feel as though it's not their place or they're not in a position to speak up. This perception must be reversed. SAFETY IS EVERYBODY'S JOB. No matter the situation, if you observe an unsafe behavior or condition, it is your responsibility to intervene. Recently, I arrived at an office building and witnessed a roofing crew using a crane to remove a large piece of equipment and lower it into the back of a dump truck. I stopped to watch how they were going to disconnect the piece of equipment and as the crane lowered it slowly into the bed of the truck, I noticed two hands reaching up to guide the load down. The crewmember in the bed of the dump truck was clearly positioned under a suspended load and if the rigging failed, he would have likely been crushed and killed. I felt compelled to say something, but the crewmember in the back of the truck and the crane operator were the only one's involved in the task. Knowing better than entering a barricaded work zone, the next best option would be to inform someone to raise awareness about this issue with the workers and the company they work for. While many would avoid notifying the company and possibly getting these workers in trouble . . . it's better to be in trouble, than dead.

Submitted by Lori Guasta, Predictive Safety

Given the critical long-term implications associated with the loss of these programs, SME has taken an active role in seeking to formulate meaningful, actionable strategies to assist mining and mineral processing/extractive metallurgy programs in mitigating these challenges. While the specific threats vary by school, there are commonalities that are inherent to each of these degree programs. Of paramount concern is the absence of a viable means to address the looming faculty shortages that will be created by retirements over the next two decades. Put simply, the inability to replace retiring faculty with viable candidates who possess professional experience, the capacity to effectively teach core courses and have the requisite skills to someday achieve tenure, represents an immediate threat to most mining programs. Two fundamental studies conducted by McCarter (2007) and Poulton (2012) analyzed the demographics of U.S. mining engineering faculty and provided quantitative evidence of this crisis. These studies showed that of the 74 tenured track faculty reported in the 2009/2010 academic year, 100

(Continued on page 14)



Newmont: Gold miner earns top recognition for third consecutive year

(Continued from page 10)

highest score (100th percentile) in a number of areas, including Impact Measurement and Valuation; Policy Influence; Biodiversity; Environmental Policy and Management Systems; Water-related Risks; Asset Closure Management; Corporate Citizenship

and Philanthropy and Labor Practice Indicators. Newmont also achieved the metals and mining industry's best overall scores in the economic, environmental and social dimensions.

RobecoSAM evaluates more than 600 data points in its annual Environmental, Social and Governance analysis of

more than 3,900 listed companies worldwide. RobecoSAM assesses companies based on a variety of criteria, including transparency, corporate governance, risk and crisis management, environmental management and performance, climate strategy, water risks, stakeholder engagement, local community development, labor

President's Page: SME initiatives are paying off for all involved

(Continued from page 6)

percent of the senior faculty in the United States (39 mining professors) will be eligible for retirement by 2020 and that 86.5 percent of all mining faculty are over the age of 40. Compounding this situation is the historically low number of Ph.D. students graduating from U.S. mining schools and that few of these individuals are seeking careers in academia. The situation facing the six remaining U.S. extractive metallurgy/mineral processing departments appears to be even more dire as a consequence of the limited number of key faculty keeping these programs viable. An estimate of these programs by a working group within ESC revealed approximately 22 tenured or tenure-track faculty. Of these, half will be eligible for retirement within the next five years.

The challenges associated with faculty scarcity is cumulative and extends from recruiting appropriate candidates with a desire for pursuing a career in academia and the ability to successfully complete a Ph.D. degree, through the complex process of achieving tenure. The success rate of developing faculty from graduate school to tenure is dismal; likely less than 20 percent. The ominous implications of this situation are being realized by the limited number of qualified candidates currently available for open faculty positions. As such, many schools must rely on the hiring of faculty from

other academic programs, which is inherently detrimental to the nation's collective capacity to generate young mining engineers.

In analyzing these challenges, the Educational Sustainability Committee, working in collaboration with numerous other SME and SMEF committees and through the direct involvement of SME leadership, conceived two initiatives. Both sought to make a substantive difference in sustaining the remaining degree programs by creating a viable means of promoting the development of new faculty. The initiatives are: (1) a four-year graduate fellowship for qualified Ph.D. students who are committed to pursuing careers in academia, and (2) the awarding of career development grants intended to assist newly appointed faculty in establishing research and publication records necessary to achieve tenure. Working collaboratively with SME constituencies and through the generous support of industry partners and individual donors, the Ph.D. Fellowship and the Career Development Grant programs were initiated in 2015. Since then, the program has supported nine Ph.D. students and six faculty, and the results have exceeded all expectations. Already, one of the Ph.D. fellowship awardees received a full-time faculty position at the University of Kentucky and two of the Career Development grantees have recently received tenure.

The impact of these programs is significant. It strengthens the long-term sustainability of the remaining degree-granting departments by creating a means to recruit and develop high-quality faculty and, in turn, ensures the continued supply of new graduates with the fundamental knowledge and skills needed by industry.

Thank you, Hugh.

President's Note: The SME Foundation courageously stepped forward and accepted the financial burden of the fundraising to support these programs. The Foundation has committed to \$8 million of funding over the next seven years to fund both programs. I recently visited an interesting historical church in South Carolina. Local lore claims that it was designed as a round church so the collection plate would not get trapped in the corners, but instead would continue to go around and around. This is where I pass the plate for the Foundation, hoping for a similar effect. As we approach the end of 2017 and SME members consider their charitable giving options, please keep the early success of these programs and the commitment of the SME Foundation in mind. If you love mining and what mining represents for our society, I cannot think of a form of giving with a higher potential impact to our industry. Thank you in advance for your consideration.

Tap 'er Light. ■

Mentoring young professionals; Mining concentrates on extraordinary people



John G. Mansanti
2017 SME President

This month's theme is mentoring. I thought this was going to be an easy exercise, as I had many examples of people who were kind enough to mentor me or my peers throughout our careers. However, as I reflected on the possible examples, it became obvious that I could not pick just one example. The other extreme, recognizing everyone who had supported me and my peers, was strewn with pitfalls.

The exercise reaffirmed my belief that I have had a blessed career and have had the opportunity to work for, and with, some extraordinary people. If you are willing to help yourself, many people are willing to help you as well, sharing their knowledge, their experience and their perspective. Further, the mining profession is populated with a disproportionate percentage of outstanding individuals. Traveling as the SME president this year, I have ample confirmation of the great people who work in our industry. The outstanding people and the challenging work are the foundation for a rewarding career.

Mining is as much a family as it is a career. Most of us feel this way and believe all others should think this way as well. It can even get in the way of mining's public perception, as we become frustrated when others fail to view our industry the way we do. You can't insult family.

Many with a lifetime in mining feel compelled to pass such beliefs on to the next generation, this sense of family, this sense of a great career with great relationships. Some experienced mining professionals are just looking for someone who will appreciate the lifetime of knowledge that they have accumulated and are in pursuit of an open mind to be the receptacle of that knowledge. Which takes us to mining students and young professionals.

Students and young professionals will be attending the 2018 SME Annual Conference and Expo (Feb. 25-28, Minneapolis, MN) seeking knowledge, skills and possibly employment. They will be developing a network of new contacts and trying to obtain the most from the event. Some years ago, SME established a mentoring program just for this reason. Young members can sign up to be a mentee, while not-so-young

Safety share: We'll get by with a little help from our friends:

A work colleague was recently rushed to the hospital having a heart attack. He is a fit and active guy, but he travels a lot for work. Recently, while working in another country, he enjoyed the local delicacies a little too much and then decided to go to the gym and push himself to work off that overindulgence.

The following day he had pains in his chest and all down his arm. Being bulletproof, of course, in his mind, he kept on working and endured the situation. It took one of his team members to recognize that he was not himself and to push him to go to the clinic.

As soon as he arrived at the clinic, the medical professionals recognized his condition and took him to the hospital where he had an angio operation. He is now recovering well.

It took someone else to help him and that probably saved his life.

Keep each other safe and listen to your friends. When they ask how you are, tell them the truth and it may save your life.

Submitted by Mick Routledge, RUT LLC

members, those feeling compelled, can sign up to be a mentor. Mentees and mentors are matched up prior to the annual event, they coordinate their initial introduction and schedule their activities while at the conference. Most mentors have their mentees shadow them to the myriad of activities at the convention, technical sessions, exhibits, committee meetings and social events. Mentors will often financially assist the mentees, treating them to meals and sometimes social functions. Most importantly, they introduce the mentees to new acquaintances and help them understand the workings of the convention.

While this program targets those attending the annual meeting, SME recognizes that a minority of the membership attends the annual meeting and that there is a greater value in longer term mentor-mentee relationships. So, SME implemented a newer program where mentee and mentor can establish such longer-term relationships; relationships that are more about professional development and support than the ins and outs of attending a convention.

Goal A of the SME's 2010 strategic plan is to provide resources for sustainable professional and educational programs. Nothing screams providing resources for sustainable professional development louder than mentoring. A whole

(Continued on page 14)



XV WORLD EXHIBITION
AND CONGRESS FOR
LATIN AMERICAN
MINING

Chile

APRIL 23-27, 2018

Santiago, Chile - Espacio Riesco

U.S. EXHIBITOR CONTACT

info@mdna.com
Tel. (312) 781-5180

U.S. VISITOR INFORMATION

visitantes@expomin.cl
www.expomin.cl

PARTNER



ORGANIZED & PRODUCED BY



Mentoring: Sign up and welcome someone to the mining family

(Continued from page 6)

A whole column could be dedicated to the benefit to the society. Another whole other column could be dedicated to the benefits to the mentors and the mentees. The bottom line is that the benefits of participation will be personal and will be something different for each person involved. I encourage your consideration of either or both programs.

In the spirit of a currently popular book, you may be asking, "Wait, what ... you want me to do what?" "You want me to be a mentor?" "You want me to be a mentee?" The answer is yes. "How do I do such a thing?" The how is easy. When you fill out your registration for the SME Annual Conference & Expo, check the box that asks if you would like to participate in the mentoring program. For the longer-term program, visit the SME website, find the menu bar, click "Events and Professional Development," then click "Mentor Program." Follow the instructions to a potentially life-rewarding experience, and welcome someone to the family of mining, to a profession with a disproportionate amount of extraordinary people. ■

Cobalt: Automakers are seeking long-term supplies of cobalt

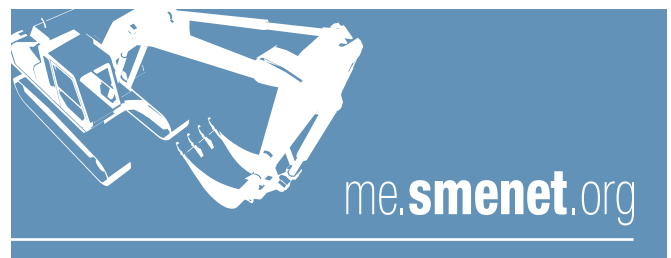
(Continued from page 10)

security of supply. The DRC's president Joseph Kabila has not set a date for elections, after he failed to step down before a deadline last December.

Cobalt production in the DRC is dominated by a handful of producers including Glencore and China Molybdenum. Outside the large companies, cobalt is mined by hand before it is collected and sent to China. Last year, Amnesty International said that process often involved child labor.

"A secure and sustainable supply of raw materials for the Li-ion [lithium ion] battery will be the key factor to become e-mobility market leader," VW said in the tender, a copy of which was seen by the *Financial Times*.

The original deadline for the tender was the end of September, which was then extended until this month. ■



A personal perspective on safety; Staying focused on the four P's provides a solid foundation



John G. Mansanti
2017 SME President

People, Planet, Property, Production. These four P's represent my personal perspective on safety and operations. This alliteration provides a hierarchy for making decisions and a tool for making value judgements in a dynamic operating environment. These four words are the foundation for a belief system that can assist and empower employees to make the proper decisions during any situation; especially a situation at 4:00 a.m. when management is offsite, supervision is preoccupied elsewhere and a decision must be made.

Let's break it down. People is for the health and industrial wellbeing of our employees or anyone else on our sites. It should not be confused with Human Resource initiatives, employee discipline or changes in employment strategies. In this context, People is about ensuring that every individual walks off our site as safe and healthy as they entered the site at the beginning of their shift. It is about zero harm.

Planet is for environmental stewardship, for regulatory compliance, for internal compliance and for protecting our license to operate. Why would society issue us a license to operate if we cannot abide by the rules of our existing licenses?

Property is for the infrastructure and equipment used to meet our business objectives. How do we expect new funding for equipment from our shareholders or other investors when we have not taken care of the equipment purchased through prior funding?

Production is for production. It is expressed as tons mined, pounds concentrated, ounces recovered, yards of concrete poured, tons of steel erected, etc.

Here is how it works. A decision to prevent individual harm should supersede everything else. For instance, if a temporary spill is necessary, or damage to property must be sustained, or a reduction in production is required to avoid injury or harm to an individual, and there are no other options, then those outcomes are preferred to harming the individual. Progressing further, a decision to maintain a compliance standard, whether a corporate, site or regulatory standard,

Safety share: When was the last time you completed a safety interaction in the field with your team or in one of your colleagues operating areas? Think about that interaction and ask yourself a couple of questions. Did I just reduce risk for the team? Are the people I interacted with happy at the end of it and would welcome it again in the future? If you can't answer yes to both of these questions, then you more than likely just increased risk for your team by wasting their time and now they have to complete the same work they had with less time. Stop and think then plan your leadership field interactions to add value for the team.

Submitted by Mick Routledge, RUT LLC

should supersede the protection of property and production. If the only alternatives to sustaining compliance is damage to a piece of equipment or a reduction in production, then those alternatives should be pursued as opposed to violating the compliance standard. An example would be operating a failing pump that might result in a scored shaft or equipment damage when the only other alternative is an unauthorized discharge. And finally, when equipment damage is evident and the only alternative is reduced production, the equipment must be taken off-line, repaired and returned to service, even at the detriment to production.

Depending on one's business model, Product quality may be considered a fifth P. This would fall in the progression between Planet and Property. This P represents customer relations and company reputation. It defines our credibility with those who purchase and use our products. It must be fiercely protected unless it conflicts with the possibility of individual harm or a threat to our license to operate.

Communicating a list of words to our employees in which production comes in last place can be unsettling. Empowering employees with such a guideline and a stop work program might seem like a pathway to failure. However, I have found the opposite. In general, as miners we are wired to produce — it is in our mining DNA. When operators make decisions to protect people, the environment, product

(Continued on page 24)



First phase of Hecla's mine approved; US Forest Service gives go-ahead to Rock Creek Mine in Montana

HECLA MINING CO. won approval to begin moving forward on the first phase of its proposed Rock Creek underground silver and copper mine in Montana, but the U.S. Forest Service stopped short of approving the second phase of the project.

The decision from Region 1 Deputy Forester David Schmid left both Hecla, and those who oppose the mine, claiming partial victory. In his decision, Schmid said the decision on the second phase would not be made until the requirements of the first phase have been met, the *Missoulian* reported.

"My specific concern with signing a record of decision approving the entire project is the inherent

level of uncertainty in the analysis, based on the current availability of information," Schmid wrote in the decision. "Underground mine development occurs in rock formations that are generally hundreds to thousands of feet below the surface, hidden from view, and inaccessible other than through mine development or drill holes."

Schmid's 23-page response to Kootenai National Forest Supervisor Chris Savage gave the agency's answers to objections about how the mine might affect water sources in the adjacent Cabinet Mountains Wilderness, threatened populations of grizzly bears and bull trout, ground subsidence and tailings stability, and wilderness character of

the region.

Schmid wrote that most of the objections were addressed in the environmental review of the mine but added some new instructions for several points.

Hecla vice president for external affairs Luke Russell said Schmid's response was in line with the company's long-range plan for the project.

"This is a phased project, and this is the first step in that project," Russell said. "We think it's all part of the process and we're moving forward."

Mine opponents applauded the Forest Service's modification of what had been a full approval of Hecla's mine plan. ■

President's Page: It's all about people, planet, property and production

(Continued from page 10)

quality and equipment, production tends to take care of itself. Enhanced production is usually the product of the systems in place to protect the other items. The combination of lower workmen's compensation costs, less compliance related mitigation, fewer customer complaints and less equipment damage will enhance yet another P, resulting in increased

profits.

As stated earlier the 4 P's are the foundation of a belief system. When this belief system is combined with other fundamental safety beliefs, such as all accidents are preventable, that injuries are not okay, and that there is no such thing as a hazard-free work place, employees are empowered to work in a zero-harm environment. There are no silver bullets in safety

and strong leadership. An open culture, robust safety systems and ongoing risk assessments are necessary to avoid personal harm and property damage. However, as we continue to pursue zero-harm on and off our work sites, I offer an important tool that can be neatly integrated in to these bigger programs, a tool that helps clarify decision making at all levels - People, Planet, Property, Production. ■

Wisconsin: Law from 1998 banned sulfide mining in the state

(Continued from page 10)

The current near-ban on non-iron mining was signed into law in 1998 and was driven by concerns about mining minerals in sulfide deposits, which have a history of releasing acidic material and polluting waterways.

The state's mining moratorium requires a mining company to show that another sulfide mine in the United States or Canada operated for

at least 10 years and then was closed for 10 years without pollution.

Wisconsin is the only state with such a restriction, which has kept mining companies out of the state since Rio Tinto Kennecott closed the Flambeau Mine in Ladysmith in 1997 after four years of mining copper, gold and silver.

Supporters of the bill say new technology allows for safer, cleaner mining that would bring needed jobs

to rural areas. Environmentalists say opening the door to metallic mining would threaten state waterways.

Sen. Jerry Petrowski (R-Marathon) said he was concerned about mining but had voted for the bill because he was able to amend it to help ensure that mining companies paid taxes and that local communities got a six-month delay in implementation to allow them to pass ordinances on mining in their areas. ■

Growth is important for the Society; A New Year's resolution for all SME members



John G. Mansanti
2017 SME President

I need to be careful quoting a public land policy critic and political anarchist in a mining magazine, but I want to borrow a quote from Edward Abbey. "Growth for the sake of growth is the ideology of a cancer cell." As long as I have been associated with SME, growth or, more specifically membership growth, has been a main area of focus. Why? What is the reason for this focus? Is it growth for the sake of growth? Is it just an attempt to offset the dramatic membership loss that occurred after the membership peak in 1983 (28,700 members)? Is it chasing the glory days of the past? Is it something else?

Membership trends show that the Society lost approximately 850 members a year between its peak in 1983 and 2005 when membership bottomed out. Membership grew to a new peak of just under 15,300 members in 2013 and receded to a new low of 13,000 members in 2016. I am happy to report that membership will be up in 2017. Historic membership levels and membership loss are tied directly to the U.S. mining economy and compare well with trends in the U.S. Geological Survey's (USGS) nonfuel values, the Mine Safety & Health Administration's (MSHA) labor count and MSHA's operations count. As illustrated in Fig. 1, SME membership lags these other values by about three years. The question that should be asked and answered is, "Why have the number

Safety share: When the barometric pressure drops during colder weather, methane can migrate more easily into the mine atmosphere, increasing the risk of an explosion. Dry winter air also results in drier conditions underground, allowing coal dust to become suspended in the mine atmosphere, increasing the danger of an explosion.

Examinations are the first line of defense underground and should include the following:

- Check for methane.
- Know the mine's ventilation plan and maintain ventilation controls.
- Continually apply rock dust to prevent the propagation of an explosion.

At surface operations and preparation plants, hazards such as limited visibility, slippery walkways, and freezing and thawing highwalls may lead to accidents.

- Check highwalls and benches for stability.
- Examine vehicles for exhaust leaks and consider limiting engine idle time to reduce risk of carbon monoxide asphyxiation.
- Remove snow and ice on roadways, and apply sand to maintain traction.

Submitted by U.S. Mine Safety and Health Administration

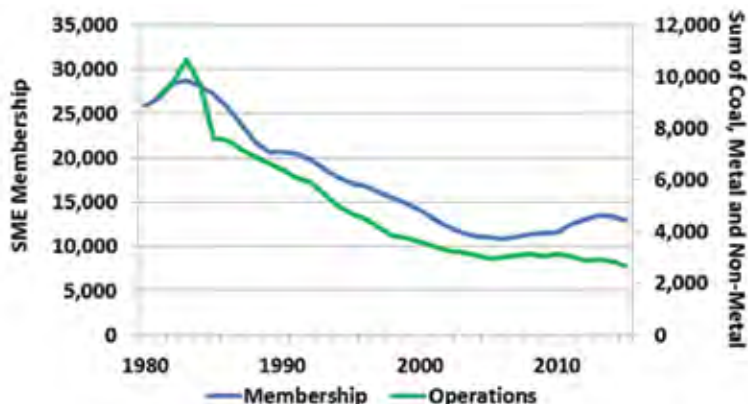
of coal, metal and nonmetal operations in the United States dropped from 10,643 operations in 1982 to 2,691 operations in 2015?" Unfortunately, that is the big question with multiple complex answers and beyond the scope of this month's column.

We still have not answered the question of why membership growth is important. Assuming SME provides a value and service to the mining industry, growth is important for several reasons. First, membership growth, especially young membership growth, ensures the sustainability of the Society and its continued value to the industry. Second, membership growth provides a diversity of thought and a wider net for sharing technical and operational ideas within the Society, especially as we consider international alternatives. Finally, level of services, just as the Society's mining operations or mining services members find there are fixed and variable costs in their businesses, SME finds the same. There is a certain level of membership required to provide the desired membership services.

(Continued on page 15)

Figure 1

SME membership and MSHA's mineral operations.



Vista Gold updates Mt. Todd project; Company announced improved gold recovery from mine

VISTA GOLD Corp. issued the results of its previously announced metallurgical testing program for the Mt. Todd gold project located in the Northern Territory, Australia. The test work confirms that the inclusion of automated sorting and a redesigned, two-stage grinding circuit will enable the project to achieve a finer grind size, higher gold recoveries/higher gold production and lower processing costs with no material increase in project capital.

Vista Gold's automated sorting program is now complete, with assays for all size fractions. The test work confirmed that the combination of X-ray transmission (XRT) and laser sorting on the 16 mm (0.63 in.) screened high-pressure grinding roll (HPGR) crushed material (approximately 18 percent of the run-of-mine feed) enables the company to reject approximately 10 percent of the run-of-mine feed as below cutoff grade material. This results in an approximate 8 percent improvement in estimated mill feed grade (life-of-mine average 0.91 g/t compared to the 0.84 g/t life-of-mine reserve grade) with an estimated gold loss of only 1.3 percent. With the

installation of an automated sorting circuit, Vista Gold expects to reduce total grinding, leaching and tailings handling costs by about 10 percent.

Past metallurgical studies at Mt. Todd demonstrate a strong correlation between finer grind size and higher gold recovery. To efficiently achieve a finer grind size and higher recovery, Vista Gold has optimized the crushing and grinding circuits. Excess capacity in the HPGR crusher will now be used to produce finer feed for the grinding circuit. Each grinding module is now comprised of a primary ball mill and three, small fine-grinding mills. The combination of the reduced material volume (as a result of automated sorting), smaller mill feed size, and two-stage grinding, lowers the total estimated project power requirements by approximately 13 percent and enables the company to cost-effectively achieve a nominal P80 grind size of 60 µm. Leaching tests on material ground to 60 µm in the two-stage grinding tests show improved estimated gold recoveries of 86.2 percent (weighted average, net of solution losses) compared to previous gold recovery estimates of 81.7 percent calculated on

the same basis.

"Mt. Todd is one of the largest, advanced-stage gold development projects in Australia," said Vista Gold's president and chief executive officer, Frederick H. Earnest. "Last year we initiated a comprehensive program to optimize the Mt. Todd project and demonstrate its viability at a US\$1,250/oz gold price. We have now completed test work confirming our ability to achieve a significant improvement in feed grade to the grinding circuit while reducing our grinding, leaching and tailings handling costs. Our newly designed, two-stage grinding circuit is expected to generate a finer product (with lower power consumption), which we have confirmed results in higher gold recovery and a 4.1-percent increase in gold production. We intend to include these process area improvements in an updated Mt. Todd preliminary feasibility study, targeted for completion in Q1 2018. We expect these improvements, along with current foreign exchange rates, and updated capital, labor and operating costs estimates to demonstrate that Mt. Todd will be a long-life, low-cost, significant gold producer, with robust project economics at today's gold prices." ■

President's Page: be a member and get a member in 2018

(Continued from page 6)

Therefore, the Society's need for membership growth is sustainability of the Society, diversity of thought and preservation of the level of services. With the recent level of services that SME provides to members, the target membership value is around 15,000 to 16,000 members. The difference between this level and our current level of 13,000 members provides the basis for our growth, growth that is needed to sustain the planned services and provide some cushion for upsets.

The good news is membership is up and expected to continue to move up. The Society added five new student

chapters in 2017 and one new domestic local section. It appears the industry downturn has bottomed and, factoring in the lag to industry, SME membership is expected to continue to move up. In addition to the industry rebound, there are other plans for membership growth underway. The new Health & Safety Division has grown to more than 390 members. In June 2017, SME signed an association agreement with MEAI and the Society has added 272 associate members. Both areas will continue to grow in 2018 and beyond.

I am happy to conclude that SME has a broader ideology than a cancer cell, that there is a purpose and a need

for its membership growth. I'd like to close with membership challenge in support of that need. Every person reading this column knows one person at the site or around the office that is engaged in our business and active in the industry but is not a SME member. So, I am suggesting that we reach out to these folks and other prospective members, that we help them understand the benefits of membership and that we become ambassadors for SME. The challenge is for every member to recruit just one new member in 2018. Make it a New Year's resolution - be a member; get a member. ■

The importance of my SME experience; Networking at local sections was the start of a great journey



John G. Mansanti
2017 SME President

My first exposure to SME was at a local section meeting at the Tower Inn in Salem, MO. My supervisor and others at work encouraged me to attend and to meet some of the people in the local mining industry. Even in a cloak-and-dagger industry such as lead and zinc, it was an opportunity to know people from the competing lead companies and to talk shop. It was an opportunity to network before I had a true understanding or appreciation of what networking really meant. My supervisor and I were scheduled to attend the 1983 national SME-AIME meeting in Atlanta, GA to present a paper on

our flotation upgrades at Ozark Lead. This never transpired, as the mine was mothballed, and I was working nightshift as a security guard at the time of the annual meeting. With a newborn daughter and a newly administered 10 percent pay cut, the concept of taking personal time off and paying my own way to the annual meeting never entered my mind. The irony — it was during a dinner conversation at the Atlanta meeting between a local section colleague and my soon to become supervisor that led to my promotion from a security guard in rural Missouri to a metallurgist in the goldfields of Nevada. It would be eight years into my career before I would have the opportunity to attend an SME annual meeting.

The 2018 Annual Conference & Expo in Minneapolis is almost here and, like most years, approximately 10,000 SME members will not attend. These members will experience SME at the local section, again underscoring the critical importance of local section programming. Further, during the quarterly presidential calls, several local section leaders related that many of their members are retired and prefer not to attend the Annual Conference, attending the local meetings to keep current and to network with others in the industry. This remains their primary contact with SME.

There are several things that stand out to me as I reflect upon my experiences and the experiences of others with SME: 1) It is all about the local section. 2) Networking is the one universal value of SME. 3) It is people

Safety share: Looking back to the lessons learned from fatal and nonfatal mining accidents in the past, it is clear that many of those accidents could have been avoided through more effective communication between employees at different levels.

When staff on the front lines have an open line of communication for sharing occupational safety thoughts and concerns with organizational leadership, it can lead to more effective safety and risk management systems.

The use of multiple methods for communicating organizational safety messages to individuals across all levels can be useful. For example, some employees find visual communications to be more effective, while others respond more favorably to tailgate meetings. But regardless of the method, when we watch out for each other, the message comes through loud and clear.

Finally, if we are willing to communicate our observations, work collectively and learn from each other by sharing safety lessons and strategies in the public domain or developing industry-wide safety forums, the improvement of safety performance and outcomes can go beyond the mine or organizational level.

Submitted by Ali Lashgari, Civil & Environmental Consultants, Inc.

about five to 10 years relatively senior in their career that encourage SME involvement.

For most members, the SME relationship begins and ends at the local section level. Often, the young member and the elder member do not have access or the resources to attend the Annual Conference every year. For the rural member, it is relationships that begin at the local section that mirror family and become life-long relationships. Despite the mobility of our industry, and the years and miles of separation, we can count on these close relationships to be there during life's milestone events, whether happy or sad. As president, I visited several local sections this year. I heard many of the same concerns I heard when I was in a local section leadership role. Should they charge dues or pursue fundraising to cover expenses? Which city to program at? Which night of the week works best for attendance? Who will be a meaningful speaker? Will they have to pay the caterer for no-shows or will they run out of food at the dinner and on and on. To the members who volunteer and lead the 43 SME

(Continued on page 12)

Pebble project permits submitted; Northern Dynasty renews push for Alaskan mine

THE U.S. ARMY Corps of Engineers has begun the review process of an application submitted by Northern Dynasty Minerals for a wetlands fill permit for the proposed Pebble Mine in Bristol Bay, AK.

The application is a milestone for a project that has gained new momentum following the decision by the U.S. Environmental Protection Agency (EPA) to remove special protections that were put in place by the Obama Administration to block development of the massive gold and copper mine.

"For the Pebble team, this day has been a long time in the making and is the result of a tremendous amount of hard work," Tom Collier, chief executive of the Pebble partnership, said in a statement.

The U.S. Army Corps of Engineers, the federal agency that regulates the development and dredging of wetlands, has published the completed permit application from the Pebble Limited Partnership on its website.

The application will trigger a formal environmental review of the plan to build an openpit mine in a region with

the world's biggest sockeye salmon runs.

The Pebble Mine, proposed for more than a decade, is the world's biggest undeveloped gold and copper project. Located in Alaska's Bristol Bay region, it has drawn opposition from environmentalists, some native groups and sport fishermen.

The Obama-era EPA had blocked the project in 2014 even before a permit application had been filed, a move reversed in October when Scott Pruitt, current administrator of the EPA, directed his staff to withdraw a plan to protect the watershed of Bristol Bay.

Reuters reported that the permit application announcement came three days after the partnership said it gained a new member, First Quantum Minerals, the world's eighth-biggest copper producer, which will acquire an option to buy a 50-percent stake in the project for \$1.5 billion.

For four years, the partnership had been limited to Northern Dynasty, whose previous partner, Anglo American, dropped out in 2013, *The*

Financial Times reported.

"We believe a successful outcome to the permitting process for Pebble would deliver the potential for further growth in copper for First Quantum well into the future," Philip Pascall, chairman and chief executive of First Quantum, said.

Northern Dynasty outlined a scaled-back plan for the Pebble Mine to address concerns about the salmon fishery, reducing its footprint and announcing no primary mine operations would be located in the Upper Talarik watershed.

"Not only are we confident that Pebble as currently envisaged will secure development permits from federal, state and local regulatory agencies, we are confident it will co-exist with the world-class fisheries of Bristol Bay," Collier said.

The company estimated that Pebble Mine operations will make annual payments of \$49-\$66 million to Alaskan coffers and create 1,500 to 2,000 direct and indirect jobs.

Opponents vowed to continue their fight. ■

President's Page: Encourage the next generation to be part of SME

(Continued from page 6)

local sections — thank you for your time, your commitment and your hospitality — your work is foundational to the Society.

There are many SME products that provide value, most notably *Mining Engineering*, OneMine, national, regional and local programming, books and licensure. They have all had a mixed meaning for me during the different stages of

my career. However, the one item that has provided value throughout all my career is the networking opportunities and the relations that were possible through SME.

And finally, it was mining professionals five to 10 years my senior that encouraged me to become involved and to participate in SME. They provided support and continue to provide support to me throughout my involvement. I believe this is important for every

SME member. The Society can create programs for every age group within the organization, but it is those who precede us that are most influential to our engagement. One of the most important aspects of SME sustainability is that the young members of today need to be there for the young members of tomorrow. Knowing the young leaders of today, I depart as president encouraged for the SME of tomorrow. ■



yourproducts

yourservices

yoursuccess

to be included in the next directory, contact Ken Goering today | goering@smenet.org



SME President
Timothy D. Arnold
VOL. 68 NO. 3 – VOL. 69 NO. 2

March 2016: VOL. 68 NO. 3

An interview with the 2016 SME President

April 2016: VOL. 68 NO. 4

What can be done to effect change? Efforts to improve public perception of mining will continue

May 2016: VOL. 68 NO. 5

Health and Safety needs our support; SME can provide a home to mine safety professionals

June 2016: VOL. 68 NO. 6

The world faces many challenges; Science and engineering should not be restricted to one issue

July 2016: VOL. 68 NO. 7

SME thrives thanks to volunteers; Take some time to thank those who make the Society great

August 2016: VOL. 68 NO. 8

Mining industry needs young talent; Universities and industry need to work together

September 2016: VOL. 68 NO. 9

Mining builds strong bonds; It is crucial to pass on the correct values to the next generation

October 2016: VOL. 68 NO. 10

Some wounds never fully heal; Make safety a value to avoid the scars that last a lifetime

November 2016: VOL. 68 NO. 11

Giving thanks; SME Foundation is a great place to show your appreciation

December 2016: VOL. 68 NO. 12

Mentoring the next generation; SME offers members to pass on advice and knowledge

January 2017: VOL. 69 NO. 1

SME to honor WAAIME for 100 years; The mining industry has benefitted from the work of WAAIME

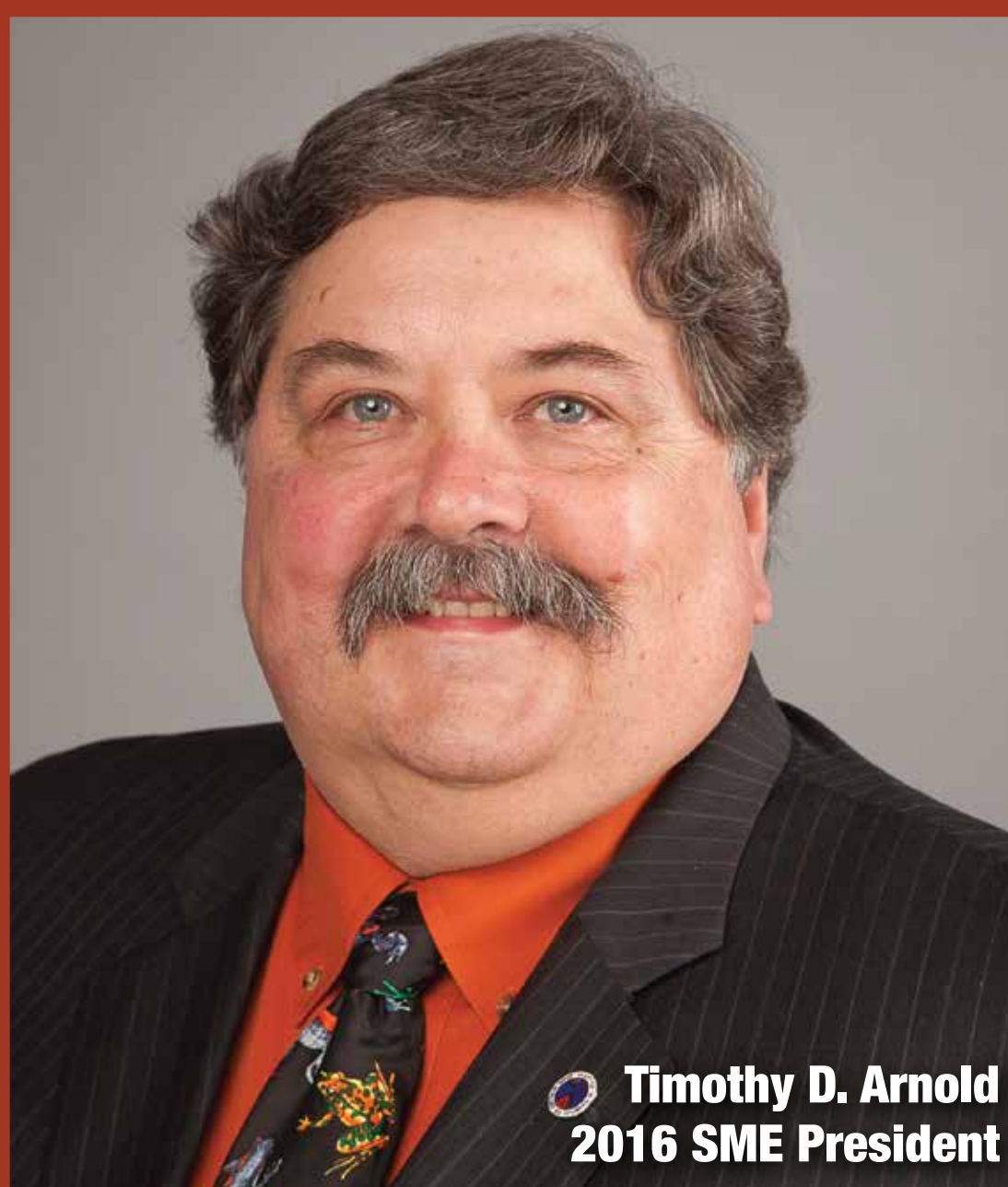
February 2017: VOL. 69 NO. 2

A long, strange trip indeed; SME President reflects on the long road through the Society

MARCH 2016
VOL. 68 NO. 3

OFFICIAL PUBLICATION OF SME

Mining engineering



 **Timothy D. Arnold**
2016 SME President

2016 SME Bookstore Catalog

Timothy D. Arnold;

An interview with the 2016 SME President



History - How did you get into mining and involved with SME?

Unlike many past presidents, I do not come from a mining lineage. I liked math in high school and believed I wanted to be an engineer. I told my math teacher that, and he laughed in my face. I believe that humiliation is what carried me through engineering school. At the time my ability to go to college relied on how inexpensive I could make it. My brother told me that there were a lot of scholarships in mining engineering, and I should apply to mining schools. As usual, he was right and I was off to the University of Idaho to study. My first summer break I got a job with Hecla at a mine in Arizona. I was a laborer on a shotcrete crew. I knew after the first summer that I loved underground mining, and I never considered

changing disciplines. Looking back, I was working in miserable conditions (hot, humid), on a miserable job (shotcrete), where I got injured, and two summer student roommates died in a car accident on the commute home after work. I had every reason to hate the industry, as I had seen virtually everything bad about what we do. But I didn't, I loved it. I said I was good at math, I never said I was smart.

I joined SME in college because I was told to by the head of the mining school, Dr. Jack Hoskins. You did what Jack told you to do. I got involved because I went to an annual meeting and the papers in the underground sessions were terrible. I refer to bad papers as the "Tensile strength on cable bolts in sub-arctic regions on Tuesday" papers. Real snoring fodder. I don't remember who I was complaining to, but they told me to quit my grumbling and fix it. So I chaired a session, and tried to get only good quality papers, something that has been my mantra for years with the Mining & Exploration Division. I also volunteered to help the local sections too. Then one day I woke up as president.

What is your opinion of the health of the mining industry?

The mining industry is in bad shape. Coal is under attack and will likely never recover to its former greatness. Our President has banned new coal leases, and the state of California is forcing people it does business with to divest their interests in coal companies. And that all happened in just in a few short weeks this January. Usually in America you get a trial before you are given a death sentence, but not with coal.

Virtually every commodity price is at multi-year lows. You have to go back to 2009 to see prices as low as they were at the end of 2015. The people that hate our industry still hate our industry. Permits continue to take longer and longer to get. Thousands of mining professionals are out of work or underemployed. Since that first summer underground in 1976, I don't remember a tougher time to be a miner.

But there is hope. Our industry has one resource that no other industry does. We have miners. And there is no one I would rather have by my side if I were to wake up in the middle of a Steven King novel than a miner! The distress we are going through today is nothing to the suffering of the generations of miners before us. We are tough, resilient, and can find a way.

One reason I have hope is because we are graduating more students from our universities now, and that should continue for a while. We have great young people coming out of these schools, and they are finding work in a variety of fields that were not normally available to mining graduates. And it is a good thing, because the average age of our industry continues to creep up and up, and these folks are the future. To young minerals professionals I give the following advice: strap in tight, because you will be put in positions soon that took many more years of experience for us old guys to get. In 2008, I introduced my friend Douglas Silver at the keynote address at the SME Annual Conference. I described myself as: "The only unemployed mining engineer in America." My, how a few short years have changed things.

And cycles are, well ... cyclical. We will bounce back. People continue to need stuff. The standards of living worldwide continue to rise. People make a lot of the slow growth in China, and it seems like every time an article comes out about it, the price of commodities fall. I like to remind people that the 'slow' growth in China is still twice the growth in the United States. And it is a country of 1.4 billion people. I am an operator, not a fortune teller, so I don't like to make predictions about the industry. But I talk to a lot of smart people, and the consensus seems to be that there isn't a lot of hope that 2016 will be a good year for mining and the prices, but I am confident that we will bounce back. The prices recently were at six year lows. Let's not forget there was a hump on the price graphs between 2009 and today. There will be more.

What are the major challenges of the industry today?

At times like these, often the knee jerk reaction is to slash. Slash costs, slash people, slash spending. While that has a temporary influence on a business, I believe that a more profound effect can be realized through focusing on productivities. It has long been my belief that if you want to become more profitable, start with your safety program and then work on morale. Because when employees see management focusing on their well-being, they will be more productive. And by including all persons in the business of being more productive it will always improve the bottom line more than cutting plastic forks and paper plates out of the lunchroom. Miners are your most important asset. Let them help you improve the business by sharing common goals.

Something must improve in our ability to permit mines in America. The cost of permitting

is the number one detractor to investment in mining in the United States. And the time and money it takes to permit a mine is not the fault of the average person who is concerned about the environment. It is because there are groups out there whose sole function is to make a living trying to shut down mining and other resource industries. I dislike the term nongovernmental organization (NGO). My daughters' third grade dance class was technically an NGO. I think the better term is RAMBO (Radical Anti Mining Business Organizations). These groups make hundreds of millions of dollars fighting not only our industry, but virtually every resource industry. Steve Gardner spoke of not-in-my-backyard (NIMBY) or build-absolutely-nothing-anywhere-near-anything (BANANA) groups last year in his presidential interview. It is something that needs constant attention. A good start is HR-1937 — National Strategic and Critical Minerals Production Act of 2015 sponsored by Nevada's Mark Amodei. Call your senators and tell them to get behind this bill.

I believe the perception of mining worldwide is a serious issue. A pet peeve of mine is to sit with a group of miners and listen to them complain to one another about how nobody knows where their stuff comes from. We preach to the choir, but don't communicate to the masses. SME and MEC can be THE source of information on how mining touches your lives, but we need to do more. I saw a panel discussion once where a man from the U.S. Forest Service told miners in the audience that if we would put 10 percent of the money we spend on beer into a public relations program, we would not have a problem with the public. I think there is a lot of truth to the idea that we as an industry do not spend enough resources on improving our overall image. But until the CEOs of the mining industry can be convinced of that, it will always be an uphill battle. Great things are being done in many venues, but a nationwide pro-mining public relations program could pay for itself in the shortening of permitting times alone. Look what has happened to coal, all because of politics and the ignorance of the average citizen. We need to tell our story, and it needs to be on a much grander scale.

How is SME's health?

A lot of this article has been pretty gloomy up to now, but SME's health isn't gloomy at all. We are coming off some strong years, and 2016 looks pretty good. We are still attracting miners and vendors to the conventions, they are just carpooling and staying in less fancy hotels. We are doing some outstanding things.

We have a congressional fellow that is now sitting on the House Resource Committee. Our Educational Sustainability programs are major game changers for universities offering degrees in mining and metallurgy. The Foundation is under great management, and even in these tough times we have companies, as well as individuals, who are sticking with us at very generous levels. Our UCA Division has become one of the workhorses of our society and opened up great opportunities not only for SME, but for engineers graduating in mining programs everywhere.

If you look at the five Future Goals of SME on the website, you will see that we are tracking very well with what we are trying to do. We

are a great resource for members. We provide information as good as, or better than, anyone. We are financially secure, and we have solid relationships with our allies. We still have a lot to do in these areas, like communicate it better, but we are doing very well. If that statement made you think I'm crazy, then I want to hear from you.

The presidency of SME is a bit of a team effort, and all the leadership have been discussing finances. We need to steel ourselves against the next few years with respect to our finances. This current cycle in mining will eventually effect SME, and we need to be well prepared for it. Prepare for the worst, hope for the best.

From laborer to SME President, Arnold has done it all in mining

Timothy D. Arnold is vice president of operations for Nevada Copper Corp. and senior mining consultant for Barr Engineering, living in Sparks, NV. His career in mining began in Casa Grande, AZ as a summer student working at Hecla's Lakeshore Mine. Arnold used mining to help pay for school at the University of Idaho, where he received his degree in mining engineering. He graduated in 1982, and there was little opportunity for mining engineers at the time. Because of his work history, he was able to land a job as an underground laborer on an electrical crew at the Mt. Taylor Mine in New Mexico. His boss told him he would give him a job, "as long as you don't tell anybody you're a damn engineer." The pay was good, and he didn't. During the rest of the early 1980s, he worked as a laborer, equipment operator, nipper and, finally, a contract miner. In 1985, he immigrated to South Africa to work in the underground gold mines, where he finally gained supervision and engineering experience. His first job as a supervisor was in a stope 3,500 m (11,500 ft) below the surface.

After returning to the United States in the late 1980s, he began a career in engineering and operations management. He has held positions in engineering from junior engineer



to chief engineer at operating mines. His management positions have ranged from shift boss to vice president and general manager and chief operating officer. Most of his career in operations was spent at underground mines like the Lucky Friday, Bullfrog, Jerriitt Canyon, Kensington, Crownpoint and Ozark Lead. He has spent several years either operating or attempting to develop open pit mines such as the Rochester, Mt. Hope, Nkamouna and Pumpkin Hollow.

Arnold has worked for SME as a volunteer since the early 1990s. He

has been a local section secretary, treasure and chairman. He served on the executive committee for the Mining and Exploration Division, culminating as the chairman and being honored with the M&E Distinguished Service Award. He is a Founding Registered Member of SME and a professional engineer in two states. He is in the 2012 class of SME Distinguished Service Award winners. Timothy and his brother James are the first set of brothers to serve as president of SME. Their mother, Arzell, would be very proud. ■

But to me, SME will always be about the staff. I have made some lifelong friends among the staff at SME, and as long as we have a productive and engaged staff in Denver, we will continue to better ourselves. I went to a symposium for chief elected officers and chief executive officers of societies like ours. In this symposium, there were small volunteer societies and some giants. The topic of the symposium was how to lead a society so that it is functioning at a high level and is constantly successful and improving. I can honestly say that Dave Kanagy and his staff could have taught the course. SME had every base covered. Combined with direction from some fantastic past presidents, our society is in good hands.

What are the challenges facing SME?

Carrying on what we started. In the good years, we created some great programs and have expanded by every metric you can imagine. Our biggest challenge will be to keep it up.

What are your SME goals?

The nice thing about being the president of SME is that you get a lot of hands-on experience before you become one. You spend one year as president elect-designate, then one year as president elect. Then one year as president and one year as past president. It is a little bit like a tour of duty, rather than a one year obligation. My goals will be similar to the presidents before me, because all of us work on making sure that there is continuity and efforts being spent on the many issues relating to our strategic plan.

Keep moving forward. In recent years, we have initiated several programs and efforts that will need continued support through my term. Primary in my mind is the Ph.D. Fellowship program and the Career Development Grant programs. This will greatly improve our ability to fill the U.S. universities with quality mining and metallurgy professors in the future. Also, the Health & Safety Division is in its infancy at SME. We need to continue to support the efforts of the leadership of the new division to give it a fair chance at success. There is a great opportunity to bring in more mining professionals into SME through this division, and we need to help them be successful.

Remote members. One of my primary goals is to improve the value of SME to members that are not involved on the "(inter) national" level. I am talking about the folks that never make an annual meeting. The men and women being served by local sections, or out of section. The

international members.

My catchphrase is, "How satisfied is that guy in Tonopah?" I want SME to better serve that person who puts on a hard hat every day to go to work. That is why I am wearing a hardhat in my president's page photo. I use that to remember that we have a lot of folks out there who need to understand the value of SME, and we need to keep adding value all the time.

Over the years, we have added many services for the remote member. OneMine.org is a perfect example and has been a huge success. But I believe that there is a disconnect between the staff and leadership of SME and the average person in the field. We need to make sure that every member of SME feels like they are part of a community. SME has so much to offer its members, but many of the members don't even know where to start. We are more than a magazine and a monthly meeting. I want every member of SME to understand that, and for SME to continually improve the value of membership.

Steve Gardner asked me to form an ad-hoc committee on this topic, and we have just scraped the surface of ways to improve the value of SME to remote members. I see this focus carrying on to future presidents as well.

Public perception of mining. For mining to be seen in the same light as we see it nationwide, we need to do more than we are doing. The things we are doing are fantastic, and our volunteers doing work in the field, such as at National Science Teachers Association conventions, the Boy Scouts or just sharing our story in schools and with their friends is so very important. But if our task is to change the perception of mining nationwide, the sheer number of people we need to be reaching is overwhelming.

It will take the combined efforts of mining societies, organizations and the industry to tackle such a project. My goal will be to continue these conversations. Try and convince the leadership of our industry that this is vital to our survival in the long term. But I cannot be the sole voice in this. Every person reading this article needs to do what he or she can to help us convince the movers and shakers in our industry to get on board. It will take time and it will take money. Both things miners are notoriously stingy with.

In conclusion

We have some challenging times ahead, but don't let that cloud your outlook. Regardless of what we're facing, there are great times ahead of us because of the folks we all hang out with. Miners. ■

What can be done to effect change?

Efforts to improve public perception of mining will continue



Tim Arnold
2016 SME President

The governor of Minnesota recently announced that he will overrule his Department of Natural Resources decision to allow Twin Metals access to specific state lands for the purpose of conducting environmental, mineral assessment and geotechnical due diligence activities in support of a potential mine (see page 10).

Meanwhile, we have all been following the U.S. Environmental Protection Agency's (EPA) attempt to stop the Pebble Mine in Alaska by producing a report intended to thwart the legal permitting process in order to make an apparently official statement that you cannot mine in that part of the world.

What is particularly troubling in both of these cases is that we have individuals and agencies (made up of individuals) preempting the system we have in place for permitting mines in the United States. These "death sentences" are being made before the mines have had a chance to propose how they would build and operate a mine. As if the systems we have in place are not onerous enough, these officials are now adding another layer of preemptive vetoes. Political stunts as they are nonetheless affect public perceptions about the projects before they have a chance to tell their story to the public.

I am an introspective person. I always ask if I have done enough to change a bad situation. So when I reflect on how these preemptive decisions are being made on an industry that I love, I ask myself, what have I done to prevent real problems from happening?

I have been a good operator and steward of the resources I have had an impact upon. But perfect is a high hurdle. Without perfection, the industry's detractors will always throw anything they can latch onto in all our faces. One of the online comments below the article about the Minnesota mine stated: "In truth, if they are like 100 percent of prior copper mines in the U.S., Twin Metal's goal is to stop pollution only long enough to cash their profit checks and leave the public with polluted water and huge bills."

My goodness, we miners must be some major SOB's. As tired and trite as those laments have become, facts remain optional to the "NIMBY" acolytes.

Safety share: • The biggest safety hazard we face in our daily lives is driving a vehicle. In the mine, we typically do a pre-operational check before starting up each vehicle or piece of equipment. What about your personal vehicle? When did you last check all the lights, tires, tire pressures, oil, water, brake fluid, windshield washer fluid, coolant, etc.? When did you do a walk-around to ensure your car is in good condition? Simple checks can help prevent accidents and improve the likelihood of having a safe drive.

Submitted by Jürgen Brune

Beyond being a good operator, I must ask myself what else have I done? The answer is that I vote nearly religiously. Every time. And what makes a good candidate to me is his or her stance on natural resource issues. Yes, I am pretty much a one issue voter. Mining and natural resources issues in general are what I vote on.

In reality, I have not voted for a candidate in a long time. I just seem to keep voting against a candidate. We are in the midst of the most unusual primary season in my lifetime. If nothing else, it has been entertaining. I will not suggest one candidate over another, but I will say one thing: if you don't vote, you don't get to complain later. If you are a manager of people, please encourage a system where all your employees get a chance to vote, and encourage them to take advantage of that system.

Lastly, I vote with my wallet as well. I go to outdoor shows and I don't do business with vendors that have the "Stop Pebble" sticker showing proudly in their booth. And I tell them why. I don't drink a certain beer, even though I love it, because the owners of the company donate to environmental extremist groups that want to put miners or others like us out of business.

We live in a strange world. We are in an industry that is not thought of positively by most of the citizenry. The most important thing I can do to change that is to continue to operate honorably, meet as many people as I can, and tell my story. I tell the truth. I let them know that we do things right, chastise those that don't and introduce them to the greatest folks on the planet: the hard working miner. ■

Health and Safety needs our support; SME can provide a home to mine safety professionals



Tim Arnold
2016 SME President

In 2015, we created a new division at SME; the Health & Safety Division. As with any change, there has been controversy. Many people in the existing divisions have remarked that safety is everyone's responsibility, and it is absolutely entrenched in the work we do. We should not separate safety from, for instance, the Mining & Exploration Division, but should keep it within the division. I get that. But, I also get the other side of the story.

A few years back I was asked to take a look at the awards that are given out at SME. I looked for duplications and for gaps. What was glaring to me (as a lifelong operator of mines) is that SME did not give any safety awards. That has subsequently been remedied. But for a society of 10,000 plus safety professionals (we are all safety professionals) to overlook offering a major safety award to its members well into the 2010s was troubling to me. It made me wonder if we were not expecting someone else to be watching our back. As if we were not counting on someone else to take care of that problem. Sound familiar?

That is why I support the idea of a Health & Safety Division. We have many SME members whose sole purpose is to focus on safety, and safety only. They are the true full time safety professionals. Granted, they are not a large number within SME, but we all know a few. As important, there are many full time safety professionals that feel like they need a home – and SME can be that home. These people, like many people that formed the Environmental Division many years ago, feel that they can accomplish more as a unified group working with all the divisions than being incorporated into each division. I agree with them. Does each department at a mine have its own safety department, or is there a safety department working with all other departments to create the culture of safety on a minesite?

Being a safety person is one of the most thankless jobs in mining. You are required to walk the thin line between enforcing the rules and being the confidant to the employee's concerns. You have to be the hammer and the therapist. Your job requires you to accept nothing less than everyone being absolutely

Safety share: • The biggest safety hazard we face in our daily lives is driving a vehicle. In the mine, we typically do a pre-operational check before starting up each vehicle or piece of equipment. What about your personal vehicle? When did you last check all the lights, tires, tire pressures, oil, water, brake fluid, windshield washer fluid, coolant, etc.? When did you do a walk-around to ensure your car is in good condition? Simple checks can help prevent accidents and improve the likelihood of having a safe drive.

Submitted by Jürgen Brune

perfect. And at the end of the day, more people remember the hammer than the therapy. In December of 2005, I wrote an article for Rock in the Box that I have partially reprinted below. I ask that we, as members of SME, band together to give this new division the support it needs to get on its feet and functional as soon as possible.

The Safety Guy (TSG) completed a long and distinguished career. His work at the mines was focused on training the workforce on how safety is everyone's responsibility. He spent his life showing miners that in order to keep everyone safe, everyone had to be a safety professional. TSG was a lucky guy too. In his career, although he was involved with some significant accidents, he never had a fatality under his watch. All in all, a great career. Unfortunately for TSG, soon after his retirement he quietly passed in his sleep one evening.

One day TSG was sitting alone. The Big Guy asked him what was on his mind. TSG said;

"My career seems somewhat... 'uneventful'. I was truly blessed with being associated with mines that didn't have much of a problem with safety. No one wants accidents, but it seems that I just... I don't know... skated by. And I started my career with such passion about safety! It is just a little bit of a letdown I guess."

The Big Guy chuckled. He said;

"Safety Guy; you haven't a clue. The problem with being a safety guy is that if you are good at what you do, you will never know

(Continued on page 16)



Carmichael Mine construction approved; Queensland gives Adani Group the go-ahead for coal mine

THE QUEENSLAND government has approved the construction of Adani Group's Carmichael coal mine, the largest thermal coal mine in the world.

The Financial Times reported that leases for the mine, rail and port projects were granted for the project that could cost as much as A\$21.7 billion and create thousands of jobs.

The approval is a significant step forward for the project, but there is still a ways to go. Dredging of a nearby port cannot begin until Adani demonstrates that it has raised enough money to complete the project.

"This is a major step forward," said Annastacia Palaszczuk, Queensland's premier. "Some approvals are still required before construction can start, and ultimately committing to the project will be a decision for Adani," she added.

As with any coal project, this one has its detractors.

The mine in Queensland's Galilee Basin has become the focus of a global campaign by environmentalists who say digging new mines and burning coal will cause irreversible climate change. They say that burning Galilee's coal reserves would pump 700 Mt (770 million st) of CO₂ into the atmosphere every year for over half a century.

Greenpeace described the government's decision to approve the mine as "appalling," particularly as the nearby Great Barrier Reef is already experiencing severe coral bleaching due to climate change.

But it also suggested the mining project would never proceed as it "remains in financial disarray and faces legal challenges as well as a coal market in structural decline."

Thermal coal prices have more than halved since 2011 due to a supply glut and waning demand in China, the world's biggest coal market.

Adani is fighting legal battles against two campaign groups opposed to the mine project. It also faces the challenge of raising billions of dollars in finance even as several large lenders including Deutsche Bank and HSBC have refused to back the project.

Environmentalists wage a high-profile campaign against Australia's coal industry.

Last year Adani suspended preparatory engineering work on the Carmichael Mine, blaming legal challenges.

Adani has secured all required primary approvals from state and federal governments required to proceed. It still must get secondary approvals for rail, port, power and other construction, but supporters do not expect this to hold up the project.

The three mining leases approved are estimated to cover an area containing 11 Gt (12 billion st) of coal.

Other companies plan to develop mines in the same basin, including GVK Hancock, a joint venture between India's GVK and Hancock Prospecting, which is controlled by Gina Rinehart, Australia's richest person.

Analysts say those planned mines will probably depend on Adani's project going ahead, as it will provide the requisite rail and port infrastructure.

This has made Adani's project a potent symbol for global environmental campaigners, who want to keep the coal in the ground. ■

Colorado: Safety guy

(Continued from page 6)

about your success. The fingers all stayed on the hand, all the toes remained attached, the bones weren't broken. The roof never fell, the brakes never failed, and the raise was always barricaded. The miners showered after shift, went home to their families and lived long lives. The wives had husbands, the children had mommies and daddies, and the new truck dealers all got wealthy. You taught these people to be safe, and that knowledge kept them alive. Your impact on your fellow man was immeasurable. Immeasurable – literally, because the accidents never happened. You saved more lives than you will ever know. But I know Safety Guy, and that is why you're here." ■



GRIEVE

OVENS & FURNACES



Heavy-Duty Truck Ovens

- Compact truck-loading
- Gas & Electric models
- UL Listed controls
- Class A flammable solvent models
- Companion trucks to your specs

www.grievcorp.com 847-546-8225

The world faces many challenges; Science and engineering should not be restricted to one issue



Tim Arnold
2016 SME President

April and the early part of May were busy times for me, traveling constantly and exclusively on SME business. These trips included a great Minnesota meeting in Duluth, a trip to Washington D.C. to hang out with the presidents and executive directors of other engineering societies in America, the record-breaking World Tunnel Congress (WTC) in San Francisco, CA and the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) meeting in Vancouver, BC. I am happy to report that the sun followed us to all these locations.

While in D.C., I attended many meetings and seminars, rubbing shoulders with numerous brilliant scientists. I was also able to fulfill one of my bucket list desires: I finally saw the Smithsonian National Museum of Natural History. I spent hours in the mineral collection, as I am sure many of you would.

But I must admit that I was taken aback by one issue while I was in D.C. and on these trips. Somehow, the nation's focus in science and engineering has become entirely isolated on one issue: climate change.

Safety share: • A summer safety share from Nantucket — While car and truck drivers should know to swing wide when passing a bicycle because they are passing another vehicle, bicycle riders should also respect the rules of the road: signal at turns, stop at stop signs, etc... and use front and rear lights at night, wear bright, reflective clothing, and ride single file. And while shorts and flip-flops are fine for the beach, they invite foot-pedal confusion and leave a large smear (road-burn) on the asphalt if knocked off.

Submitted by Lee Saperstein

I believe that our duties as engineers is to apply science to practical problems. And I am not going to fill this page with a discussion on whether climate change is or is not a problem, or whether humans are or are not part of the problem.

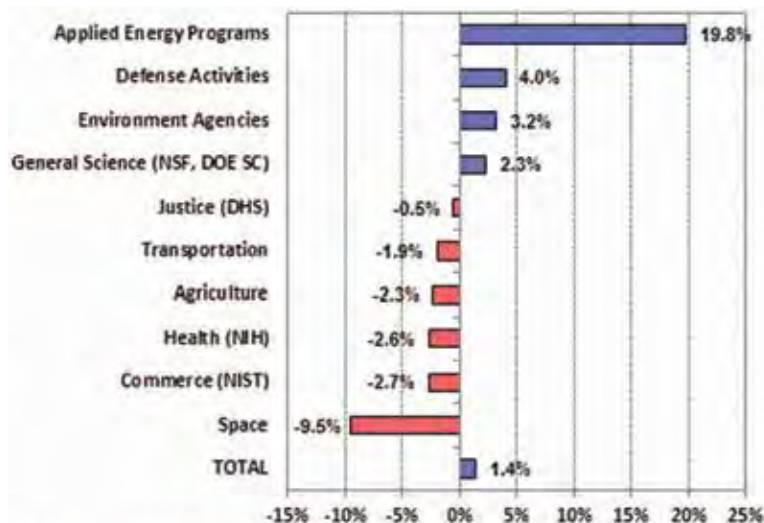
What I do ask is: is it our only problem? Should engineers and scientists be ignoring other problems in the world so that we can focus most of our resources on one? Are the hungry now fed? Have we eliminated many of the world's diseases? Is the American infrastructure on par with Dubai? Is everyone in the world drinking clean water?

Figure 1 is taken from the American Association for the Advancement of Science's report called "Guide to the President's Budget: Research and Development FY 2017." You can see that the percent change in research and development in the proposed 2017 budget is heavily weighted in applied energy programs. To quote from the report "One major priority clearly jumps out: applied energy R&D. In particular, the administration again proposes major increases for the Office of Energy Efficiency and Renewable Energy, the Office of Electricity Delivery and Energy Reliability, and the Advanced Research Projects Agency-Energy, or ARPA-E. This is not surprising, as low-carbon energy technology has arguably been the Obama administration's biggest R&D priority."

And, in case you are wondering, these

Figure 1

Fiscal year 2017 research and development in the base budget by function. Percent change from FY 2016, nominal dollars.



Source: OMB R&D data, agency budget justifications, and agency budget documents. © 2016 AAAS

(Continued on page 18)

President's Page: Climate change shouldn't be the only priority

(Continued from page 06)

changes to the budget are following a steady decline in spending on R&D by the United States, as seen in Fig. 2.

Every meeting I had in D.C. the topic of the urgency of climate change came up. The Smithsonian is filled with signs and reminders of the dangers of greenhouse gasses and how man is harming the earth. We all know why this is happening. It is the politically correct hot topic right now. And we have become a society of jumping from one hot topic to the next, driven by one nongovernmental organization or the other, backed by

a media trained in keeping us in a constant state of frenzy.

But I would remind everyone reading this: you are engineers and scientists. You are the people that can see through this façade. You are the people that can calmly and deliberately judge and prioritize. And I would also remind you that, even if you consider climate change a top priority for us to tackle, it is not the only priority.

At the World Tunnel Congress, one of the speakers was making a case about the urgency of addressing climate change. He ended his speech by saying that we need to do this for the future generations (for

the children). I took the photo in Fig. 3 in Cameroon a few years ago when the company I was working for was trying to develop a mine in some of the most remote areas of Africa. We would have brought a lot of cobalt and nickel out of that area, but we would have brought a lot of relief to the area as well. Relief like clean water to people that were drinking, bathing, washing their clothes and (you know what) out of the same small stream. Relief, like housing, medicine and micro-business. Relief, like reducing the infant mortality rate and extending people's lives. I agree that we need to think of future generations. But can we do a better job of helping the current one? I think we must. ■

Figure 2

Federal budget as a percent of GDP, base budget only in FY 2017.

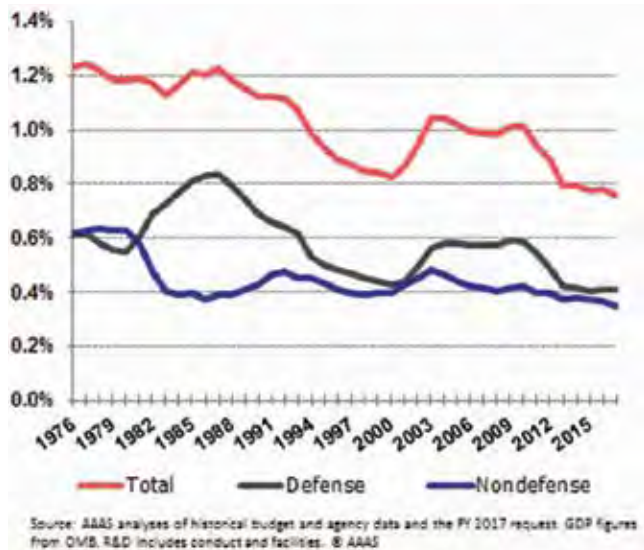


Figure 3

Children in a village in Cameroon.



EPA: States, tribes and local governments will receive funds

(Continued from page 13)

- request more money.
- \$221,000 to Silverton and San Juan County, both in Colorado. The Gold King Mine is near Silverton in the county.
- \$208,000 to La Plata County, Colorado.

- \$157,000 to the Navajo Nation in New Mexico. In addition, the EPA itself spent \$1.1 million on the Navajo Nation responding to the spill, the agency said.
- \$116,000 to the Southern Ute Indian Tribe in Colorado.
- \$2,400 to Durango, Colorado,

in La Plata County.

The EPA said it is still considering three requests for reimbursement for expenses already incurred: \$304,000 from the state of Colorado; \$140,000 from La Plata County, Colorado and \$128,000 from the state of Utah. ■

SME thrives thanks to volunteers; Take some time to thank those who make the Society great



Tim Arnold
2016 SME President

Volunteers are the lifeblood of our society. We could not get along without our amazing staff, but it is the volunteers that keep the momentum going. Volunteers come in many shapes and sizes. Some are humble, others cranky, some give a little, some work tirelessly. Some work locally, others nationally or internationally. All of them, regardless of the size of their contribution, are not thanked enough.

While we do have distinguished service awards for persons who have put out enormous efforts over many years, both at SME and within the divisions, those awards only honor a fraction of the volunteers that are the

foundation of our society.

I was a local section chair, vice chair, program chair, and also the dreaded 'secretary/treasurer.' During my time in the latter position, we still had dot matrix printouts of the membership that had to be retyped into WordPerfect to make labels. Stamps were hand licked ... every month, for 400 people. That was one of the most time consuming jobs I ever did for SME. That process has gotten a little easier through the years, but it illustrates how much effort people put into our local sections every month of every year. And instead of spending time licking stamps, our volunteers are accomplishing bigger, better and more meaningful things every year, usually with their spare time.

There are many local section heroes. There are many people that have given their time, sweat and money to support SME in countless ways. I only recently found out that two of our members volunteered long ago to subsidize the membership fees of every student at the University of Nevada, Reno, and have been doing so for nearly a decade (see SME News, Local Section Hero, page 91). This is a perfect example of how wonderfully our members support SME. And they do it quietly, year after year, and expect nothing.

Over the next few months we will be doing our best to highlight these types of members. There is a nominating process for a local section hero that can be found at smenet.org/local-section-hero. I am sure you know someone that straps on a cape and mask at your local section,

Safety share: • When we think about safety, we need to think about all of the little decisions that we make and assume that any one of those decisions can affect the outcome of our situation. Having a "buddy" can decrease medical response time after an accident. Wearing a harness can prevent a fall. Wearing a hard hat with a chin strap may diminish impact and head trauma. Moving a ladder can eliminate the need for an unsafe reach. Doing the small things can make a huge difference. Never forget that the little stuff is often game-changing stuff.

Submitted by Susan M. Moore

and needs to be recognized. Please take the time to do so.

In addition to the local section hero program, we have initiated a monthly local section meeting between the local section executive committees, SME staff, myself and the President-Elect, John Mansanti. We are putting a major emphasis on understanding and assisting with the issues at local sections, improving the communication between staff and the sections, and most importantly, creating a community among the local sections so that they can communicate and help one another. This started a year ago under the guidance of Steve Gardner, and I am sure this will carry on for many years to come. You will hear more about this as the efforts continue.

So, at your next local section meeting, do me a favor. Look around the room. Figure out how the podium got there, and the computer and screen. Think about who convinced the speaker to take time out of his or her busy schedule to share their expertise with you today. Who sent you your invitation, your reminder and organized the meal? Think about the logistics of paying for the food or getting a vendor to sponsor your drink. You may not be the kind of person that writes nominations, but you should be the type of person that walks up to your local section leadership, shakes their hand, and thanks them for helping to make SME a great organization.

And on behalf of the SME Board and Leadership, I would like to thank them all as well. ■

Mining industry needs young talent; Universities and industry need to work together



Tim Arnold
2016 SME President

One of the few certainties in the mining industry is our need for young engineers and new talent. We struggle to attract young people into our professional ranks. Our industry isn't exciting to today's youth. Many seem to place quality of life above career success or advancement, and we ask a lot of our engineers. If an engineer graduates from The Massachusetts Institute of Technology with an electrical or mechanical degree, they may be able to choose from several jobs that allow them to live in urban areas, show up for work infrequently and do most of their work remotely using a laptop from home or a Starbucks.

Conversely, we expect many of our engineers to live in remote places, get dirty, work long hours, and "prove themselves to the organization" by showing commitment and often sacrificing a work/life balance common to other engineering disciplines. Then there is the cyclic nature of our industry that we all have to struggle through. These are huge generalities, but I think you get my point.

Compounding our problem, the university systems across the country are struggling financially. This puts a lot of pressure on academic departments that fail to have large enrollments and/or maintain a high per capita research volume. Unfortunately, this is common for many mining and extractive metallurgy programs. As one professor I know stated, "Many universities don't even know they have a mining department, but when they find out, they get rid of it." Additionally, the way the universities put pressure on the academics is by judging success for departments and faculty relative to the amount of research funding they bring in, the student credit hours they teach, the number of masters and Ph.D. students they graduate, and their record of scholarly publication in "quality" refereed journals.

Our industry needs young engineers with bachelor's degrees. To be honest, the newly graduated engineer begins his or her real learning process the day they step onto the mine site, not in the four years prior. Receiving a master's degree without first having industry experience only delays the learning process. It doesn't help the mine manager who needs

Safety share: • One of the biggest challenges we face in mining today is predicting and managing low-frequency, high-potential incidents that could cause a fatality in our mines. We all have great procedures and policies that provide a clear view of what we need to do to remove or control these risks both on the surface and underground. The real challenge comes when we have to get our competent team members out into the field to ensure that those critical controls are in place and effective. Everyone within the organization has to contribute to checking and supporting these controls. When it comes to fatal risk management, we all rely on each other to do a great job. There is nothing more important than for us all to take care of each other and help to make sure everyone goes home safe at the end of every shift. What is your system to check these controls are in place?

Submitted by Mick Routledge

help getting the dilution down or the chief metallurgist who has trouble getting the roughers performing properly.

From the perspective of most of us in industry, the most important things a professor can do is to make sure that the new graduates are well educated in the fundamentals and know how to solve problems; that they understand the industry they are about to join and that they are excited about going into that industry. That involves mentoring and lots of face time with the students. That can't happen if the faculty are preoccupied with academic obligations that don't directly help educate students.

Clearly, we have a significant disconnect. We have an industry that wants practical 25-year-old graduates, and we have a university system that judges success of the educators by standards that are in conflict with what the industry wants. What do we do?

Traditionally, we throw money at it. There will always be an argument about how much money the industry gives for education and whether the amount is consistent with other engineering and science disciplines, but there are certainly many very generous companies out there helping various schools. SME has also created the Academic Career Development and Ph.D. Fellowship programs to help rebuild the faculty pipeline. This is a huge commitment for a

(Continued on 18)



PolyMet: Permits are the first of nearly two dozen to be submitted

(Continued from page 14)

state's first copper mine might be built and operate, although it's still possible that the state and PolyMet could hit a snag on details of a permit.

The final environmental review report concluded that PolyMet operations will not raise downstream

sulfate levels or harm wild rice, won't send tainted ground water north toward the Boundary Waters Canoe Area Wilderness as some critics have suggested and will not violate downstream mercury limits in the St. Louis River watershed.

The DNR concluded that PolyMet

could operate within all current state and federal pollution standards and that the project won't have impacts but that those impacts will be manageable.

The proposed openpit mine, is estimated at \$650 million to build and would employ about 300 workers for about 20 years. ■

President's Page: challenging times for mining programs

(Continued from page 6)

society that is suffering from the most severe economic downturn that our industry has experienced in the last 25 years.

That being said, I have to ask the question. Is it logical for us to be providing these resources to professors who are successful in the industry's eyes in their ability to produce "shovel-ready" engineers, when those very professors may fail to get tenure because of the demands by the administration related to research, advanced degrees and publication? The answer is not to give up on the programs. The answer is that the industry and the universities need to be able to find common ground on what makes a successful professor.

SME's Education Sustainability Committee has done some remarkable work in the last few years, and the Career Development and Ph.D. Fellowship programs will be game-changers in supplying the universities with good professors. In spite of their challenges, the universities continue to increase the graduation rates of engineers. The final task, with respect to educational sustainability, is for the industry and university administrators to come together and discuss meaningful ways to allow these professors to be successful, while still supplying the industry with what it needs. It won't be easy, but I hope this is a challenge that existing groups within the Society are willing to commit to solving in the future. ■

NEW!

**MARTIN® CLEANSCRAPE™
CLEANER**

A REVOLUTIONARY INNOVATION
IN BELT CLEANING TECHNOLOGY.

Martin® CleanScape™ Cleaner

- Lasts **at least twice as long** as traditional cleaners.
- Easy to install with little ongoing maintenance, requiring only **one tensioner adjustment EVER!**
- Offers the **lowest blade-to-belt pressure** of any cleaner on the market.
- **You can put it anywhere!** Installed at an angle, it requires very little space for installation.
- Suitable for both **mechanical and vulcanized splices** because of its durable tungsten carbide tips, which are available in multiple grades of carbide to match your application.

The Bottom Line:

The CleanScape™ Cleaner is an innovative, durable metal-tipped belt cleaner that provides maximum cleaning efficiency without compromising your belt.

Ask about trying it Risk-Free ASAP!

Try this cleaner risk-free and you will insist we replace the rest of your cleaners as well. If you don't think it's the best cleaner you've ever used, we will give you your money back. Period.

See CleanScape™
On Display at MINExpo
Booth #4015
Las Vegas, NV, USA
Sep 26-28, 2016



call **888.432.3525** or **309.606.4887**
email **cleanscape@martin-eng.com**
visit **martin-eng.com**



® Registered trademark of Martin Engineering Company in the US and other select locations. © 2016 Martin Engineering Company. Additional information can be obtained at www.martin-eng.com/trademarks and www.martin-eng.com/patents.

Mining builds strong bonds; It is crucial to pass on the correct values to the next generation



Tim Arnold
2016 SME President

Justified is a show on FX that takes place in Kentucky coal country. The two main characters, a cop named Raylan and a criminal named Boyd, are adversarial to the very end, yet they manage to maintain a seemingly inexplicable bond of friendship through it all. The final episode ends (spoiler alert) with Boyd asking Raylan why that is. He responds, "If I allow myself to be sentimental, there is one thing I wander back to..." Boyd responds, "We dug coal together." Fade to black.

What creates these types of bonds between friends and co-workers in mining? I don't know about you, but many of my best friends I met in mining. Certainly the people I respect the most in this world are a part of our industry. Good, honest, honorable men and women. And I am not just talking about the leaders of our industry. I am talking about great miners who taught me how to do the right thing and also be productive.

I have had the pleasure to work for some great people and the misfortune of working for some of the loudest screamers. What I consider the worst butt-chewing in my life may surprise you. I once worked for a man I respected, because he showed me respect. He went on a business trip and left some instructions. For some reason, I was able to justify to myself that they applied to everybody but me, and I disobeyed them. When he returned he called me into his office and said to me: "Tim, you pissed me off when you did that." He said it quietly and with no anger. I had lost his respect. This devastated me more than any screaming shift boss ever could have. I learned a lot about values from that conversation.

Most of us will spend more time at work than we will with our families over a lifetime. It is natural that tight bonds be created at work. What I believe makes mining special is that these bonds are so strong. They are strengthened by the incredibly hard work our miners do. They work at all hours, on holidays and in all sorts of extreme weather conditions. The physical demands of the job are sometimes exhausting. Our bonds are further reinforced because the work is dangerous. Not only does management watch out for the wellbeing of their people, but each and every one of us looks out for one another. The bonds are made tight because our people are so passionate

Safety share: • In the event of a terrorist attack situation, one should remember four actions: think, run, hide and call.

• Think – make a quick assessment of your surroundings and recognize what the threat is or where the threat may be.

• Run – once you have recognized the threat, do what you can to distance yourself from the threat. Consider a safe route and see if there are multiple ways to remove yourself from this threat as soon as possible.

• Hide – if you cannot run or get far away, get out of view of the attacker and try to find cover. Make sure you understand where the exit points are so, should an opportunity present itself later, you can still run. Stay quiet, silence your cell phone and don't bring attention to yourself in any way. Lock all doors, barricade yourself, stay low and away from the doors.

• Call – once you have done everything to secure yourself from the threat, take the time to call emergency services, your family and your friends. Remain calm and wait for emergency services to arrive. After the emergency services arrive, treat them with respect and follow their direction. Remember the advice of the national campaign being led by U.S. Department of Homeland Security, "If You See Something, Say Something."

**Submitted by Dean Gehring,
President and CEO Rio Tinto Minerals**

about what they do, no matter the department or profession. Finally, they are strong because of the thousands in the industry that keep doing the right thing, every day. We make great friends in this industry because of the strength of character of our people. That is why Boyd and Raylan respected one another so much.

I think society in general has developed some unfortunate weaknesses and character flaws, but the qualities absent elsewhere can still be found in our industry. I still see the strength of character in many of the youth that seem to be attracted to the mining industry. I see it in the sons and daughters of my friends in the industry. Good people are still attracted to our industry for the very same reasons expressed previously. Let us make sure we mentor them and reward the ones with the correct values and the strength to do the right thing. Let us continue to lead by example. Let's keep the work in mining rewarding for the next generation.

Lou Holtz said it best: "Do what's right. Do your very best. Treat others the way you would like to be treated." Deep enough. ■

Some wounds never fully heal; Make safety a value to avoid the scars that last a lifetime



Tim Arnold
2016 SME President

I spent a lot of my mining career as an hourly worker. I have been a graveyard shift laborer replacing rail along the main haulage, worked as an electrician for a year, (even though I knew virtually nothing about electricity), and I am proud to say that for a brief period I “made it” working as a contract miner in a track drift, advancing the headings with a jackleg and a 12B mucker. That was in a time when, if you called yourself a miner before you had proven yourself to the crew, you would get your lamp busted out on the cage going down. I have been on bull gangs, nipped, sunk shaft and even been greased (some of you will know about the last one).

I have many scars from my time as a miner. My first scar came on my first job, where I was on a shotcrete crew as an operator and a laborer. We had to add accelerator to the shotcrete so it would dry faster. The pH of the accelerator was above 11, so it was rather caustic. One afternoon the 55 gallon drums of accelerator could not be delivered to the machine, so we had to carry it to the machine in five gallon buckets. With no lids. Over uneven ground. Needless to say, I slopped a bunch of it down my boot.

I had my fairly new jeans tucked into my boots, and at the end of the shift my calf was itching like crazy. As we were waiting for the ride out of the mine, I pulled the top of the boot down. My leg was literally smoking. The shift boss, understanding just a little chemistry, told the crew to hold me down, and he poured vinegar on my leg. Good thing he told the crew to hold me down, I would have killed myself bouncing off the drift. To this day, I have an indentation on my calf from that impromptu chemistry experiment, and it took a couple of years for the blue dye from the jeans to work its way out of my skin.

My next scar was when I was working as an electrician. You have probably seen these orange hangers that hold up electrical cables in an underground mine. Back then, the end of the hooks were sharp, not rounded as they are now. Placing these hangers

Safety share: • The U.S. Department of Labor’s Mine Safety and Health Administration (MSHA) issued a drill entanglement safety alert to the mining community urging drillers to consider the following before beginning drill operations:

- Examine the drill and surrounding work area.
- Eliminate all tripping hazards.
- Do not wear loose-fitting or bulky clothing when working around drilling machinery.
- Avoid using objects that could entangle in – and be thrown by – moving or rotating parts.
- Stay clear of augers and drill stems in motion.
- Never manually thread the drill steel while the drill head rotates.
- Drill from a position with good footing and access to the controls.
- Assure that machine controls and safety devices such as emergency shutdowns operate effectively.
- Never nullify or bypass machine control safety equipment.
- Place emergency shutdown devices – such as panic bars, slap bars, rope switches, two-handed controls – in easily accessible locations.

Submitted by MSHA

was tedious work, up and down a ladder, over and over again. In some places though, the back of the drift was low enough that if you jumped really high, you could snag one end on the wire mesh, and you didn’t need the ladder. As you are all probably guessing by now, you could also snag an electrician with the hook on the other side of the hanger. Imagine, for a moment, a chubby electrician momentarily hanging from the back of the drift, one end of the hanger firmly attached to the wire mesh and the other end firmly attached to the meat between my thumb and first finger. That incident left a small scar that you can still see today.

“On Feb. 5, 1997, Rick Smith, miner, age 35, was fatally injured in a fall of ground at 6 a.m. Smith had seven years of mining experience, all at this operation.” The partial conclusion of the U.S. Mine Safety and Health Administration

(Continued on page 12)



Photo from
cabproducts.com.



Possible new coal mine in Australia; Pembroke Resources looks to open Olive Downs project

PEMBROKE RESOURCES, a private equity-backed firm, announced that it plans to build a new metallurgical coal mine in Australia's Bowen Basin in 2017.

The company, led by the ex-boss of Gloucester Coal Barry Tudor, said it expects the Olive Downs project to start up within 12 months with a 1-Mt/ (1.1-million-stpy) mine and add two more mines by 2019.

"We'd like to get it into production as soon as possible, but we're not trying to pick peaks in the market," Tudor told *Reuters* in an interview.

Backed by U.S.-based Denham Capital, Pembroke bought the Olive Downs project from U.S. coal giant Peabody Energy and China's CITIC Resources for A\$120 million (\$92 million) plus an agreed royalty earlier this year, *Reuters* reported.

That's a fraction of the \$2.4 billion boom price that BHP and Mitsubishi Corp., paid in 2008 to buy the nearby, still undeveloped, New Saraji metallurgical coal project, which has a similar-sized resource.

The news of a new coal mine in Australia comes as Ramaco Development announces its own plans to open a pair of metallurgical coal mines in the United States (see page 10).

At full tilt of about 14 Mt/a (15.4 million stpy), Olive Downs will be among the largest metallurgical coal mines in Australia, just behind top global exporter BHP Billiton's nearby Peak Downs Mine.

Production costs are expected to be in the lowest quartile due to its large size, high quality coal and proximity to infrastructure. BHP, the world's lowest cost producer, averaged costs of \$55/t (\$50/st) at its Queensland coal operations in the year to June 2016.

"We assessed this opportunity based on prices at the bottom of the market," said Tudor.

Hard coking coal spot prices have nearly doubled this year to \$140/t (\$127/st), as high-cost U.S. supply has dropped out of the market and Chinese production has fallen.

Tudor declined to put a price tag on construction but said the first mine, Olive Downs North, would be cheap, as the company would pay a toll for another miner to wash the coal rather than build a washing plant.

Olive Downs South and Wilunga would cost a lot more, but not as much as recent mines such as BHP Billiton Mitsubishi Alliance's \$3.4 billion Caval Ridge Mine, as Pembroke plans to ramp up production in stages.

"It would compare very favorably," Tudor said. "It's something we're very confident of being able to fund."

Pembroke is not alone in snapping up metallurgical coal assets from mining giants that are flogging assets to cut debt.

A team led by Taurus Funds Management recently bought Anglo American's 70 percent stake in the Foxleigh Mine, and a consortium led by private equity firm Apollo Global Management is the frontrunner to buy Anglo's Moranbah and Grosvenor mines. ■

President's Page: Focus on safety, some scars never heal

(Continued from page 6)

(MSHA) Accident Investigation Report was: "The accident resulted from the victim being in an unsafe location in relation to the material he was barring down."

I was the underground superintendent at the mine where Ricky Smith was working. He was a co-worker and friend of mine, as well as everyone else at the mine. He was a very likeable man. Very positive and upbeat and one of the hardest working guys on the property. He came in as an entry-level laborer, and distinguished himself as a good worker, willing to jump in and help with anything, any time. Just the type of guy you would want on your crew. He was a "hand." Unfortunately, our

last words were not pleasant ones. He was irritated about the events of a company golf tournament, and he left my office angry. It is amazing how clearly I remember every word of that conversation after all these years.

I felt guilty about the accident. What could I have done to prevent this accident from happening? Was our training good enough? Were we tough enough about safety? Were we walking the walk? There were thousands of other questions I was asking myself, and I didn't have any answers. I was not alone. The chief engineer came to me asking the same questions about himself. So did the general foremen, the shift bosses, the chief geologist, the senior engineer, etc. Everyone on the property felt that

they had somehow failed. We had. A fatality had occurred on our watch, and he was our friend.

Nobody teaches you about how to deal with a fatality in school. You are on your own, treading on new ground. You learn a lot about character from it. Some people shy away, some step to the front. We all agonized. We all dealt with it in our own way, and none of us was wrong. It is the most difficult thing you will ever experience in mining, and you can never be prepared for it.

So please remember, we must be vigilant about safety.

The scar from the loss of Ricky Smith is deep and long. It runs from the top of my soul to the bottom of my heart. That scar will never heal. ■

Giving thanks; SME Foundation is a great place to show your appreciation



Tim Arnold
2016 SME President

It is November, and many of us associate that with Thanksgiving Day in the United States. I have a lot to be thankful for — I am particularly thankful the U.S. presidential election is over. I am thankful for the volunteers in our society that give so much of their time and effort to make us the largest, and in my opinion, the greatest mining society in the world and I am thankful for the excellent staff at SME that tries to keep me in line.

I am also thankful for our SME Foundation and the progress it has made through the years. The Foundation was created 25 years ago as a part of the Society where donations were used to help with service to our industries and educational programs. Initially, the Foundation was relatively silent. It did not pursue significant contributors or contributions. One of the first fund drives was called the “Buck a Week Club.”

The Foundation found a true meaning to exist around 2004 when it was assigned the cost of the Professional Engineers exam services, as well as directing GEM efforts. It was later assigned the ABET degree program accreditation efforts. This invigorated the Foundation, and it began to grow. In 2008, the merger of the Mineral Information Institute (Mii) and the GEM Committee created the Minerals Education Coalition (MEC) as a program of the Foundation. This spurred even greater reasons for growth and fundraising within the foundation. More recently, SME leadership envisioned and created the Ph.D. Fellowship and Career Development Grant programs, and the Foundation supports and/or administers a host of named scholarship programs.

The Ph.D. Fellowship and Career Development Grant program is our most ambitious program to date. It is the Foundation's big hairy audacious goal (BHAG). It is essential to assure that we have a mining and minerals industry in the future. At present, the average age of faculty members in mining engineering departments is nearing that of retirement. New young faculty members must be educated with Ph.D. degrees to become available to join mining engineering teaching and research staff, and then

Safety share: • Prescription drug abuse has changed the paradigm of substance abuse. Previous stigmas and detection methods are no longer sufficient. Fortunately, regulators and doctors are working closer to rein in opioid prescription drug abuse. However, there is still much to be done and companies need programs to address these issues with their employees and families. Are your procedures sufficient to detect prescription drug abuse? Do these procedures include front line management, human resources and other managerial positions? Is the focus of these procedures just for hourly employees? Considering the societal impact this new wave of substance abuse is having, it would be prudent to review your policies, philosophy, and culture regarding substance abuse detection and prevention.

Submitted by Pratt Rogers

make successful progress to become tenured faculty members. Achievement of these goals will require the raising of approximately \$1.3 million annually to support Ph.D. candidates and young faculty members' research to fortify and sustain the mining engineering and mineral processing academic programs in the United States.

Our Foundation has been fortunate to have the support of large corporations, as well as many individuals, to sustain these programs. The Corporate Roundtable donors (see page 60 for more information) have made substantial contributions. The Foundation Trustees currently have committees to engage individual donors, corporate donors and other groups such as legacy and estate plan donors. To achieve our BHAG, the Foundation needs more donors — large and small — to see this program to completion and to preserve our mining engineering and mineral processing degree programs. The goal is 24 or more successful faculty members teaching mining engineering and mineral processing, and conducting valuable research for the industry. All of the Foundation programs are important and need your support. For information about donating, contact AnnMarie Estrada at 303-948-4239, estrada@smenet.org.

Finally, I am particularly thankful to the late great Bob Shoemaker, who bequeathed a substantial sum to the Foundation that allowed

(Continued on page 14)



Sentinels of Safety winners named; National Mining Association recognizes safety achievements

TEN AMERICAN mining operations – six coal mines and 13 mineral/metal mines – are the recipients of the National Mining Association's (NMA) "Sentinels of Safety" awards in recognition of their outstanding mine safety achievements during 2015.

The awards were presented to company representatives at a luncheon ceremony in Las Vegas, NV, during the NMA's MINExpo International 2016.

Sponsored annually by the NMA, the Sentinels awards recognize coal and mineral mining operations in 10 categories for recording the most hours in a calendar year without a single lost-time injury.

Arch Coal's Leer Mine was recognized by Jessica Kogel, assistant director of mining, Office of Mine Safety and Health Research, NIOSH,

for extraordinary efforts to apply technology in ways that will improve mine worker safety or health with 2016 Mine Safety and Health Technology Innovation Award. Leer Mine's recognition was based on its development of a stockpile safety system that provides dozer and plant operators with a video feed of the location of dozer on the stockpile in relation to the feeders. J.H. Fletcher & Co. and Small Mine Development, LLC received the 2016 Metal/Nonmetal Award for their fan handler. The fan handler reduces exposure to hanging auxiliary fans, protecting miners from the hazards of working around the suspended load.

The winners are listed below with the large mine first and small mines in italics. Number of injury free hours are in parentheses:

Wolf Den Run Mine, Vindex Energy Corp. (27,552).

Coal processing facility

New Era Mine, American Coal Co. (224,235). *Miller Creek Preparation Plant #1, Consol of Kentucky (26,007).*

Underground metal

Resolution Copper, Resolution Copper Mining (114,341).

Underground nonmetal

Saint Genevieve, Mississippi Lime Co. (306,756). *West Warm Springs Field Project, New Era Petroleum (45,345).*

Openpit

Genesis, Newmont USA Ltd. (506,025). *Barefoot Pit, A.O. Hardee & Son, Inc. (16,332).*

Quarry

Drake Quarry, Drake Cement LLC; (216,041). *Sylvania Stone Quarry, Hanson Aggregates Midwest (12,395).*

Dredge

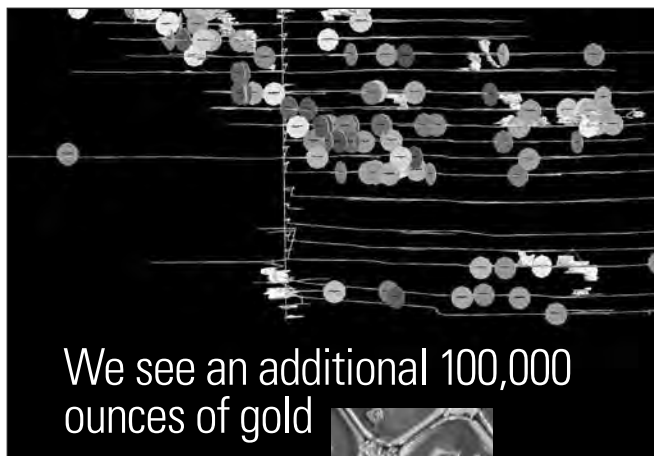
Frac Diamond Aggregates, Shale Support Holdings (88,417). *New Harvey Sand, Martin Marietta Materials, Inc.; (10,688).*

Bank or pit

Schoolhouse Quartz Plant, Unimin Corp. (204,998). *Portable Screen, McAtee Paving Co. (9,469).*

Metal/Nonmetal Mill

Edgar Plant, BASF Corp. (395,821). *Lithonia/Pine Mountain Quarry, Hanson Aggregates Southeast (22,758).* ■



We see an additional 100,000 ounces of gold

Accurate structural geology interpretation can mean the difference between a money pit and a gold mine.

When our team of the world's best structural geology specialists analyse complex data sets you get insights that let you make confident, informed decisions.

Before you undertake your next mining project, let us give you a clear picture of the risks and rewards.

For a snapshot of 17 distinct services to the global mining industry, download our new mining brochure, available at:

srk.com



>1,400 professionals • >45 offices • 20 countries • 6 continents

Underground coal

King II Mine, GCC Energy (242,309). *No. 88 Blue Diamond Coal Co. (89,556).*

Surface coal

Three Oaks Mine, Luminant Mining (714,065).

President's Page: Giving thanks

(Continued from page 6)

us to exceed \$2 million in contributions raised this past fiscal year. Bob was a giant in our industry and a mentor to many. I was honored to be at the Mining Hall of Fame dinner in September, where Bob was inducted into that Hall of Fame along with another SME and industry giant, Stan Dempsey. If there is a greater gentleman in this industry than Stan Dempsey, I have not met him. I am thankful to have known Bob and to call Stan my friend.

We in the mining industry have a lot to be thankful for, but I am most thankful for the quality of the men and women in mining. Stan summed it up best in his acceptance speech at the Hall of Fame dinner in which he quoted Agricola, "Mining is a calling of peculiar dignity." I could not agree more. ■

Mentoring the next generation; SME offers members to pass on advice and knowledge



Tim Arnold
2016 SME President

The school of hard knocks is real. Many attend, few graduate with honors.

One of my favorite things about SME is mentoring. It allows us old farts (OF) to pass on our silly opinions (disguised as advice) to the young people in our industry. I have been mentoring students at the annual conference since its inception, and it has been very rewarding. I had one mentee become a chief operating officer of a mining company before I reached that level, which is humbling. Many have become good friends, and one even gave me his family's secret recipe for chili. Over the years I have collected a number of OF tidbits. I've sorted them under many categories; some I called Arnold axioms, some are rookie mistakes, not all of them

are mine, and not all of them were thought of alone. Unfortunately, too many I learned the hard way.

A consensus favorite among my friends is about how to start your career. ***For your first five years out of school, pick your job based on how much you learn.*** Not on how much you get paid, not on the title, not on where you will live and not on lifestyle balance. How much you will learn is your only criteria. Like anything, you have to start with a rock solid foundation. OF's like puns, too.

Learn to take pride in your and your teams' Herculean efforts to garner fantastic results, because your boss will remember those efforts right up until his head hits the pillow that night. Stated another way, what have you done for me lately? This is not because all bosses are jerks. It is because a lot of the reason you have a job is that everyone expects you to do it well. Usually people are thankful for excellent work, but don't regularly expect bonbons and roses. Your boss probably works as hard as you do and is under the same amount of stress you are. Also, luck favors hard work; "Depend on the rabbit's foot if you will, but remember, it didn't work for the rabbit"—R.E. Shay.

Buckets of poop fall faster than Newton can explain, and the number of buckets that fall is inversely proportional to the time you have to deal with them. Stated another way, all hell will break loose. Just about the time you think you have it under control, Murphy walks in

Safety share: • When a person is having a stroke, his or her brain is not getting the blood it needs. Sometimes a stroke develops gradually, but more likely there are sudden warning signs such as numbness or weakness in the face, arms, legs or one side of the body. At the SME midyear meeting, I urged attendees to know the signs and use the FAST test. If you suspect someone is having a stroke conduct this test.

Face: Smile. Does one side of the face droop?

Arms: Raise both arms. Is one higher than the other? Do they have trouble holding one up?

Speech: Repeat a short simple sentence, like Mary had a little lamb. Is the speech slurred?

Time: If the answer to any of these is "yes", call 911.

Submitted by Tim Arnold

with more manure than an Iowa dairy farm and plops it right on your desk. In hindsight, I think surviving those days were some of my favorite memories in the business. Herculean efforts were applied, sometimes with only marginal success, but usually dodging complete failure.

Understanding the dynamics of an office is paramount. Don't complain about your boss to coworkers. You cannot please everyone all the time. Gary Marshall said, "Learn to work with people you would not go to lunch with." Don't play politics, but recognize it is being played around you. Never believe that the higher you go in the hierarchy, the less the rules apply to you. Work can be a harsh environment, and you need solid Zen PPE to survive.

I held a staff meeting once and told everyone there, "I just fired somebody." They all looked around the table and counted noses and didn't see anyone missing. I explained that somebody was no longer working at our mine. Somebody got the pink slip. So the next time you hear that "somebody" should be fixing this, or "somebody" should be doing that, tell them that "somebody" doesn't work here anymore. If you see a problem, either fix it or bring it to your supervisor. But don't expect "somebody" to do it for you, because he is in the unemployment line.

(Continued from page 20)



Lundin Mining to sell stake in copper mine; Chinese equity firm to buy Tenke Fungurume stake for \$1.14 billion

LUNDIN MINING Corp. announced that it will sell its minority stake in Tenke Fungurume Mining S.A. to a Chinese private-equity firm for \$1.14 billion in cash.

The sale is a result of Toronto-based Lundin's review of strategic options for its interest in TF Holdings Ltd., the Bermuda holding company

that indirectly owns an 80-percent interest in the Tenke copper mine in the Democratic Republic of the Congo.

Lundin holds a 30-percent interest in TF Holdings and an effective 24-percent stake in the mining operation. Freeport-McMoRan Inc. currently owns the remaining 70 percent stake in TF Holdings but is in the process of selling

that to China Molybdenum Co. *The Wall Street Journal* reported.

"The sale will enable Lundin Mining to advance its strategy to incrementally grow the company with projects and operations we control, while maintaining a strong balance sheet," Lundin chief executive Paul Conibear said in a release. ■

President's Page: School of hard knocks teaches needed lessons

(Continued from page 6)

I have occasionally worked very hard on an issue in my career, only to have something come out of the blue and make it fiercely and magnificently fail. I mean piñatas and fireworks level fail. You will never be able to think through all of the possible outcomes. So be prepared for negative

ones, even with the best laid plans. Most importantly, learn from the failures. "I have not failed. I've just found 10,000 ways that won't work." — Thomas A. Edison.

The school of hard knocks is real. Many attend, few graduate with honors. Albert Einstein said, "There

is only one road to human greatness: through the school of hard knocks."

It is my hope that the next generation of great mining professionals can use these OF tips to smooth out a few of the bumps in that journey. But if you do make some of these mistakes, relax. You got this. ■

Cradle to cradle



Exploration, feasibility, due diligence, engineering and operations through to mine closure.

Our global experience gives you expert, integrated solutions on every phase of your mining project.

Same team — start to finish.



>1,400 professionals • >45 offices • 20 countries • 6 continents

ICMM: Sustainability is possible

(Continued from page 14)

host countries' economic and social development.

The report also includes a guest contribution from the UN Development Program's Casper Sonesson on the opportunity to re-imagine mining's role in helping to achieve the UN's Sustainable Development Goals.

Aidan Davy, ICMM's chief operating officer said; "Mining's role in lifting people out of poverty and furthering the sustainable development of host countries has often been overlooked. This report flags a number of countries where mining can play a major role in helping host nations meet their developmental aspirations."

Sonesson, policy adviser at the UN Development Program, said, "Mining can play important roles in contributing to sustainable development. It makes critical economic contributions through the government revenues it generates and the linkages it creates with local economies in many countries, as shown in this report.

"In addition, there is great scope in other areas ranging from leveraging mining-related infrastructure and water management for local development to minimizing environmental impacts. Going forward, new partnerships and good governance will be essential to fully realize mining's role in tackling the UN's Sustainable Development Goals." ■

SME to honor WAAIME for 100 years; The mining industry has benefited from the work of WAAIME



Tim Arnold
2016 SME President

The 2017 SME Annual Conference & Expo is just around the corner, Feb. 19-22 in Denver, CO. This year we are honoring the first 100 years of WAAIME, and we hope you will join us in celebrating its numerous achievements.

WAAIME, first known as the Women's Auxiliary of the American Institute of Mining Engineers, was established in 1917 and operated alongside AIME as an independent nonprofit corporation. WAAIME started at the famous Waldorf Astoria Hotel in New York City in 1916, where the wives of AIME members had come together to enjoy a "ladies night." What should have been a

pleasant affair was mired with anxiety as a World War raged in Europe. They wanted to send some cheer to the fighting men in the trenches, so they passed a hat and collected money to buy chewing gum, candy and tobacco, which they sent to the British Army of Engineers.

This event spurred the ladies to formalize their efforts. Keep in mind, this was a time when only men worked in the mining industry and women's roles were in the home. These strong ladies did not "ask" their husbands or AIME if they could form the auxiliary but, rather, they simply informed them that the auxiliary was being organized.

Amy Jennings, wife of 1918 AIME president Sidney Jennings, was WAAIME's first president in 1917. WAAIME's stated purpose was to render service to country, community and to humanity through all that pertained to the profession of mining engineering. The post-war years found WAAIME gradually shifting away from foreign relief and emergency response and focusing, instead, on efforts in education, medical support and social services. They created the National Education Fund in 1920, and, of the first \$1,000 raised, a quarter of the money was invested in Liberty bonds to form the nucleus of a permanent endowment. The remainder was awarded as scholarships.

In 1921, WAAIME members began collecting books to establish a circulating library among mining camps. This work was built on the premise that everyone, rich or poor, should have the privilege of reading. Local WAAIME sections grew quickly in the post-war period

Safety share: • Instead of starting meetings, line-outs, toolbox talks, etc. with a safety share, consider ending such meetings with these important safety reminders and related stories to reinforce the value and effect of these important lessons. This idea is worth considering and is supported by human performance and cognitive science literature suggesting that the content, information, and stories that humans are most recently exposed to are more likely to stay on our "front-of-mind-awareness." This modification is a safety awareness technique with potential to improve the effectiveness of safety shares across the mining industry.

Submitted by Lori Guasta

and became the backbone of the organization. Initially, women living in mining camps with few amenities came together for companionship, advice and solace. The Arizona Section was the first local section, but by 1940, WAAIME presence was coast-to-coast, with 27 chapters and more than 1,900 members.

Perhaps one of the most important programs that WAAIME initiated was well before its time. In 1959, WAAIME initiated its "Engineers for Tomorrow" program, an outreach to high school students informing them of the need for professionals in mining, metallurgy and other earth sciences. Interested young people heard lectures, saw movies, and were taken on field trips to mines, mills, refineries and fabrication plants. This exposure, coupled with WAAIME's scholarship program, introduced many new, and very needed, engineers to the industry.

Today, the scholarship program is the longest-lasting and most significant WAAIME initiative. Since the formation of the National Fund in 1920, and with the forethought of growing an endowment from the very start, the WAAIME portfolio is now a multi-million-dollar legacy. This program supplies hundreds of thousands of dollars in scholarships each year to hundreds of AIME Member Society students attending universities, not only in the United States, but also in Peru, Chile and Mexico.

WAAIME continues to give for the good of the country, community and to humanity

(Continued on page 14)



Mine in Peru is asked for another review; Government asks for a fresh environmental review of Las Bambas

PERU'S VICE PRESIDENT, Martin Vizcarra, said the government has asked MMG Ltd. to provide a new environmental plan for its Las Bambas copper mine following protests from communities near the mine.

Reuters reported that Vizcarra said Las Bambas, one of the world's biggest copper pits, would be able to operate as usual while it prepares an "integral" environmental impact study. Vizcarra said the request was part of the new government's bid to rebuild trust with local communities following deadly protests that suspended exports from the mine in October.

The mine had earned environmental approval from previous governments in Peru and its subsequent modifications were also approved, allowing MMG to transport its concentrates to port on local roads instead of through a pipeline as initially proposed.

But residents in the highland

region of Apurimac have said they were not consulted on the revisions and have protested pollution from hundreds of trucks carrying copper concentrates on unpaved roads near their communities every day.

"We've asked the company to start the process of modifying its environmental impact study within three months," Vizcarra told *Reuters* after visiting Apurimac to hold talks with local leaders. "We want to prevent and correct all the mistakes or deficiencies that may have occurred."

Vizcarra has been leading the government's efforts to ease tensions near the Chinese-owned mine but said it was too early to specify how its environmental plan might be revised, saying only that "everything that has been changed" was on the table and that local communities would be involved.

Vizcarra, who is credited with helping resolve a dispute over another large copper project when he was

governor of an important mining region, helped end a stalemate with protesters near Las Bambas in October when a province-wide road blockage threatened to shut the mine down completely.

A key road has remained blocked by four Quechua-speaking communities, but the company has continued to use alternate routes to transport its concentrates, Vizcarra said.

The government has proposed buying the land that the blocked road passes through from the towns for about 17 million soles (\$5 million), Vizcarra said. That road and two others would then be paved.

The centrist government of former investment banker Pedro Pablo Kuczynski, who took office in July, has also proposed about 2 billion soles (\$588 million) in social and development plans to help poverty-stricken towns near Las Bambas, Vizcarra said. ■

President's Page: Alumni night will be all about WAAIME in 2017

(Continued from page 6)

through all that pertains to the profession of engineering in the extractive industries. When WAAIME merged with SME in 2008, it was because the members recognized that it had outlived its membership model: a place for mining wives to contribute and socialize. With air travel, Internet and social media, just to name a few, families in today's mining communities are far from disconnected.

Furthermore, the mining workplace is no longer exclusively male. In fact about 30 percent of SME's student membership today is female, and growing. Since the merger, WAAIME continues to reinvent itself to meet the needs of the times and its members, and to be a valuable Division of SME.

On Tuesday, Feb. 21 at the SME Annual Conference & Expo in

Denver, CO, all of the universities that normally hold their alumni events separately have agreed to meet in a common area to celebrate and thank WAAIME for its service to our industry. I hope you will join us in celebrating WAAIME's 100th Anniversary, commemorating not only the past 100 years of service, but also the present and the future of this tireless organization. ■

Main: NMA hoping to move beyond regulation-based policy

(Continued from page 11)

The National Mining Association has argued throughout Main's tenure that the government should do more than enact new regulations and conduct inspections as a means to improving safety.

"If focusing on only these two aspects would get us to zero fatalities and accidents we should have accomplished these goals long before today," said Bruce Watzman, who handles public policy for The National Mining Association, an

industry group.

"Our hope is that the next assistant secretary (of the Labor Department) will look beyond the regulations to drive continued improvement," Watzman told the *Associated Press*. ■

A long, strange trip indeed; SME President reflects on the long road through the Society



Tim Arnold
2016 SME President

In thinking about my presidential term before I became president, I had the idea of having a quote from a rock and roll song in each of my articles. That didn't pan out, but at least I can end with one. As the Grateful Dead wrote, "Lately it occurs to me what a long, strange trip it's been."

Being the president of SME is different from what I had imagined. The job entails rubbing shoulders with many other presidents of our sister societies and other associations. In doing this, I realized that SME is an extremely well-respected society, even among the big boys like the electrical, civil and mechanical societies. Our relationships with sister international mining societies is stronger than it has ever been. There is one reason for this: good management.

A couple of years ago, I went to a seminar held by the American Society of Association Executives. The purpose of the seminar is to educate association executives and their volunteer leadership on how to run an effective society, like SME. There were both giant and tiny associations at the seminar. What I learned is that SME is absolutely in the top tier when it comes to functioning at a high level. Dave Kanagy and our staff could teach this seminar. We are in good hands. And I want to thank that wonderful staff for all the support they have given me and all of the past presidents.

Another thing that surprised me about being your president was the human interaction side of the position. We are a society of about 15,000 people. Simply stated, some of them are kooks, and every year a few of them pop out of the woodwork. I guess it shouldn't have been a surprise. Any group of 15,000 people probably has similar issues, but a surprise it was.

I have had a lot of positive feedback about this column throughout the year, particularly the writing. Truth be told, I have about as much creative talent as Van Gogh's left ear after it was chopped off. Male Arnolds have a multi-generational tradition of marrying well above their station in life, and my children were blessed with wonderful creative abilities through the genes of their mother. My son, working as my editor, is a huge reason these articles have been coherent. I could not be a fraction of the man I

Safety share: • We are proud to announce that SME's safety offerings will soon expand to include the Certified Mine Safety Professional (CMSP) certification, the world's only mine-safety-specific certification. SME acquired the CMSP from the former International Society of Mine Safety Professionals (ISMSP) and will secure and strengthen the certification in the years to come. The SME Health & Safety Division will oversee the certification and will work to make it the most widely recognized mine safety and health credential in the world. You can read more about this development on page 57 of this issue. We believe this will help enhance safety for the worldwide mining community.

am without the support of my wife and children.

We are miners. A rare, rough, quirky, eclectic, nerdy, ass-busting, reliable, loyal and ferocious breed. Our bonds are as tight as some of our co-workers on Saturday night in a mining camp. We have been overworked and unemployed. We have had huge successes and abject failures. We have been there for joyous births and too many deaths. We live through them all. These wins and losses are what shape core values. Every little thing is a building block of who we are. Who am I? I am a man that woke up every day of his adult life saying, "I didn't win the lottery today, so I have to go to work. If I do have to work today, I am happy that I get to work in this industry, with these people."

SME is different things to different people. To me, SME is about the networking and relationship building. As I start a new position with a new company in this new year, I am comfortable in the knowledge that I am only one or two phone calls away from a world-class expert on nearly any subject in mining or underground construction. It is through SME that I have met these friends, peers and even bosses and employees. This network has been invaluable to me as I have advanced throughout my career.

It really has been a long road. I started getting actively involved with SME many years ago. I was complaining about how bad the underground sessions were at the annual meeting, and someone suggested I do something about it, which I did. Who would have guessed that those initial efforts would transpire into the honor of being able to serve you as your president this last year? And a great honor it has been. Thank you. ■



SME President
J. Steven Gardner
VOL. 67 NO. 3 – VOL. 68 NO. 2

March 2015: VOL. 67 NO. 3

An interview with the 2015 SME President

April 2015: VOL. 67 NO. 4

Updates from the annual conference; SME board approves new Health and Safety Division

May 2015: VOL. 67 NO. 5

Locals sections are on the front lines in the struggle to improve the perception of mining

June 2015: VOL. 67 NO. 6

Predicting the mine of the future: How does the industry survive environmental activism?

July 2015: VOL. 67 NO. 7

The 2013 Boy Scout Jamboree: Looking back at the path to the Mining in Society merit badge

August 2015: VOL. 67 NO. 8

Changing minds about mines in America and the world

September 2015: VOL. 67 NO. 9

What does the future hold for coal? Recent rules will impact the US coal industry

October 2015: VOL. 67 NO. 10

Changing minds about mining: A call to all members to be activists for the mining industry

November 2015: VOL. 67 NO. 11

SME in South America: Trip to PERUMIN 32 strengthens relationship with important region

December 2015: VOL. 67 NO. 12

Flaws exposed by Gold King Mine; Mining experts should have been called on by the EPA

January 2016: VOL. 68 NO. 1

Mining, climate change and science; A collection of shout outs, commentary and reminders

February 2016: VOL. 68 NO. 2

Staying safe and other observations; Record year for safety in the industry one reason to celebrate 2015

Mining engineering

OFFICIAL PUBLICATION OF SME

MARCH 2015
VOL. 67 NO. 3



J. Steven Gardner
2015 SME President

Special Editorial Supplement: **Tunneling & Underground Construction**

www.miningengineeringmagazine.com

J. Steven Gardner;

An interview with the 2015 SME President



What is your assessment of the minerals business?

My experience with mining has been primarily in the coal sector until about 10 years ago, when I also became heavily involved in the aggregates and industrial minerals sectors. I have also had peripheral involvement through family and partners in the gold sector, with just enough exposure to gold to become fascinated. In 1994, I visited Ghana and considered the possibility of taking an expat assignment at a surface gold mine that had just been started.

It is not news that the coal sector in this country has suffered tremendously in recent years. Especially hard hit is the central Appalachian region, where a number of factors combined have had a devastating effect on production, jobs and the economy. These factors include federal regulations affecting coal production and use, higher production costs and decreasing market share of Appalachian coal by the switch from lower sulfur coal in favor of lower-cost, higher sulfur coal from the Illinois Basin, as utilities have installed scrubbers to comply with Phase II of the 1990 Clean Air Act Amendments.

Nationally, the lower cost of natural gas has been a huge factor affecting coal use. In Kentucky, for example, which exports to other states around 70 percent of its coal, those markets are disappearing, as utilities close coal units in favor of natural gas. This is a structural change in the electricity market, and one that will become more pronounced as federal greenhouse gas regulations are implemented.

We often hear the phrase, “the war on coal.” While there are certainly a number of market factors affecting coal production and use, this phrase captures a different element that is all too real. The attacks have come from environmental activist groups for many years; from some in the media and, in the last few years, from a White House administration that believes strongly in alternatives to coal. Then, there really is an alternative to coal in the form of the previously untapped unconventional gas reserves that allowed utilities to move away from coal.

Coal mining will continue in this country. In fact, it appears that our production is holding fairly steady at about a billion tons a year. And predictions that I have seen indicate this will continue for the next few years. What impact the Environmental Protection Agency’s Clean Power Plan will have beyond 2020 is another question.

What do you feel is the future of the minerals industry — near term and longer term?

Our society depends on the future of minerals in this country being strong. Near term, we are going through some of the typical cycles. Having also been involved in aggregates during the last few years, the business follows government infrastructure projects, such as highway construction and public and private sector development. Those sectors are heavily dependent upon government spending and a strong economy. Increased spending in those sectors, which appears to be on the horizon, should provide additional market shares for aggregates.

At one time, it was thought that Chinese consumption of raw materials was going to drive up prices and create shortages of materials coming out of China, such as rare earths and other industrial minerals. The Chinese economy has slowed considerably, which, in turn, is impacting prices in the United States. I became involved in an exploration project for an industrial mineral in the United States that is currently 100-percent supplied by imports. That resource’s price skyrocketed about five years ago, and then a downturn caused the

price to plummet, stopping the exploration project. There are concerns with strategic minerals for the future. The United States has to review its policies to encourage more development of critical mineral resources that are present in the country, not only for the U.S. economy, but also for national security.

What do you consider to be the major challenges for the mining industry?

We have many challenges for the mining industry, and I think SME is well-positioned to help address these challenges. First, one of the major roles of SME is to serve as a bridge between academics and industry. We have recognized there is an issue with

educational sustainability for mining engineering programs in the United States. I hope everyone saw John Marsden's column in the February issue of *Mining Engineering* (page 6). Engineering and the sciences that contribute to the recovery of natural resources are critical to this society. Our educational sustainability initiative addresses a problem staring us in the face. That is, ensuring that we have enough professors in the mining engineering departments that remain in the country to continue graduating mining engineers. That is an issue near and dear to my heart because my younger daughter is one of those recently graduated mining engineers. I want to applaud and congratulate John Marsden taking

Gardner brings a wealth of experience

J. Steven Gardner is president and chief executive officer of ECSI, an engineering consulting service based in Lexington, KY.

He is a Professional Engineer and Professional Surveyor with licenses in several states. He is a graduate of the University of Kentucky and holds an M.S. in mining engineering, a B.S. in agricultural engineering and holds a certificate in environmental systems from UK.

In 1983, he formed ECSI, and has been providing professional environmental and mining engineering services for more than 35 years. His consulting practice focuses on energy, natural resources, sensitive land use issues, reclamation liability, environmental, health and safety issues, mining and quarry operations, and industrial heritage projects.

Gardner's first exposure to coal mining came at the University of Kentucky's College of Agriculture job fair, and he was hooked when he was given a tour of an underground longwall mine, mountaintop surface mine and preparation plant.

He went to work with Bethlehem Steel Mining Operations and spent a summer working on Tenneco's gas pipeline operations and a natural gas liquids recovery plant. That was followed by a consulting position with a firm in the Washington, D.C. area where he was able to work on his graduate degrees and work on research that enhanced mountaintop removal as encouraged in SMCRA,

plus he contributed to the training program for the first OSM inspectors titled, "Surface Mining and the Natural Environment."

Gardner moved from there to Tennessee where he served on the Tennessee Department of Labor's "Volunteer" Mine Rescue Team, where he learned important lessons on the health and safety aspects of mining.

His first exposure to consulting engineering was when he worked for Bethlehem in the 1970s. He "was enamored with what I perceived to be the lifestyle, glamour and interesting variety of the work. A few years later, personal circumstances and a sudden unplanned career change gave me an opportunity to try independent consulting. My older daughter was in a serious car accident and came to live with me after recovery. Consulting gave me the flexibility to be with her more."

It was as a parent of a sixth grader that Gardner became aware of the public's lack of knowledge about mining when his daughter's teacher spoke about how terrible coal mining was and how he could not understand why we still mined coal and why didn't we just use electricity?

"That was the beginning of my involvement with SME's GEM Committee, now MEC, and what in large part, involved in SME leadership leading now to the SME

presidency."

Since its inception, more than 30 years ago, ECSI has prepared and reviewed thousands of mining and reclamation coal permit actions in Kentucky, West Virginia, Ohio, Indiana, Tennessee and Virginia.

Gardner has consulted on projects throughout the United States as well as internationally in Colombia, Brazil, Morocco and Ghana. Additionally, he has served as an expert witness in numerous litigation actions involving environmental violations, accidental death and injury, hydrology and flooding, quarry and mine operations, landslides, subsidence and ground water contamination.

One of his signature projects is his role as project manager for a publically funded exhibition mine. Portal 31, Kentucky's first exhibition coal mine, was the ACEC of Kentucky 2010 Grand Conceptor award winner and was in the top 24 national projects honored at the Engineering Excellence Award Dinner in Washington, DC.

Gardner currently serves on the advisory boards of the Kentucky Geological Survey and the University of Kentucky's Mining Engineering Department. He and his sister inherited the tobacco farm where they were raised.

"With my career, I can proudly say I have now been involved in the two most politically incorrect industries in the U.S., mining coal and raising tobacco," Gardner said. ■

on the initiative to appoint the committee, headed by Hugh Miller, and all of the participants on that committee for devising a plan that is now well on its way to being implemented. I also want to thank the SME foundation for its efforts in raising the necessary funds.

Another challenge facing coal, and other mining sectors as well, are government efforts in the United States and other countries to combat climate change. We have already seen significant impacts on mining. In the November 2014 issue of *Mining Engineering*, John Marsden's column on climate change stirred up some debate. We all know that climate change has natural causes, but human activities can contribute to the change. This issue is a major challenge to not only the mining industry, but to the public that we serve because now it is primarily a political issue. Regardless of one's position on the issue of climate change, its causes or its consequences, the reality is the movement to reduce emissions linked to climate change is growing in the United States and in other countries. I agree with John's analysis and reiterate that regardless of the accuracy of climate change predictions, SME needs to be part of the conversation so that, we can continue to use our coal resources in a carbon-constrained world.

What are your perspectives of SME and being SME president?

I have had the pleasure of getting to know several of SME's past presidents. While traveling and talking with some of these former presidents, I have begun to dub them "The League of Past Presidents." Past presidents represent a cross section of society from industry, government, academia and consulting. SME's leadership structure encourages interaction between the president, past president, president-elect and presidential nominee. This gives us continuity to get things done that cannot be accomplished in just one year.

Many people know that my first boss and lifelong mentor was David A. Zegeer. When I began work in Jenkins, KY for Bethlehem Steel in 1975, Zegeer was the person who encouraged me to join SME and to become active. February marks my 40th year as an SME member thanks to him.

He had an extensive library and saved everything. We became partners in an office building in Lexington, KY when he was working as a consultant, and he moved much of his library into our building. When Dave passed away in December of 2012, I inherited the library and files that he had left in our office. Included in those files is almost every copy of *Mining Engineering* that he had received from 1949 forward. He also had nearly every copy from 1943 of *Mining & Metallurgy*, ME's predecessor. This has given me a tremendous

resource. I have compiled a notebook of all of the SME presidents from 1957 (when SME was founded) to the present and have read all of their articles and interviews. One observation that I have from the early days is, as much as things change, they stay the same. Reading through just the presidents' columns has given me a perspective on the history of SME, a perspective that I plan to use throughout my year. Many of the issues discussed in those early articles are the same issues we face today.

Regarding the "future of the industry," I am an optimist. Each industry sector faces its own challenges and opportunities. However, I have confidence in the overall resilience of the mining industry to ride out difficult times and position itself accordingly for the inevitable recovery. All five sectors (metals, coal, industrial minerals and aggregates, and underground construction) have their own economic pressure points and have their own independent triggers for recovery. SME is a central point that members can use to stay abreast of what is going on and be a resource to make a difference.

What do you feel the government's role in the mining industry should be?

SME members work in all sectors: government, industry, academia and consulting. I know that many of our government-sector members pay their own dues, since many of their agencies will not support their professional society activities. I applaud them for their dedication and participation in SME. SME should be the bridge between all of these sectors. Many of our members have crossed over and worked in more than one sector, or all at one time or another in their careers.

I think we have seen that the government sometimes makes bad scientific decisions that incorrectly find environmental, safety or health problems associated with mining that are based on incomplete or misleading interpretation of data or in reaction to a public outcry on a particular incident. The mining industry has, at times, found it difficult to figure out what the rules are. Many times it is the public's fear, due to misleading information from activists, that has led to a groundswell of vocal opposition to projects that results in them being delayed or canceled.

I believe SME's efforts through its Government & Public Affairs Committee (GPAC) have been a great start to increasing our influence. John Hayden has done a great job coordinating those efforts. The briefing papers, our professional peer-review panels, SME's Congressional Fellow, members willing to testify in government hearings all serve as a resource to help our elected officials shape policy for the good of the country. I encourage SME members to get involved in the political process

across the country at whatever levels they feel comfortable. Use our fact sheets from the Minerals Education Coalition (MEC) and the GPAC briefing papers as a resource.

What do you see as SME's strengths and weaknesses?

I believe SME is in a good position financially and has a great staff, plus an active membership. I want to congratulate Dave Kanagy on his MMSA Gold Medal Award awarded in February for his accomplishments leading SME. I wholeheartedly supported his nomination and selection. SME now owns its headquarters building outright. We are seeing good international participation and hope to grow that sector. Onemine.org is a member benefit that continues to grow and one that more people worldwide want access to. Another strength that SME has is the resources to promote the facts about mining so our stakeholders (members, media, elected officials, public) can make informed decisions. And a major strength is the Society's publications, *Mining Engineering*, *Tunneling & Underground Construction*, *Minerals & Metallurgical Processing* and *Transactions* and the numerous books that SME offers.

Another one of SME's strengths in leadership is the continuity between presidents. The current president, past president, president elect and the presidential nominee work together as a team. There are a lot of requests for an SME president around the United States and the world. The four of us, Jessica Kogel, John Marsden, Tim Arnold and I, have teamed up to fulfill those requests. Past presidents have been a resource as well.

In surveys of members, two things that stand out that seem to be on their minds are the poor public perception of mining and a perceived disconnect between local sections and SME. These are two areas I want to focus on in my term as president. I came up through local section leadership before beginning to attend the annual meetings.

First, to address our local sections, I will appoint an ad hoc committee led by Tim Arnold, 2016 SME President; to study how SME can better serve its members through local sections. We will be soliciting comments and suggestions throughout the year.

Second, public perception of mining has been, and will continue to be, an ongoing issue that I will seek to address through the numerous SME activities that are grounded in the key stakeholder group that we serve, the public. I feel a key connection to helping address the problem is through our members and the local sections, the grassroots of the society.

One of SME's big success stories in recent years was leading the effort to reinstate the Boy Scouts

Mining in Society Merit Badge. I believe that, in the long term, this will go a long way to helping in the public perception battle and that SME should build on that success. I was proud to be a part of the almost 10-year process, culminated by surviving a trip to the Boy Scout Jamboree in 2013 and seeing the first badges awarded last year at the annual meeting.

Mining and sustainability are, for many people, an oxymoron. Sustainability in mining is a topic I have thought and written about quite a bit. Mining in and of itself is not sustainable. However, land uses after mining can certainly be sustainable. In many areas, there are beneficial reuses for mining that are higher and better than land uses before mining. In my native Appalachia, some of the most economically valuable lands in the coalfields are on reclaimed mine sites. They can be used for residential, commercial and recreational development. In that economically depressed region, a condition that has been exacerbated by the downturn of coal in Appalachia, I believe these reclaimed mountaintops hold promise for future development.

Jessica Kogel, during her term as president, reached out to nongovernmental organizations that were considered to be potentially constructive partners in natural resource development, as opposed to the not-in-my-backyard (NIMBY) or build-absolutely-nothing-anywhere-near-anything (BANANA) groups. I would like to continue this initiative, with SME reaching out to invite more interaction, whether hosting or participating in a summit on mining and sustainability or just continuing to meet with certain environmental groups. SME is involved in the World Federation of Engineering Organizations Task Force for Sustainable Mining that will be an ongoing effort.

Raising the level of health and safety in SME was an initiative that has also been underway. I feel it is important for SME to be viewed as the leader in promoting health and safety in the mining work place. That is another public perception issue that we are continually battling in the media and with activists.

In summary, the focus areas that I have identified for the year include:

- Continue the education sustainability initiative.
- Raise the level of health and safety within SME.
- Mining and sustainability initiative.
- Public perception of mining.
- Local sections = importance.

I am looking forward to my year as president and welcome anyone to contact me at any time. ■

Updates from the annual conference; SME board approves new Health and Safety Division



by J. Steven Gardner
2015 SME President

SAFETY SHARE: With SME's emphasis on health and safety in the mining industry, one of my goals this year is to encourage everyone in SME to begin all of their meetings — whether a committee meeting, local section meeting, board meeting or of course, at their work place — with a safety share as the first agenda item. I also recommend and encourage everyone to start his or her day with a personal safety share.

For example, before you get in your vehicle, walk around it, be aware of your surroundings and make sure there is nothing obstructing the vehicle. Especially anytime you are leaving a parking place or the driveway, make sure there is nobody standing behind you. Some of us drive big pickup trucks or SUVs, and many times it is difficult to see what is behind you. Unfortunately, we have heard about many accidents where someone has backed up and run over someone, which is especially heartbreaking when it's a child or a loved one. So in any setting, be aware of your surroundings.

SME has always had very strong health and safety programs that worked cooperatively across our divisions where there was commonality. After listening to the proposals for a new Health & Safety (H&S) Division, the consensus of the SME board was that it was important to elevate the prominence of health and safety awareness in our society. Approval of the creation of the Health & Safety Division within SME stresses the importance the industry places on health and safety. It is also designed to better coordinate programming and provides more opportunities for special programs across the country. The new division provides a home for health and safety professionals who might work across sectors. One goal is to attract other health and safety professionals into SME as members. One of my goals is to make sure this initiative is continued and properly implemented.

There were a lot of questions from our other divisions about how this would be implemented and concerns that the existing division membership and programming could be watered down, not properly coordinated, be redundant and conflict with other sessions. The Health & Safety Division is in the process of

being organized and is creating programming that should not impact the efforts of any other SME division. The H & S Division will work with, and support, all SME divisions in their health and safety programming efforts for the greatest benefit to the SME membership. It is my intent to make sure the implementation builds on the strength of SME's existing divisions and programs.

Raising awareness of health and safety is one reason that I have asked all SME meetings start with safety shares. I have asked the new H&S Division leadership to compile a list of appropriate safety shares that can be used in any of our meetings and to keep it continually updated. In fact, I encourage all members to send in your best safety shares that can be posted on the SME website. I intend to start all of my articles with a share, so send ideas in and I will pick one each month. Bill Gleason (gleason@smenet.org) is the SME staff liaison for the H&S Division.

SME had a great annual meeting in Denver, CO in February. I want to thank John Marsden for his leadership and vision during his term as SME president. I am honored to serve as the 2015 president of SME. John is turning over the presidency after a very successful and productive year. John has been an excellent advocate and voice for SME and he has done a fantastic job promoting our interests in the United States and around the world.

It has been my pleasure and honor to work with John during my year "in training." We have had some good times and good discussions. We will all remember the laser tag outing at the midyear meeting in Phoenix where John brought in ringers, his two sons who showed up the rest of us. At past president George Luxbacher's suggestion, we are going to one up John when the midyear meeting comes to the Bluegrass state in September — we are going to be shooting with real guns. (Sporting clay shooting after the meetings are over for those who want to participate.)

I'm coming into the presidency at a very strong point and, hopefully, I can help that trend continue. I feel that SME has become the "go to" group for mining and is recognized as the place to go for information. In fact, SME's long-term vision is "to be the premier resource and advocate for the mining community we serve"

(Continued on page 18)



President's Page: Goals for the coming year

(Continued from page 6)

and our mission is “SME serves professionals in the mining community and supports the advancement of the industry.”

Looking forward, SME's Board approved an update of the SME Strategic Plan. As part of that process, a survey of members was taken. The two things that were of greatest concern to our members was the public perception of mining and a perceived disconnect between local sections and SME. Those are not really new issues. They were of concern to members in the 1970s, as evidenced by columns I read in issues of *Mining Engineering* from that decade. My first real interest in SME came about through my frustration with those negative public perceptions. Not long after I became an SME member, I became involved with the Government, Education, Mining (GEM) Committee to try and address that concern.

Many times we find ourselves preaching to the choir. I want to challenge members to preach to the public. And by preach, I mean educate with facts. SME has developed abundant resources to help with this endeavor. So, how do you change public perceptions of mining? My goal is to have SME focus more on this issue and to develop a more unified strategy, collaborating with other stakeholders in all sectors of the mining industry to more effectively use the tools that we already have in place. We want to study and figure out how we can make a difference instead of just throwing money at it. SME has a lot of programs and tools that people can use. For example, the Mining in Society merit badge that we were able to get reinstated with the Boy Scouts is one that will make a huge difference in public perceptions and we want to build on that success.

I want to enlist our members to be ambassadors for mining. We will not change everyone's opinion, but we need to change the opinions of people who are only hearing one side of

the issues. Talk to friends, neighbors, relatives and enlist your coworkers to do the same. Don't be afraid to write a commentary or letter to the editor or participate in constructive community debates. I have found that reasonable people will listen. We just have to give them another voice to listen to.

Local sections are important to me and to SME. To help identify ways to provide more value to members of local sections, I have appointed Tim Arnold, 2016 SME president-elect to lead an ad hoc committee to see how SME can better serve its members in the local sections. We are in the process of organizing that committee and will be soliciting members to join the committee to share their ideas and experience. Local sections can be an important part in combating the public perception problem.

I also want to make sure we continue the important initiatives that are ongoing — implementation of the Ph.D. Fellowships and Career Grants program that the Education Sustainability Committee proposed and the SME board approved, raising the recognition of health and safety in SME with the new Health & Safety Division and continuing the discussion on mining and sustainability.

Jessica Kogel, 2014 SME president, was very involved with mining and sustainability. Besides SME's Sustainability Committee efforts, Jessica was involved in several initiatives to reach out to nongovernmental organizations to find some common ground and show that we really are mining for sustainability and to find ways that we can work together. That's also something that I want to make sure that SME continues. Jessica is taking over the efforts that Nikil Trivedi has ably led with the World Federation of Engineering's Task Force for Sustainable Mining.

Other past initiatives that already have significant success and momentum are SME's global outreach and our social media

I want to enlist our members to be ambassadors for mining. We will not change everyone's opinion, but we need to change the opinions of people who are only hearing one side of the issues.

engagement. SME is truly an international society, and we have significant potential for growth in other countries as evidenced by our success in Peru in 2014. One of our strengths internationally is OneMine.org. OneMine.org is the attraction for international members and cooperative efforts with other societies.

SME will be rolling out a redesigned website in the next few months and a new association management system that will be much more user friendly. I want to encourage our local sections and members to utilize the social media to better communicate with each other. All of these initiatives and efforts tie together and, in the end, I feel will lead to improving the overall public perception of mining. Local sections play an important role in the success of all of these initiatives.

It is time for everyone to begin thinking about nominations for SME leadership. Our society has a long history of service from its members. Many people have told me they are interested in serving in their division leadership and the many important committees that SME has. Please review the list on the website and submit your interests. Also important is our local section leadership. There are sections out there whose information at SME headquarters and on the website is out of date. Please take some time to review and send those updates in. Angie Grace is SME's Local Section Coordinator (grace@smenet.org).

I will continue to provide updates on these initiatives and other activities in the Society. Until next month, stay safe out there. ■

Local sections are on the front lines in the struggle to improve the perception of mining



by **J. Steven Gardner**
2015 SME President

Since the SME Annual Conference & Expo in February, I have been traveling to many other meetings on behalf of SME. PDAC in Toronto, Platts Coal Properties and Investments in Florida, AUSIMM's PACRIM conference in Hong Kong where Dave Kanagy and I met with our GMPA partners, the Minnesota Section meeting and the St. Louis Section's annual dinner. Each of these meetings has helped the focus of my year as president and provided fresh input of ideas and suggestions.

When I attended the Minnesota meeting, I flew into Minneapolis and drove to Duluth. Along the interstate a billboard caught my eye, that asked is "Sulfide Mining Right for Minnesota?" Below that statement was www.MiningTruth.org. When I checked out the website I found it was far from the truth. Attending various presentations at the meeting, I got a feel for the issues faced in that part of the United States, which are very similar to issues I have seen in my experience and heard about in other parts of the country. The Minnesota section scheduled a session on business ethics "Promoting ethical cultures and preparing leaders to make ethical decisions" to fulfill a requirement of state licensure boards.

During a question and answer session after her presentation, I asked the presenter, Rev. Dr. Karen Schuder, how do we as engineers and scientists, who are bound by professional codes of conduct, deal with activists who use the tactics of fear, exaggeration and misinformation by making outrageous and untrue statements that are repeated so often that they begin to be accepted as fact by many in the public, and especially in the media. The answer given was somewhat circular logic, but the bottom line is that we as professionals must continue being ethical in attempting to gain the public's trust.

The Sierra Club was started with a noble purpose. I have friends who are members probably as do many other SME members. Unfortunately, as we know, the Sierra Club, and many other groups, have engaged in successful, but unethical campaigns against virtually all new major mining projects in the United States by painting doomsday scenarios. I have questioned the ethical nature of many of their tactics. A

SAFETY SHARE: Across the country we have experienced the Spring tornados and rains. Many SME members are avid campers, hikers and love the outdoors. Recently, in Kentucky a young mother of three, camping with her husband and sons was killed when a large tree limb fell onto their tent during a storm. High waters made rescue difficult because of where they had placed their campsite. The take away is to check your surroundings and anticipate hazards to the best of your ability when in the outdoors.

friend recently posted something on Facebook that the Sierra Club had originally posted, which said, "What does your activism mean to you?" with a nature photo and a quote from Alice Walker, "Activism is the rent I pay for living on the planet."

I don't think that the Sierra Club or any other group has an exclusive on activism. We in the mining sector are very good at "preaching to the choir." There is nothing wrong with calling ourselves activists for our profession. In the end it is the right and ethical thing to do.

Visiting several local sections has also reinforced my thought that local sections are very important in our quest to improve the public perceptions of mining. Tim Arnold, 2016 SME President, and I are kicking off an ad hoc committee to study how SME can better serve the local sections and improve the value to members. My other challenge to the local section members is to be an activist to help us counter the widespread misinformation. Local sections are the front lines in these battles. I feel that everything SME is doing is helping in the public perception of mining arena. It is a message that I am trying to spread at each of the meetings that I attend.

Both Jessica Kogel and John Marsden have discussed this issue in their columns over the last two years, asking members to be an advocate or a voice for mining. I have to echo their suggestions and continue asking members to be engaged. Nothing like this happens overnight. The goal this year is to develop better strategies for SME and its members to use. We already have many of the tools.

Until next month, be safe out there. ■

SME's Mine Finance Conference emphasizes mine investment, big data



by J. Steven Gardner
2015 SME President

As part of my travels last month, I attended SME's Third Annual Mining Finance Conference in New York City. While circumnavigating the city and subways, I was reminded of the SME midyear meeting field trip in 2010 to tour subway construction projects, courtesy of our Underground Construction Association Division. For those of us who are used to going underground in mines seeing the scale of the tunneling projects was incredible. Our group entered the system through a nondescript doorway in the wall of building along a side street and descended stairs into an old section of the subway system

no longer used. After walking through some narrow tunnels, we emerged into a mammoth excavation. Being able to walk to the head of a tunnel boring machine (TBM) was an experience I will never forget. My hardhat is off to all of you sandhogs. The UCA has become an integral part of SME, and we look forward to the growth I am sure it will continue to have. I always read with interest the articles in *Tunneling & Underground Construction* and see much benefit to all of us in mining or tunneling.

Back to the Mining Finance Conference. This year's theme was "Improving Profitability by Using Smart Finance and Big Data." I thought this year's program was by far the best I have attended. The Princeton Club provided an appropriate setting, just a block or so off Times Square, and the presentations were timely and informative. We did not always hear the best of news for the mining sectors, but hopefully we see some light at the end of the tunnel. One message was that this is the time for investment for the next uptick in cycles. Another point of good news was about those commodities necessary for battery manufacturing.

During the conference luncheon, I was also honored to present a recognition of Rose Hamilton Ritter (1924-2015) to her daughter on behalf of SME, noting Rose's long standing support of SME and the New York Section. Rose was a great role model for women in our professions.

Big data has been a prominent theme of late in many sectors. Dave Kanagy and I attended the National Academy of Engineering and

SAFETY SHARE: We have all heard about tragic accidents involving someone we know falling from a ladder or the ladder hitting electric lines. There was none more tragic than one that occurred near my hometown in Kentucky last year, when a local fire department was going to use a truck to spray water from above on a group of college students as part of the Ice Bucket Challenge. Somehow the bucket got too close to electric lines, and an arc-over killed one fireman and severely injured another. The take away, once again, for any situation at home or work, is to be aware of your surroundings before raising a ladder and then to use extra care in placement and climbing. Stop and think about the situation in which you are placing yourself.

American Association of Engineering Societies Annual Convocation at the Academy in DC. The themes of the two sessions of the meeting were big data and diversity/inclusion. When you think about the amount of data that is now being gathered in our society, it is staggering and growing at an exponential rate. We have all heard the term, "the internet of things." We are all connected and data about us, our businesses, equipment, agencies, and all facets of life is being collected. If you recall, there was also a discussion of big data at the keynote session at the 2015 SME Annual Conference in February as highlighted in April's **ME**. It is something that everyone involved in the industry needs to be aware of and prepare for. From mining efficiency to regulatory compliance, big data will touch us all.

In a recent issue of the *Engineering News Record* an article was apply titled, "Big Data Big Iron, Your Equipment is Talking, Are you Listening?" A telling statistic was given comparing the adoption of telematics showing that mining lags way behind construction and other industries.

With many graduations this month, I also wanted to take the opportunity to offer up some advice. First, Red Conger offered excellent career advice in his leadership presentation to the Young Leaders at the Annual Conference in Denver. For students who are SME members,

(Continued on page 24)



Predicting the mine of the future: How does the industry survive environmental activism?

FOLLOWING THE keynote address of the 2015 SME Annual Conference & Expo, the audience of about 2,000 people was invited to submit questions to the panelists. The audience responded with hundreds of thought-provoking questions. Moderator Peter Bryant posed a handful of questions to the panelists, and now *Mining Engineering* is attempting to get answers to more of these questions.

This month we turn to Bryant, senior fellow at the Kellogg Innovation Network and co chair of the Mining Company of the Future initiative, and 2013 SME President, Jessica Kogel and President, GeoIntellus, who were kind enough to answer the submitted question:

“How do we, as an industry maintain and grow our business while increasing our transparency in a climate of ever increasing government oversight being driven by environmental activism which seems more intent on shutting down mining?”

Kogel: This is a very important question that highlights a dilemma that the mining industry must tackle head on. Transparency requires open and unapologetic dialogue with all stakeholders, including those who

may have negative and biased views of mining. As industry leaders, we must be willing to listen and respond to these voices. At the same time, we must seek out the groups who want to engage in collaborative relationships with the mining industry to find constructive solutions to the issues that are so often the focus of these debates. Groups such as The Nature Conservancy, Conservation International, World Wildlife Fund and many more have a proven track record of partnering with the industry.

These partnerships are built on common ground where we can work together to achieve shared goals while recognizing that mining companies and environmental groups have very different views, expectations and motivations when it comes to mineral extraction. This reality creates risk and opportunity for both sides. But the opportunities have the potential to greatly outweigh the risks. For example, successful partnerships boost the reputation of the industry while ensuring that mining projects are managed to the highest environmental standards. That is the type of win/win situation that the mining industry must actively pursue. Over time, these success stories will change the dialogue and working in partnership instead of

opposition with environmental groups will become the norm.

Bryant: The industry faces some serious headwinds from growing community and indigenous peoples activism that demonstrates that they are not only interested in economic benefits but the environmental and social impacts and fair outcomes as well. This activism is already responsible for some \$25 billion of stalled projects and increasing government nationalistic moves further erode profitability. This trend is only growing.

The industry must change its approach from one of an extractive company to one of a true development partner. This involves an entire mind set shift. The industry has made some headway through the ICMM and individual company efforts like Anglo American's seat program. However, these changes are being way outstripped by the pace of the growing demands of society. The change is now urgent, and the industry must embrace a new approach on how it gains privilege to operate (sometimes called the license to operate) or face growing activism that will cost the industry significantly in operations delays and project delays. ■

President's Page: Advice for graduates

(Continued from page 6)

there are a few additional pointers that I would like to add for the new graduate:

1. Remember that your first year of SME membership after graduation is complimentary, a \$152/year value. Please keep your membership current after that and let SME know where you land. It's up to you to keep your information current in SME's system.
2. Wherever your first assignment takes you, find your local section

and start showing up.

3. For the engineering graduates, TAKE the FE and PE ASAP. Many states now offer you the ability to take the PE immediately upon graduation. You still have to have four years' experience before the license is issued, but it is much easier to pass right after graduation.
4. Beginning your career is just the beginning of your life-long education. Learn to listen, listen to learn.
5. For any discipline, obtain

additional licenses and certifications.

6. Be active in your faith and community wherever you go.
7. Be an activist for our mining profession. Don't just preach to the choir, tell your friends, neighbors and family about mining in society.
8. And last, but not least, take time for yourself.

Remember the call for SME nominations and, until next month, be safe out there. ■

The 2013 Boy Scout Jamboree; Looking back at the path to the Mining in Society merit badge



J. Steven Gardner
2015 SME President

In July 2013, along with about 40,000 others, I attended the Boy Scout Jamboree at the Summit Bechtel Family National Scout Reserve (Summit) in West Virginia. The Summit is a 4,300-ha (10,600-acre) site donated by Massey Energy Co., now part of Alpha Natural Resources, and located beside the New River Gorge National River. Many other mining companies and individuals associated with mining donated money for the construction of facilities (reported to cost approximately \$450 million). It is now the permanent home of the Boy Scouts of America's (BSA) National Jamboree.

The Summit contains zip line challenge courses, 58 km (36 miles) of mountain bike trails and 5 ha (13 acres) of shooting sports, as well as kayaking, rock climbing, bouldering, skateboarding, BMX and various other activities. The site is a historic coal mining area, and much of the primary recreation activities are located on reclaimed mountaintop mines or are underlain by old underground coal mines.

I did not go to prove I was tougher than a Boy Scout, although I am proud that I managed to survive the week uninjured and 10 pounds lighter. I participated along with many other SME members and staffers who volunteered their time to assist with the introduction of the Mining in Society merit badge.

There are many words and phrases to describe the experience at the Jamboree, a few are:

Wow is the first. Google Jamboree or SME's MEC website for photos.

Logistics – 40,000 people.

Patches – I did not realize what a big deal patches are to scouts. (More intense than miners trading hardhat stickers.) We reached out to nearly 5,000 scouts and leaders with our Jamboree patches, which were on eBay before the Jamboree was over.

Coal – To the trained eye, evidence of mining is all around. Mining of coal made the Summit possible.

Hot & humid – Welcome to summer in WV.

Wet – From your own sweat or the rain.

Proud – I could make the daily 6.4 km (4-mile) hike back and forth.

Finally – Finding a comfortable position for

Safety Share: Thinking of the Boy Scout Jamboree, I am reminded of the perils of insects and other critters in the wild. With field work and vacations ongoing, please be aware of the precautions to avoid tick bites, which can result in diseases. Different types of ticks can be found throughout the United States.

According to the Centers for Disease Control (CDC), the brown dog tick can be encountered in nearly every neck of the woods in the continental U.S. Some species and some life stages of ticks are so small that they can be difficult to see. A complete list of practical tips for avoiding tick bites during and after working in the field can be found at the CDC website, www.cdc.gov.

We want to make the Safety Share a regular continuing feature, so keep ideas coming.

surgically repaired joints on bunk bed cots.

Light bulb — Seeing a “light bulb” go off in a kid's eyes (and even adults) when you make the connection between mining and society.

Sustainability — Telling Scouts mining is necessary to build solar panels and windmills. (Thanks Frank McAllister for manning the Sustainability Tree House).

Safety – How we made the connection between safety at the Summit, where there were reports of more than 100 broken legs, arms and various other injuries from the high adventure sporting activities. Being able to tell Scouts that most accidents in any walk of life — mining, at home or at the Summit — are the result of carelessness or human errors.

Ambient — Temperature showers and realizing that ambient means NOT HOT!

Cities of tents – Everywhere.

Mud – As Mike Rowe of “Dirty Jobs” said “Boy Scouts are not afraid to get dirty.”

Tough — Boy Scouts are tough.

Intelligent — Boy Scouts are intelligent.

Enthusiastic — Boy Scouts are enthusiastic.

Walk, walk, walk — Everywhere.

Diversity — Of people, cultures, religions and opinions.

Now that two years have passed, I have been reflecting on the long road that SME took to

Continued on Page 20



President's Page: Reflections of the Boy Scout Jamboree

Continued from Page 6

to bring the Mining in Society merit badge to fruition and all of the people that made it happen. There were so many who played a key role in that effort who have already been recognized. I will not begin to try and mention everyone here again.

My first recollection of SME involvement was from 2007 when Elaine Cullen, then with the National Institute of Occupational Safety and Health (NIOSH) in Spokane, WA, brought a merit badge proposal written by Mark Larson to the GEM Committee (now MEC). Larson also worked at NIOSH and was very active in Scouting. Stan Krukowski, the GEM Chair at the time, took on the task and was instrumental in the effort. After some initial resistance from the BSA, SME efforts gained momentum with an exhibit at the 2010 Jamboree at Fort A.P. Hill in Virginia, where several SME volunteers and staff helped gauge

interest with scouts. It also helped when the BSA administration finally realized the support that mining gives the scouts. Along with tremendous support from staff, financial backing by the SME Foundation and the support of numerous other SME members, the effort paid off with the launch of the badge at the annual meeting in Salt Lake City, UT in February 2014. Being a member of GEM at the time the effort was kicked off, I was proud to have been a small part of the SME effort.

SME had two primary motivations to sponsor the reintroduction of the badge: first to improve the image of mining in society and second to highlight the career opportunities available in mining. The Summit proves mining can be done responsibly and that there is sustainable land use after mining. We stress through the merit badge initiative that mining has enabled our country and society to be what it is today. We have mining and the people who work in the

industry to thank for the quality of life we enjoy. The Mining in Society merit badge does just that and helps us look forward to the future.

After the introduction of the first recipients of the merit badge at our annual meeting last year, we have learned that 3,519 badges were awarded in 2014. Again, my thanks to everyone who has been part of the effort. However, there is more work to be done to make this a successful venture. We should not lose our momentum. I believe this initiative will be very important in the effort to improve public perceptions of mining. I hope SME can begin to facilitate other projects like a Mining in Society badge for Girl Scouts or similar programs for 4-H projects. I also hope that other SME volunteers will return to the Jamboree in July of 2017 to have the same great experience that I had. I think everyone who participated in the ceremonies in Salt Lake City or in any part of the process is mining proud. ■



Isogate®
slurry valves –
extensive
selection and
the proven
choice for
highly abrasive
applications.



WEIR

Minerals

weirminerals.com/Isogate
sales@weirminerals.com

Copyright © 2015, Weir Slurry Group, Inc.. All rights reserved. ISOGATE is a trademark and/or registered trademark of Weir do Brasil Ltda.; WEIR is a trademark and/or registered trademark of Weir Engineering Services Ltd.; the Linatex red color is a trademark of Linatex Ltd.

Changing minds about mines in America and the world



J. Steven Gardner
2015 SME President

During my year as SME president, I have been discussing public perceptions of mining and exploring how we can change those perceptions, or as I like to say, changing minds about mines in America and the world. It seemed like a daunting task, but after a recent visit to Colorado, I was encouraged by the controversial public debate over the Colowyo coal mine.

Federal Judge R. Brooke Jackson ruled in May that when the U.S. Office of Surface Mining Reclamation and Enforcement had approved expansions of the Colowyo and Trapper mines near Craig, CO several years ago, it was done without providing proper public notice and accounting for environmental impacts that would result from mining and the use of the coal. The lawsuit that prompted Jackson's ruling was brought by an environmental group called WildEarth Guardians (WEG). In his ruling, Jackson ordered the Office of Surface Mining Reclamation and Enforcement to address the issues at the Colowyo Mine within 120 days or the approval would be vacated.

Gov. John Hickenlooper (D-CO) is more known for his concerns about climate change than his support of coal or mining but, according to Colorado Public Radio, he was quoted as saying, "This has nothing to do with climate change. You close this mine it will not reduce the amount of coal that's burned. It's a symbolic statement, I understand that. I get it. But these are people's lives. I don't think you can be a purist on this."

I was even more encouraged by what happened in the community of Craig when people there became activists by outing the supporters of WildEarth Guardians, or more appropriately, who WEG claimed to be supporting them. Someone took the initiative to research the WEG website and found hundreds of businesses listed as supporters. *The Craig Daily Press* published a story on June 8 about local liquor stores and restaurants pulling New Belgium and Breckenridge Brewery beer because they were listed as supporters. More than 450 businesses requested that their names be removed from the WEG website. After that, WEG deleted its webpage called "Businesses

Safety share: When working in or visiting an underground mining operation, make it a habit to "look up and live." This was the mantra of a supervisor I had while working many years ago in an underground mine in Australia. No matter where you park in the mine or how many times you have been there before, the first thing you should do when getting out of your vehicle in an underground environment is look up and inspect the roof conditions. You can quickly get back into your vehicle and move to a safer location if need be. Conditions frequently change, and it pays to take the time to check all your surroundings, including those above your head.

Provided by Annette Glefi, member SME, chief of mine technology and systems, Sociedad Minera Cerro Verde, Arequipa, Peru

for Guardians." Some businesses listed said they had never given anything to WEG. This is a demonstration of how we as activists can strike a blow for the truth about mining in society. I considered it an overwhelming public repudiation of both WEG's tactics and message. Perhaps more of us should start mining deeper into the support, or so-called support, the opponents of mining say they have. We might be surprised at what we find and what we can do about it, as the example in Craig has shown.

John Hayden, SME's Deputy Executive Director-Government Relations & Public Affairs, summed it up best, characterizing the mantra of many environmental groups as, "Preying on fear; praying for change." Some environmental groups prey on the public fear, gather one million \$25 checks and then pray that will lead to change. My opinion has always been that certain environmental groups do not save or protect the environment. Neither does the U.S. Environmental Protection Agency or the U.S. Army Corps of Engineers. Sometimes their actions can actually be detrimental to the environment, society and human health. They are set up as federal permitting shops that allow land disturbance as long as certain regulatory thresholds are met. We now have agencies and courts that are retroactively revoking mining

(Continued on page 19)

President's Page: We can all do more for mining

(Continued from page 6)

permits or preemptively ruling permits will not be issued before they are even submitted. Another challenge is the regulatory agencies that have become partners with environmental groups. I have always been the first to admit that mining has had its share of problems. I have even told some of the true environmentalists that their pointing out of problems is a first step, but the solution is then helping to find creative, collaborative solutions to those problems. Working with some constructive environmental groups can, in many cases, benefit mining in the long term. It can also help in finding reasonable compromises and solutions in the regulatory arena to avoid the governmental reactions that have become more knee-jerk and over-reaching.

Living in a world with 24 hour immediate news access lets anyone be a critic or call themselves a journalist. Those who believe alternatives and renewables can immediately replace fossil fuels post to their websites and blogs, send out their press releases or make public statements for the mainstream media to pick up and report as fact. At times, the problems are compounded if there is an incident (fatalities or environmental disaster) that is used to demonstrate that

the entire industry doesn't deliver strong safety, environmental or community engagement performance. The problem then is if the rest of our industry sticks its head in the sand and does not address what has happened. The industry has boom-and bust cycles, often amplified and/or exacerbated by regulatory actions. It has witnessed job losses during the busts and unequal distribution of benefits during the boom times. All are incomprehensible to the public and how they affect certain communities disproportionately. I have witnessed the "War on Coal" in my native Appalachia, but perhaps it is time we change the language and reframe the conversation. Many times it is not what we say, but what people think they hear.

Mining is perceived as a dirty and unnecessary industry, denying climate change, slow to address environmental issues, and stalling a rapid transition to a "green" economy. The Catch 22 that environmentalists ignore or don't want to accept is that the green, alternative energies still require mining.

SME is responding, but we all can do more by enhancing communication and interaction. Individual SME members can help improve our industry's reputation. Our plan is to equip our members and stakeholders

with information and training so we can engage in a respectful dialog with family members, friends and associates. We work in an industry whose basic purpose is noble, and we should be neither apologetic nor arrogant. When mistakes are made, we must report quickly and transparently with clear plans and commitments to reduce the chances of a recurrence. The industry is complex and it is global, but we must think local.

There are those whose opinions will never be changed. I have found that a conversation about the industry, sources and validity of information, are ways to consider messages and the motivation of the messengers. When someone asks about mining or a particular incident involving mining, first find out what they think they know. Relationships are built on trust and take more time to build than lose. Remind people that mining in one way or another provides everything in their life. There is a lot of information out there and much of it is misleading or entirely false. We need to explain how our industry is high tech, the most highly regulated in the United States, provides for the good of humanity, and above all, put a human face on mining. Our industry's ability to operate the mine of the future relies upon our performance and the public's perception. ■

Mountaintop mining: Practice has slowed

(Continued from page 12)

MTR permits in Tennessee since at least 2007. West Virginia accounts for most domestic MTR production, and MTR production makes up most of the surface production in the state (61 percent in 2013).

If the mining operation will include a valley fill, which allows the overburden to be deposited in intermittent or perennial streams, an additional permit must be granted. On May 27, 2015, the U.S. Environmental Protection Agency (EPA) and the U.S. Army finalized

the Clean Water Rule that more precisely defines waters protected under the Clean Water Act. The Office of Surface Mining Reclamation and Enforcement (OSMRE) is also working with EPA and the U. S. Army Corps of Engineers to develop

an environmental impact statement (EIS) analyzing environmental impacts of coal surface mining in the Appalachian region. OSMRE expects to release an EIS, along with a proposed stream protection rule, in the summer of 2015. ■

Correction

The print edition of the July issue of **Mining Engineering** included two incorrect figures in the feature, "Sierra Gorda, Chile's new copper-molybdenum operation" by T. Comi,

C. Garcia, A. Potulsha and J.J. Opazo on page 23. The updated figures are included in the online version and in the pdf that is available at www.miningengineeringmagazine.com. ■

What does the future hold for coal?

Recent rules will impact the US coal industry



J. Steven Gardner
2015 SME President

As most people in the mining industry know by now, July 2015 was a portentous month for coal. Significant federal rules affecting both coal production and use were released — one a package of regulations from the U.S. Environmental Protection Agency (EPA) limiting greenhouse gas emissions from coal fired power plants, better known now as the Clean Power Plan (CPP), and the other, from the Office of Surface Mining (OSM), a proposed rule to limit environmental impacts to streams from coal mining, or the Stream Protection Rule (SPR). These rules are quite voluminous — in excess of 5,000 pages — and will certainly further curtail the nation's

use of coal.

These regulations will have an impact on an industry that is already reeling from a historic downturn. We all know the various causes of the downturn: the very real “war on coal”; other environmental regulations from the federal government; the slowdown in the global economy; competition from cheaper natural gas and also growing competition from subsidized renewable sources. In a nutshell — the energy landscape is changing dramatically, and these recent regulations will accelerate those changes.

I'm a history buff, and when I look at the dramatic changes that took place in the global economy and political landscape, social institutions, technology, etc., during the first decades of the 20th Century, I'm reminded that it would be naïve to expect anything less than significant changes for us in the first decades of the 21st Century. Our energy landscape will not be the same one that drove our nation during the last 100 plus years. At the same time, it's little solace when you're in the middle of it, and believe as I do, that a more gradual transition in our energy economy would be more prudent, and that market forces should be the primary driver of these changes.

As the EPA itself acknowledges, even without regulations on carbon dioxide emissions, the energy landscape is transforming as a result of technological and market forces — many of the forces we did not fully anticipate. This point is especially important. The EPA's rules on greenhouse gases are energy policy — not environmental policy. A statement from Federal

Safety share: In mining, what we mean by being “safe at work” is embodied by the H.L. Boling term “safe production.” This includes everyone from the front office staff to the working-face miners to the contractors. In fact, at many operations, mining and safety are reaching consonance; that is, we don't do any task without consideration of safety... ever. So safety has become very much a part of not only our mining vernacular, but how we actually think of mining.

So what happens at home? Do you consider safety implications when doing your chores at home? Do you communicate the expectation to others that safety must be considered prior to initiating: mowing the grass, cleaning the gutters, working on the car, etc.? Are you leading by example at home like you consistently do at work? The top five causes of accidental death at home involve: falls, poisoning, fire/burns, airway obstruction and water (Home Safety Council). Set the safety expectation with your family and neighbors. Make safety a habit...all the time.

Provided by Eric Lutz, Chair, SME Health and Safety Division

Energy Regulatory Commissioner (FERC) Commissioner Tony Clark captures the frustration of many people with EPA's climate rules. His colorful argument is that no one should believe the emissions-cutting regulation in the CPP will be straightforward. “Whatever EPA believes are the environmental benefits of this regulation, it cannot be said that it will be easy or inexpensive. Such is the stuff of unicorns and leprechauns,” he said in a statement. He went on to say, “For if EPA's energy vision was the most reliable and affordable means of providing power, we would not need the rule. Engineering experts, markets, utilities and their regulators would already be choosing these resources without EPA dictates.”

What do the greenhouse gas rules really mean for coal? Any rule that favors renewable energy resources, natural gas and nuclear over coal is going to further erode the nation's coal industry. How quickly existing coal plants will close as a result of the existing source rule will depend on how individual states write their compliance plans. The final rule has placed much more

(Continued on page 16)



President's Page: Your donations can keep SMEF going strong

(Continued from page 06)

emphasis on renewable generation (utility scale renewable, not solar panels on houses) because the costs are reported to have dropped in recent years. Many states that have significant wind resources stand to gain. However, if you are a state that relies on coal-fired generation, and your ratepayers are assuming the costs of coal plant upgrades necessary to comply with other EPA regulations, you would like to be assured those coal plants can operate as long as possible.

The greenhouse gas rules are final rules. For existing power plants, states have until September 2016 to develop the compliance plans (extensions will be granted, but the substance of a state plan is due in September 2016). For new coal plants under the new source rule, partial carbon capture and sequestration would be required to achieve the carbon emissions threshold. This makes an argument for increased investment in technologies that can assure a place for coal in our energy future.

The air in the United States is dramatically cleaner today due to the technological solutions that have already been implemented on coal-fired power plants, industrial facilities and vehicles. We no longer hear of acid rain. That is a real success story. The rest of the world is still using coal and will continue to do so for many decades. EPA admits the climate benefits of the CPP are so insignificant that it has never bothered to measure them. The world would be a far better place if we would continue with the research and development of coal mining and utilization technology to export to the rest of the world to provide real environmental benefits. The CPP does not do that.

Also released in July was the OSM proposed new rules for regulation of coal mining. This voluminous rule has been characterized as a complete rewrite of the Surface Mining Control and Reclamation Act of 1977. The full impact of this proposed rule on the coal industry remains unknown. As this is a proposed rule, it is out for public comment. I encourage people to learn more about the rule. I will be doing the same.

Are these rules another nail in coal's

coffin? They appear to belie a stated "all of the above" policy for the nation's energy portfolio. Given the Clean Power Plan is dramatically different in its final form compared to the proposed rule, and given the Stream Protection Rule is new to all of us, there will be quite a bit of scrutiny in the next few months regarding the impact of these regulations. There will also be many years of litigation surrounding both of these regulatory actions. There are some big unknowns facing coal and the rest of the mining industry in the next few years.

I want to remind you of John Marsden's column in the November, 2014 issue titled, "A convenient excuse: Politics of climate change is bad for the US economy, a common sense plan is needed." Marsden received some criticism for statements in his column for allegedly being a climate denier. Some also urged SME to take a stand on climate change — namely that we should officially admit that all climate change is a direct result of human factors. One of SME's roles is to speak out and defend the mining industry while finding solutions to the technical problems facing industry, including those that are attributed to climate change. As Marsden noted, climate change is a political reality. We have to develop our policies and programs to deal with those perceptions.

At the recent American Institute of Mining, Petroleum and Metallurgical Engineers (AIME) meeting, George Luxbacher, 2008 SME president and 2012 AIME president showed a statement from the metal plate once attached to the New York City office building housing AIME that I think sums up best SME's role:

"AIME seeks to further the arts and sciences employed to recover the Earth's minerals and convert them to useful products. minerals are the sources of the materials man has used to build his world. They are basis of civilization and essential to the continuance of life as we know it."

Education sustainability

On a much more positive note, I want to personally congratulate

the first recipients of SME's PhD Fellowships and Career Grants that were announced in July. We were very surprised with the overwhelming response we received from the call for applications. There were many excellent applications. To those not selected, please don't be discouraged. We wish we could fund more applicants. This is an ongoing program that will continue, so please keep those applications coming next year. Applications for 2016 open in December 2015.

Congressional Fellowship

I also want to congratulate Dr. Josh Hoffman, PE, SME's first Congressional Fellow who has accepted a full time position with the U.S. House Natural Resources Committee as Professional Staff on the Subcommittee for Energy and Mineral Resources and will continue to handle mining and mineral issues. I believe this underscores the success of this SME initiative by establishing a presence for mining on Capitol Hill. I also want to wish good luck to Kevin Ashley, PE our next Congressional Fellow who begins his term in September.

The SME Foundation and your dues statement

We have all said at one time or another, "I should contribute to the Foundation," and then never get around to it. The SME Board has approved a new program to make it easier for members to give to the Foundation and help support successful programs like the ones just mentioned. Your new SME dues statement will have an "Opt-Out" line for a \$15 voluntary contribution to the Foundation. If 50 percent of U.S. members of SME contributed at least \$15 to the SMEF, it would raise approximately \$82,500 to fund critical programs. We hope that as people progress in their careers they will then consider increasing their contributions. Again, this is voluntary. If anyone feels they cannot make a contribution at this time, just opt out and deduct \$15 from the amount shown due. ■

Changing minds about mining; A call to all members to be activists for the mining industry



J. Steven Gardner
2015 SME President

In my travels with SME this year, the theme I have used is "Changing Minds about Mines in America and the World." In these presentations, I borrow an image from our "friends" at the Sierra Club which states, "What does your activism mean to you?" plus their answer, a quote from Alice Walker, "Activism is my rent I pay for living on the planet." I have challenged SME members and others in the industry to get involved and be activists for the future of our industry and society.

I want to give a shout out to Bob Murray and Murray Energy Corp. employees for leading the charge and being activists for the mining industry.

The U.S. Department of Interior, Office of Surface Mining, Reclamation and Enforcement (OSM) has proposed a sweeping change in the regulation of coal mining in the United States known as the Stream Protection Rule (SPR). Murray and his employees have been at the head of the line and forefront of speaking out about the impacts of this proposed rule on the industry and to our economy at the series of public hearings that have been held around the country. I also want to thank the SME student chapters at the Colorado School of Mines, University of Kentucky, West Virginia University, Missouri University of Science and Technology Southern Illinois University and Virginia Tech for attending the hearings and helping industry proponents with attendance logistics.

I am intimately familiar with this proposed rule and the process that OSM has used during the last six years to develop the rule. The record showed the process that OSM used in this rulemaking was filled with problems and is, at best, characterized as disingenuous. Our government agencies should have higher standards of accountability, transparency and responsiveness to all citizens, not just those who are on the preferred stakeholder list. In 2009, I was recruited by OSM to serve on a team of consultants that OSM put together to write the EIS and RIA for the proposed SPR at that time. When our team of multiple consulting firms with more than 100 engineers, scientists, economists and attorneys predicted massive job losses from the impact of SPR in 2010, we were asked by OSM officials to change the numbers.

Safety share: • When entering maintenance workshops or other facilities where roller doors or overhead equipment such as cranes are installed, it pays to take a quick look above your head to identify if there is overhead equipment in operation and to check the general condition of roller doors and other installations. Anything comprised of mechanical parts has the potential to fail. A quick look up can be life-saving.

Provided by Annette Gelfi

As professionals we could not and would not do that. In an attempt to persuade the collective group of consultants to cooperate, a senior OSM attorney characterized the whole process best; "This is not the real world, this is rule making." Our contract with OSM was terminated because we would not compromise our principles.

It's inconceivable that OSM originally allowed only 60 days for public review on a six-year rule-making process that resulted in thousands of pages and is a complete rewrite of Surface Mining Control and Reclamation Act (SMCRA). After an outcry from stakeholders, OSM relented and gave an additional 30 days, which is still not a reasonable extension of time to review such an overreaching change. The rule also places a tremendous unfunded mandate on state governments and seriously underestimates the impacts on the economy. The record also shows that OSM kept state governments out of the loop in the process of developing the proposed rule.

This rule will impact all forms of mining, both surface and underground. Preliminary analyses of the rule, if implemented, show severe impacts on mining all across the country. If one reads the original SMCRA of 1977, this new rule also violates the intent of Congress when it enacted SMCRA. It appears to place a threshold of "no environmental" impact on one of our nation's most important fuel sources. Such "no impact" criteria are not applied to any other human endeavor in the 21st century.

Changing subjects, I was proud to be able to host our SME midyear board meeting in

(Continued on page 20)



Miners turn to drones for information; More companies turning to technology for solutions

TECHNOLOGY IS rapidly changing the way mining is done. From automated fleets of equipment to the use of drones, mining companies are increasingly looking to technology to find more efficient ways to conduct their business.

In Australia, Rio Tinto is on the leading edge of the use of technology. A report by *The Sydney Morning Herald* highlights some of the ways Rio Tinto is using technology, especially drones.

First it was driverless trucks and trains, now Australia's biggest mining companies are turning to drones.

Rio Tinto's technology and innovation executive Greg Lilleyman told the paper that his company had already started using drones to monitor and measure various aspects of its iron ore and coal businesses in

Western Australia and Queensland, respectively.

"Information will be the single biggest differentiating factor between the mining operations of the past and those in the future, and drones can produce a wealth of information to allow us to make better decisions," he said.

When fitted with video or thermal imaging cameras, the drones can help companies to inspect machinery and other pieces of equipment much faster and cheaper than by using humans and helicopters.

"We're already using drones to monitor our sites and inspect equipment, tasks that have traditionally presented safety risks for our people, taken up time and disrupted our operations," said Lilleyman.

"Other innovative uses we are finding include tasks like monitoring remote turtle nesting sites and spraying weeds as part of our environmental programs.

"We see immense potential for drones to help extend the advantage Rio Tinto holds through

the innovative use of technology, to improve the safety and productivity of our operations."

Fortescue Metals Group is also getting in on the act. The company had a successful trial at the Cloudbreak iron ore mine last year, while BHP Billiton has also adopted them for stockpile measurement and other topographical surveys.

The Herald points out that it is not just the mining industry that is taking advantage of drones.

Japanese company Komatsu is combining drones with cloud computing to drastically reduce the time taken to survey and then build on construction sites, and the Australian boss of Mitsui, which owns 40 percent of Komatsu, said earlier this year that he expected the technology to be highly adaptable.

But it's not as simple as companies just buying a drone and immediately using it. Australia's Civil Aviation Safety Authority requires drone operators to have an operator's certificate, and the huge demand for such certificates has seen wait times blow out to as much as 10 months. ■

800.959.4464

PREVENT UNPLANNED DOWNTIME

Use sensors to monitor conveyors
and other rotating machinery.

KEEP COST PER TON LOW





A PCB PIEZOTRONICS DIV.

www.imi-sensors.com/mining

President's Page: We need to work together

(Continued from page 6)

Lexington, KY in September. We had great attendance and participation in our committee, division and board meetings, plus enjoyed a taste of the Bluegrass. The month of September also served as a reminder to the nation of the victims of the tragic events of Sept. 11, 2001 and the impacts on families, first-responders and all involved. We are also reminded that mine disasters involving fatalities have multiple victims that include families, friends and co-workers, as well as those who design the mine plans who often find themselves second-guessed after the fact. I have had to live through the

aftereffects of losing a co-worker in a mine accident and having to meet with families. It leaves a lifelong imprint, and I have often wondered what else I could have done to predict and avoid the circumstances that resulted in someone losing their life. I don't think I will ever completely get over that event. We have to remember all of the victims of fatal accidents and should avoid the finger pointing that so often occurs in attempting to assign blame. As a professional society, one of our roles is to be the bridge between academia, government and industry to help learn from the lessons of the past so we can do our best to avoid future incidents. ■

SME in South America;

Trip to PERUMIN 32 strengthens relationship with important region



J. Steven Gardner
2015 SME President

I had the opportunity to represent SME at the PERUMIN 32 in September, one of the largest mining shows in South America. Emblematic of the mining industry today, attendance was down, but it was still a huge mining show, much larger than SME's annual conference. This year, PERUMIN was held on the campus of Universidad Nacional de San Agustín (UNSA), founded in 1828 in Arequipa, Peru, a beautiful city of approximately one million people. The campus was transformed into an exhibition with huge temporary tent structures and campus buildings used for breakout sessions. In exchange for this arrangement, the university

received funds for updates to facilities, equipment and laboratories. SME had a booth at the show along with WAAIME. WAAIME in Peru is very active, providing important programming for professional women in the mining industry, as well as scholarship assistance to students.

I had the honor of presenting the keynote speech at the all-day international session on Tuesday, Sept. 22, which was attended by many students from Peruvian universities, as well as other professional conference attendees. I understood that this was the first opportunity for students from different universities in Peru to come together, something I think will be of great benefit for the students and the mining industry. I gave a variation of my themed message this year, "Changing Minds about Mines in the World." Peru has had its share of mining controversies, including threats of protests at PERUMIN from some groups. Protests earlier this year in Arequipa turned violent. There are several controversial projects in Peru, some planned by U.S. companies in conjunction with their Peruvian partners. Fortunately, there were no problems that I was aware of during our stay.

I was also honored to be on the program with Ing. Antonio Samaniego, Presidente del Instituto Ingenieros de Minas del Peru (IIMP), which was the sponsor of the show and conference. Also on the program were Eng. Roque Benavides, President of PERUMIN 32, Eng. Javier Salazar of Southern Copper Corp., Eng. Alexis Cotrado, Rio Tinto, Eng. Manuel Diaz Yosa, Goldfields, Dr. Sean Xun, USGS and Ing. Romulo Mucho, SME Peru Section president, who also just happens to

Safety share: • We return to standard time (except in Arizona) in November, and it's worth noting that the change in light and dark patterns that affect our days are significant in terms of the body's waking and sleeping cues. In other words, it can create a sensation much like jetlag even though you haven't traveled. For those working rotating shifts, it can be particularly disruptive. It is normally advisable that it be treated essentially the same as jet lag Rest, plenty of hydration, step back and re-evaluate.

Provided by
Mark Savit

be running for president of Peru. Best of luck Romulo.

I took a Spanish class last summer along with my wife, Karen Wilson, from a Peruvian teacher in Lexington, KY. It was a good thing translation headphones were provided at PERUMIN. I learned far more Spanish in my two weeks in Peru than I did in my Spanish class in the United States. Most attendees seemed to understand English. Advice for those interested in foreign work, learn another language.

I was also invited to speak to the International Congress of Mining Students (CIEMIN2015), which is a separate meeting convened at PERUMIN with students from universities of several countries in South America. At both meetings, I was overwhelmed with the enthusiasm of the students and their attention. There was also a first-ever student design competition for Peruvian universities held in conjunction with PERUMIN. It was also very successful. At the announcement of the winners, I was able to make a few remarks. While I know there was disappointment by the students who did not win, I had to tell them they were all winners by just participating. I found the students in Peru are just like students in the United States, they are passionate about the profession, but they are also concerned about the future. I hope that I was able to reassure them that, in spite of current markets and issues, mining still has a bright future. It has to be for the sake of our society.

It was also my pleasure to meet Ing. Oscar Rafael Anyosa, Dean Consejo Departamental de Lima del Colegio de Ingenieros del Peru

(Continued on page 20)



Unearth the innovation potential.

What technologies and innovations will define, change and revolutionize the global mining industry in the future?

Find out at **bauma 2016**. You can expect:

- ▶ 700 exhibitors with mining products
- ▶ Halls B2, C2 and C3 and the bauma Forum all focus on mining
- ▶ 605,000 m² of total exhibition space with plenty of other products and components for mining

Secure your ticket
now at:
www.bauma.de/tickets/en



MINING INSIDE

31st Edition of the World's Leading Trade Fair for Construction Machinery, Building Material Machines, Mining Machines, Construction Vehicles and Construction Equipment

www.bauma.de



THE HEARTBEAT OF OUR INDUSTRY
bauma 2016

April 11-17, Munich

President's Page:

(Continued from page 6)

(CDLIMA - CIP). We signed a Memorandum of Cooperation (MOC) with the CDLIMA - CIP to establish a long-term cooperative framework so that both organizations can collaborate and carry out initiatives. We feel this agreement will enhance SME's membership position in Peru and lead to more opportunities for members of both groups in the future.

While in Peru, we took the opportunity to visit Cusco, the historical Inca capital and of course, Machu Pichu. I had always seen the pictures and marveled at the structures, but one cannot really grasp the scale and ingenuity of the Incas until you have been there. The Incas were incredible miners, engineers and metallurgists.

SME is truly an international society. Our presence in Peru has been strengthened by our relationship with EnginZone, our contractual representative in the country. Maria Isabel Barrios and Marisa Amico, our dedicated employees, have done a phenomenal job of recruiting professional members and expanding the student chapters. We are lucky to have found them. Our plans for the future include expansion to other countries to provide better service to our members and build on our existing base. Thanks Maria and Marissa and thank you Peru. ■

Vatican: Industry

(Continued from page 12)

years ago into a "day of reflection" with the industry, including many of the chief executives attending the most recent meeting.

A booklet produced for that meeting contained a quotation from the Old Testament Book of Job referring to the Earth's treasures: "Surely there is a mine for silver, and a place for gold which they refine. Iron is taken out of the earth, and copper is smelted from the ore."

Anglo and other miners have also taken Catholic leaders to visit mines in South Africa and elsewhere.

Cutifani said, "It is really encouraging. In quite a few places, we have members of the clergy coming to us and asking about investment. These are people who are important in their communities and so we need to get them interested in what mining is about." ■

Flaws exposed by Gold King Mine; Mining experts should have been called on by the EPA



J. Steven Gardner
2015 SME President

In a *Wall Street Journal* commentary on Aug. 21 titled, "Why Is the EPA Cleaning Up Mines?" Rhett Larson, an associate professor of law at Arizona State University, challenged the U.S. Environmental Protection Agency (EPA) on its decisions and the wisdom of the attempted cleanup of the abandoned Gold King Mine in Colorado. As most everyone in the mining industry has now heard, the result was millions of gallons of water released turning the Animas River a red yellow brown soup. Larson's observation was why did the EPA not contract with the experts who know mining, namely the mining companies.

As he observed, mining companies have already shown they are better equipped to deal with these situations. The EPA made numerous excuses and claims that the impact to the environment was not that bad. Those types of claims, had they been made by mining companies, likely would have led to cries for criminal indictments and extreme financial penalties.

We later learned that the EPA did not even have professional engineers or experts devise a plan for the cleanup attempt. Recently, the Department of the Interior released the findings of its independent investigation of the Gold King Mine blowout on Aug. 5. The Bureau of Reclamation led a technical evaluation with coordination and peer review by the U.S. Army Corps of Engineers and the U.S. Geological Survey. Findings revealed the blowout could have been prevented with the proper engineering expertise. The National Society of Professional Engineers has long urged the EPA, and all federal agencies, to require a licensed professional engineer (PE) with the necessary qualifications to perform this type of work. This report, written by another federal agency, makes the strongest case possible for requiring this practice across the federal government.

Colorado Congressman Bruce Westerman, PE, has now filed a complaint against the EPA with the State Board of Licensure for Architects, Professional Engineers and Professional Land Surveyors alleging the practice of engineering without a license for their actions resulting in the Gold King incident. I have to ask what would the EPA have done if a private company was

Safety share: • As the holiday season approaches and thoughts of putting up decorations or changing the batteries in the smoke detectors arrives, it seems like a good time to review the four rules for ladder safety. 1. Pick the right ladder for the job you are going to do. Do not use a metal ladder around any electrical installation. 2. Make sure the ladder is in good working condition. Make sure the nonslip rubber feet are in good condition. 3. Set up the ladder correctly. If a straight ladder is used it should be placed one foot away from the wall for every four feet of height and 4. Work safely on the ladder. Maintain three points of contact and keep centered on the ladder. Whether in the mine or at home, the proper use of ladders can help prevent injuries.

Provided by
John "Ros" Hill

responsible for such an event? It makes one wonder who is running the EPA and why proper judgement is not being used. We can only hope that the EPA learns something from its mistakes and perhaps gains a bit of humility.

The following is not a new observation, but given what is at stake, I think it bears repeating: There are so many examples of federal agencies attempting to reshape how we use our energy resources. Of course, environmental regulations have always had a role in our energy policy. But there is quite a difference between environmental regulations of the past and what we are seeing today. Time will tell whether the courts will rule that the EPA has gone beyond its authority with the Clean Power Plan (CPP). However, we have never before seen a regulatory scheme that clearly intends to take coal out of the nation's fuel mix. This is what the CPP will do. We have made great strides in environmental controls for both the mining and utilization of coal that, if shared with the world, would have a far greater impact on the global environment than the CPP. In my view, continuing investment in research to develop more responsible mining techniques and refining emissions controls for the burning of coal for electric power will benefit the world far more than any other current proposal. The EPA has

(Continued on page 26)



Afghanistan is losing out on resources; Deposits are being exploited by smugglers

IT HAS BEEN estimated that Afghanistan is home to trillions of dollars worth of mineral deposits of gold, copper, lead and rare earths in more than 10,000 deposits. However, political instability and decades of war have made it nearly impossible for the country to use its mineral wealth to its advantage.

Bloomberg reported that the Afghan government will earn about \$30 million in 2015 from its mineral sector for the third straight year, far short of a previous projection of \$1.5 billion, according to Mines and Petroleum Minister Daud Shah Saba. That's also a quarter of what smugglers — mostly linked to the Taliban and local warlords — earn annually selling rubies and emeralds, he said.

“Unfortunately, we have failed to well manage and well control our mining sector,” Saba told *Bloomberg*. “With the current fragile and messy situation, it's really hard to say when Afghanistan should expect any profits from it.”

International donors led by the United States are paying for about two-thirds of Afghanistan's \$7.2 billion budget this year. The country's mineral wealth, estimated at \$1 trillion to \$3 trillion, is crucial to bridging that gap.

Saba criticized his predecessor for saying Afghanistan would earn \$1.5 billion in annual mining revenues by now and become financially self-sufficient in a decade.

“The revenue projections of the previous government weren't realistic,” Saba said. “Afghanistan needs to continue receiving international funds, otherwise the country won't remain functional at all.”

Shortly after taking office, President Ashraf Ghani said he would use Afghanistan's mineral wealth to transform the economy, and he regularly touts the country's potential in speeches to investors. However, the two largest mining projects in the county have been mired in delays and contract disputes.

Metallurgical Corp. of China, awarded a \$3-billion contract in 2007 to mine the world's second biggest copper deposit at Mes Aynak, is disputing an obligation to build a railway and power plant, Saba said. The Chinese government-owned company also wants a lower royalty rate.

A consortium of six companies led by Steel Authority of India Ltd. has also stopped talks on mining an iron ore deposit, Saba said. Once valued at \$11 billion, the project was forecast to generate \$200 million in annual government revenue by 2017.

Minerals are the Taliban's second-biggest income source after narcotics, a United Nations Security Council committee wrote in a February report. The group earns cash in three ways, it said: directly extracting resources such as marble, extorting money from mining companies and providing services like security and transportation for unlicensed mines. ■

President's Page: SME needs to be the source for facts

(Continued from page 6)

admitted that the CPP will not make that much of a difference on a worldwide scale. Nuclear, natural gas, and other alternatives all have a place, but the attempts to eliminate coal from the balanced energy mix is both misguided and ill-informed.

There are so many examples of other misguided decisions that have occurred of late that seem to establish a pattern. EPA's pre-emptive veto of the Pebble Project, the Keystone pipeline, a retroactive permit revocation of the Spruce Mine in West Virginia, the proposed Waters of the U.S. rule and the Office of Surface Mining's proposed Stream Protection Rule are all solutions in search of a problem and arguably will result in a negative impact on both the environment and the economy.

I have many friends who work in government agencies and SME has many members in those agencies. In

discussions with professionals who work for federal agencies proposing these overreaching regulations, I am convinced they do not all agree with the proposals. These proposed policies will have a profound effect not only on coal mining but, potentially, on mining in general and, consequently, society as a whole. One of SME's core missions is to serve as that bridge between academia, industry and government. What is going wrong on the policy side where real science and engineering are not being adequately considered in the decision making process? It seems the wrong people are making those policy decisions without proper input from professionals.

The challenge is what can we in SME do to react and change the perceptions that allow such events to occur? I have heard comments that SME must not be political and risk offending government agencies. My response is SME must speak out and

defend the mining industry with science and engineering that our members help to develop and practice in the face of the bad policies that are not based on defensible science.

SME is providing input on regulatory proposals based on hard facts and proven science that we hope will be considered in the legislative and administrative processes. Our Government and Public Affairs Committee is structured to react to situations and issue briefing papers that are fact-based and peer-reviewed. We now have a professional presence on Capitol Hill with our Congressional Fellows. Our Minerals Education Coalition has fact-based educational materials that are available for members to use both in schools and in public settings. We, as individual members, must take the opportunity to explain to our friends, neighbors, communities and elected officials the importance of mining in society. ■

Mining, climate change and science; A collection of shout outs, commentary and reminders



J. Steven Gardner
2015 SME President

First, I want to congratulate fellow Kentuckian and SME member Charles G. Snively, PE, for being appointed to be the Secretary of the Kentucky Energy and Environment Cabinet by Kentucky's new governor, Matt Bevin. His responsibilities will include oversight of Kentucky's energy, environmental protection and natural resources programs. Snively has more than 35 years of experience in the coal mining industry and has been an active member of the Central Appalachian Section. He was most recently president of Eastern U.S. Operations for Arch Coal Inc. He has a mining engineering degree from Virginia Tech and is working toward

an executive Masters of Business Administration degree through a joint program of the University of Kentucky and the University of Louisville.

Mining's future. I attended the Arizona Conference on Dec. 7 in Tucson, and, while attendance was down some, there were still about 400 people at the meeting. It was a great conference, highlighted by a presentation by Mary Poulton of the University of Arizona (those other Wildcats) titled "The new face for mining: The culture change for compatible mining." She made many excellent points that strike home in our quest to improve the public perception of mining.

The mining industry news is not all good, as we well know. Just about all sectors of mining are suffering. If you haven't seen the New York Times article from Dec. 8, "If It Owns a Well or a Mine, It's Probably in Trouble," you should read it. There is a new reality that many expert analysts say will last through 2017.

While at the Arizona Conference, SME Executive Director Dave Kanagy, Tim Arnold (2016 President-Elect), John Mansanti (2017 Presidential Nominee), John Marsden (2014 Past President) and I took the opportunity to meet for almost a day and a half to discuss where we are with SME and where we are going. We are hopeful that our trend of successful annual meetings continues. But we must have contingency plans in place, considering the downturn in mining, to make sure we continue to provide the basic services members expect and to continue our important initiatives. SME's

presidential succession process has worked well over the years, allowing us to work as a team on the important initiatives for the mining industry and our society.

Climate change. Many of us have been following the 2015 United Nations Climate Change Conference, COP 21 or CMP 11, that was held in France Nov. 30-Dec.11. The conference objective was characterized as achieving a legally binding and universal agreement on climate, from all the nations of the world, to be signed in 2015 and implemented by 2020. The key expected result, according to the organizing committee, is to limiting global warming to below 2°C by 2100, compared to before the industrial era.

Those of us who have worked in the coal sector have watched this debate with great interest, but it affects the entire mining sector. First, I want to make the statement that I am not a climate denier. Climate change is real. However, it always has been. We are told that 97 percent of climate scientists agree that climate change is real and seemingly caused by human actions. I will also agree that humanity impacts climate. All developments, urbanization, agriculture, industry and energy production can impact the climate and environment. Human society has always had to adapt to climate change. No one disagrees that we should minimize the pollutants and emissions from mining and power generation, but there has to be a balance to protect both society and the environment.

Can mining and energy developers do a better job? Surely, our government, industry and academic sectors are continuously striving to find better ways to provide natural resources that society demands. However, no other human activity is currently being held to such a no-impact criteria as mining. Good science, innovation and engineering are the solutions to the problems that we have, not retroactive regulations, misconceptions, demagoguery and propaganda.

My belief is the war on coal is actually going to have a detrimental effect on the worldwide environment. The rest of the world is still increasing its use of coal with all other forms of energy (Last year the IEA projected 9 Gt or 9.9

(Continued on page 16)



President's Page: SME needs to be the source for facts

(Continued from page 6)

energy (last year the IEA projected 9 Gt or 9.9 billion st of coal production by 2019). However, that increased use of coal is not always utilizing the latest mining and generation technology. Alternative energies, nuclear and natural gas all have their place as well, but the worldwide environment would be better served if the United States continues to improve its coal and mining technology to export to the rest of the world.

The bottom line for the mining industry is we have to adapt to the political realities of the world while science and engineering continues to develop solutions to problems, all while still providing the raw materials the world demands. The mining industry should not have to apologize for the service it provides to society.

Diversity and inclusion in the mining professions. I had the opportunity to work with David A. Zegeer early in my career. He is credited by many with hiring some of the first women coal miners, if not the first in 1972 at the Beth Elkhorn Corp. of Bethlehem Steel in eastern Kentucky. (I would be interested in learning of any records of earlier women miners.) That was groundbreaking and was followed by numerous women becoming miners in subsequent years. As the father of a daughter who is a mining engineer, encouraging more participation of women in the mining profession is a subject of great interest. The last statistics that I have of SME membership showed about 10 percent of members are female, but the under 30 membership is 30 percent female.

I have always been puzzled at the low percentage of women in engineering, while other professions such as science, law and medicine are much higher.

There has been a lot of discussion at the various meetings I have attended in recent months about diversity and/or inclusion. Past SME presidents have written about the subject on many occasions. SME has been fortunate to have two excellent past presidents who just happen to be women. We now have many women who are active at all levels of the Society. That shows progress, but there is more to be done. It is an opportunity for the mining sector to recruit very qualified competent people to help fill some of our gaps in the future.

There has been a lot written about why there is a disparity between men and women in the workforce in all sectors. It is really not a reach to figure out that because of biological differences, women bear children and take off time from careers. Many choose to take off more time before going back to work. One conference I attended had discussions about re-entry to the workforce and how to make it easier for women to come back to work. My attitudes have changed over the years, especially after I faced a situation early in my career when I had to take on the role of primary caregiver for my older daughter, adjusting my career and work schedules. I can empathize to some degree with many women who have taken time off and either worked part time or re-entered the work force after a few years.

We are all familiar with Women in Mining and the Women's Mining Coalition, plus the great service that WAAIME has performed for mining

over the decades. Our WAAIME group in Peru has been sponsoring programs to encourage professional women in the mining sector. There are many groups and initiatives ongoing to improve opportunities and encourage more participation by girls in engineering and science at an early age. I believe there has been much progress in tearing down past barriers to participation by women in mining, but as one wise woman in the mining profession told me, "I want to get past women anything. I want to see equal participation in all sectors without having to have special programs."

We have a great opportunity to attract some very qualified people into the industry and perhaps attract some very good people back to the work force. Inclusion and diversity can be great tools. So, what does SME do to assist with the issue? We have to continue our existing efforts, but there is more that we can do.

SME Communities – Communication is a two-way process. Rachel Grimes, SME's MEC Outreach Coordinator, holds monthly Outreach Resources conference calls for everyone interested. These calls are great for all members who are interested in education or resources available to help change public perceptions of mining. The SME Communities are great ways to improve our interaction between SME leadership, staff, members and local sections. Log onto the SME website and go to the Communities. Improving the public perception of mining is essential to the future of our industry. You can help SME and MEC spread the word of the importance of mining and minerals in everyday life. ■

Sierrita Mine: Deposit first mined in 1907

(Continued from page 11)

it processes molybdenum from the Sierrita and other Freeport mines. Molybdenum is used in steel alloys.

The ore deposit at Sierrita was first recorded in 1895 and first

worked as an underground mine in 1907, according to Freeport. It was converted to an openpit in 1957. Freeport also owns the shuttered Twin Buttes copper mine next to Sierrita, which the company has said could

offer production synergies should both properties be in operation at once.

The ore at Sierrita is low in copper but was made profitable by the presence of molybdenum. ■

Staying safe and other observations; Record year for safety in the industry one reason to celebrate 2015



J. Steven Gardner
2015 SME President

Mining fatalities dropped to an all-time low in 2015, as 28 people died in mining-related accidents in 2015, 11 in coal mines and 17 in metal/nonmetal. True, statistically the decline in mining may have had something to do with that, but I want to think that everyone's efforts and emphasis on safety also had something to do with it as well. I think it is safe to say that many fatalities and injuries are a result of someone making a mistake. Attention to detail is what keeps us alive.

Unfortunate incidents like the dam failure in Brazil and other tragedies in the United States and around the world paint mining in a bad light. One has to remember that the mining sector is populated with honorable people who try to do the right thing. Regardless of the sector we work in, we are all part of the mining industry. There are bad actors in all sectors, and people have a tendency to make mistakes, which casts a shadow over all of us. We must react to the unfortunate incidents with the facts and strive to improve all facets of mining by learning from mistakes. Mining has an impact on the environment. Regulations and regulators exist to create a level playing field for the miners, the public, the environment and the economy. But, as we have seen, regulators can make bad decisions and mistakes as well. Zero harm is a goal we should all work toward attaining.

Mining is an honorable profession and an essential one to our society. Mining has been cast by some as evil polluters or killers. That is the perception that we must continue to work toward correcting.

I made a mistake in my December column in discussing the Gold King incident and EPA. Bruce Westerman, PE, is a congressman from Arkansas, not Colorado. My apologies. As a result of the column and discussions with officers of the National Society of Professional Engineers (NSPE), SME and NSPE are beginning a collaboration to raise the awareness of professional engineers and professional ethics in government and the mining profession, plus the importance of licensed professional engineers being involved in projects like Gold King and other projects that affect the public health, safety

Safety share: • Pedestrian injuries and fatalities are possible at a mine site, rural area or a city. We have all read, heard about, seen it happen or had a close call.

Regardless of where you are, always heed your mother's advice, "Look both ways before you cross," even if the lights are with you, make sure the way is clear.

Note: we missed our Safety Share last month. First, my column was somewhat verbose and, second, we had no submittals from members. Please keep the safety shares coming.

and welfare across the industry. SME registered members have a Code of Ethics that must be followed. Professional members are expected to conduct themselves according to the codes prescribed by their respective professions, be it engineering, geology, law, etc. Extending the SME-RM Code to professional members is something that will be reviewed.

In my March 2015 interview, I mentioned that I had assembled a notebook of all SME President's columns since SME was formed. I have frequently reviewed those columns for inspiration and guidance. We have had many great presidents, and they have provided inspiration and guidance. The initiatives I focused on during my term were not new but continuations of past initiatives started by my predecessors. SME has continued to make progress on these initiatives that I have outlined throughout the year:

- Education sustainability initiative — First Fellowships and Career Grants awarded.
- Health and safety — Health and Safety Division organized with programming for the Annual Conference.
- Mining and sustainability initiative — Continuing collaborative efforts with WFEO Task Force.
- Public perception of mining — Developing strategy for coordinating efforts across the mining sector.
- Local sections - Organized ad hoc committee to study how to better serve sections.

(Continued on page 15)

President's Page: SME has much to look forward to in 2016

(Continued from page 6)

Past initiatives that were also continued with significant accomplishments in 2015 included global outreach and communications.

SME's global outreach was characterized by the successful efforts in Peru with plans to expand to other South American countries, followed by the rest of the world. The Global Minerals Professional Alliance (GMPA) is a collaborative effort among five of the world's leading mining professional groups. OneMine.org is a common link, and other projects to benefit members are under discussion. GMPA will meet again at the SME Annual Conference in Phoenix, AZ, Feb. 21-24.

The SME communications initiative saw the launch of SME's new, redesigned website and implementation of the new association management system. (There were some issues with this as many of us have seen in our own experience, but SME staff is working diligently to resolve those. Suggestions on improvement are welcome.) I also consider the efforts of our Government and Public Affairs Committee to have been very successful with the continued issuance of technical briefing papers and the second SME Congressional Fellow

starting in Washington, D.C. Our first Congressional Fellow was liked so much he was retained to stay on for a second year. There was much more accomplished by SME. These are just a few of the highlights of the year.

One of the strengths of SME is the presidential succession process that essentially has a team of SME presidents who work together, sometimes for many years. I have used and relied on our most recent group, John Marsden, 2014 past president, Tim Arnold, 2016 president elect and John Mansanti, 2017 president nominee. I have also called on many other past presidents for advice on various initiatives that they either started or were passionate about. Also, my thanks to the many members who volunteered their time and efforts for SME. Many members sent their suggestions and questions. I have tried to respond to every message but, if I did not, please let me know. I will continue to be involved in SME to work on those initiatives that I am passionate about. Also, my thanks to the SME staff who do the work of our Society every day.

To write my last column, I reviewed again my columns from the year. As I write this in early January, I think about my resolutions for the year. I will propose a few SME resolutions

SME's global outreach was characterized by the successful efforts in Peru with plans to expand to other South American countries, followed by the rest of the world. The Global Minerals Professional Alliance, (GMPA) is a collaborative effort among five of the world's leading mining professional groups.

that I gleaned from my columns:

- Start your day and every meeting with a safety share.
- Consider public health, safety and welfare in all that you do.
- Be an advocate for mining, speak out to correct misconceptions of mining.
- Change a Mind about Mines.
- Get involved in your local section.

I want to end by wishing Tim Arnold the best of luck as he takes over as 2016 SME President. I also think it is noteworthy to remind and point out for many of our new members that Tim's brother, Jim Arnold, was the 2007 SME President.

Let's all stay safe out there for 2016. ■

Joy Global: New technology is in place for the rebound

(Continued from page 10)

million to \$150 million in free cash flow," said analyst Joel Tiss with BMO Capital Markets.

The hard times have hit home for Joy's employees. Hundreds of them are on layoff, and the company closed one of its Milwaukee facilities.

In addition to its U.S. manufacturing plants, Joy has factories in China, where it has partnered with Chinese companies.

About 10 percent of Joy's business is in China, but that's expected to rise, as more than half of the world's coal production comes from that country.

Other Wisconsin manufacturers, including Johnson Controls Inc., Rockwell Automation and the mining equipment division of Caterpillar, also have much at stake in China.

The slowdown in China's industrial growth has shaken the world economy, including the mining sector.

"In the short term, it's tough. But in the long term there's an opportunity for us (in China)," Doheny said.

One element of the company's manufacturing strategy involves building mining equipment in

China for India, Russia and possibly Western markets.

At some point, mining will rebound as the world economy improves and factories need more steel and other mined materials.

"The commodities are there; everything in the world is either mined or grown," Doheny said.

He added, "We have to get people excited about the industry we serve, and excited about the new technologies, because getting through this trough we need to have the best and the brightest people to get to the other side." ■



SME President
John O. Marsden
VOL. 66 NO. 3 – VOL. 67 NO. 2

March 2014: VOL. 66 NO. 3

An interview with the 2014 SME President

April 2014: VOL. 66 NO. 4

Advanced education sustainability: Critical issues must be addressed by all stakeholders

May 2014: VOL. 66 NO. 5

The silent majority? SME members can lend a voice to shape the discussion

June 2014: VOL. 66 NO. 6

Gas-tronomic – Global mining industry can learn from the rebound in oil and gas

July 2014: VOL. 66 NO. 7

The unsung heroes of SME: A lot of hard work goes into the SME Annual Conference & Expo

August 2014: VOL. 66 NO. 8

Your debt-free SME: Streamlined headquarters building is paid off in three years

September 2014: VOL. 66 NO. 9

AIME and the Panama Canal: SME members can take pride in the Society's legacy

October 2014: VOL. 66 NO. 10

Mount Polley spill impacts all of us; Mining industry's credibility is challenged by accidents

November 2014: VOL. 66 NO. 11

A convenient excuse: Politics of climate change is bad for the US economy

December 2014: VOL. 66 NO. 12

Innovation and technology: An opportunity for the mining industry

January 2015: VOL. 67 NO. 1

SME has come a long way: Society has seen nine consecutive years of growth

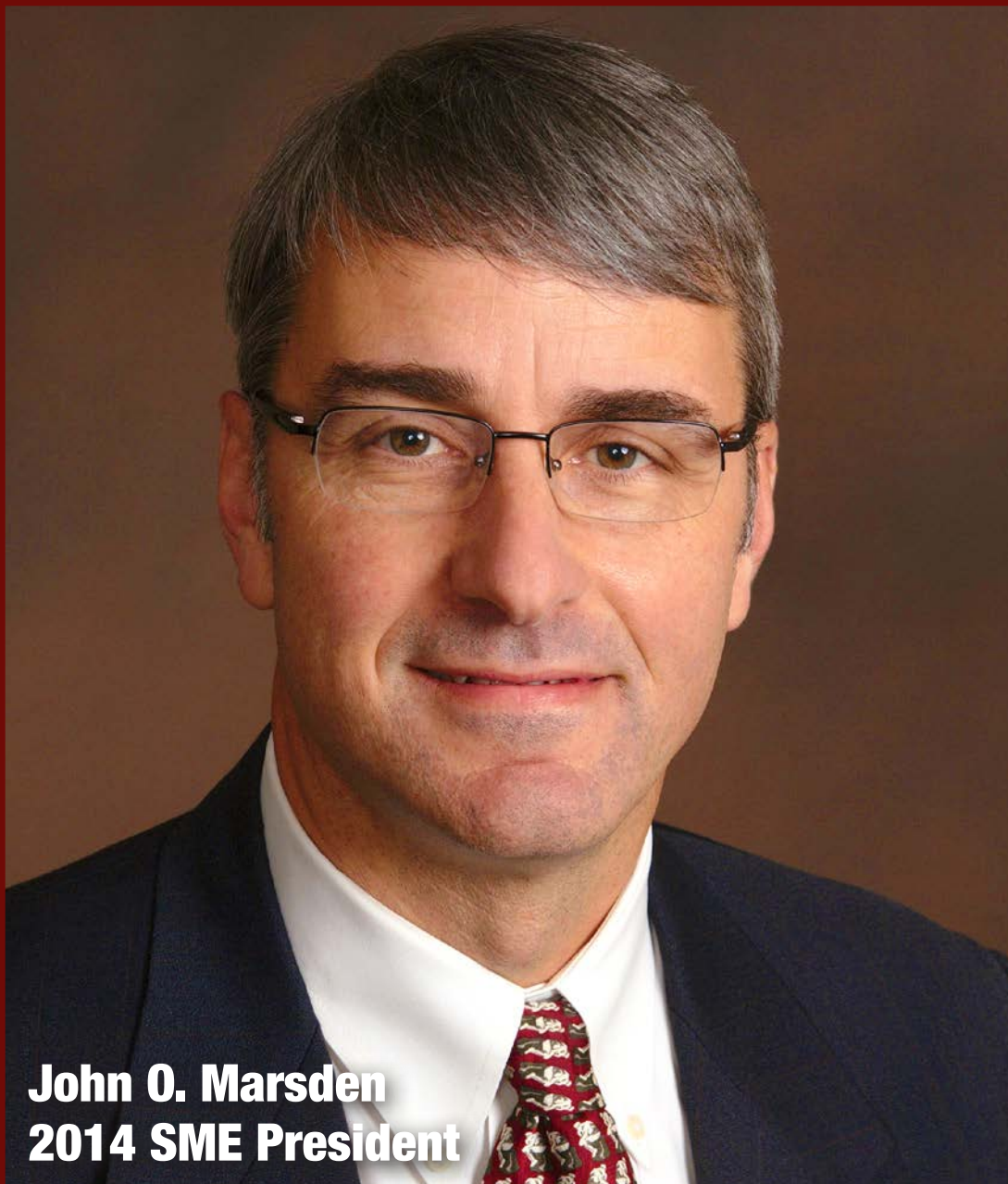
February 2015: VOL. 67 NO. 2

SME's faculty development commitment for core mining programs

MARCH 2014
VOL. 66 NO. 3

OFFICIAL PUBLICATION OF SME

Mining engineering



John O. Marsden
2014 SME President

Special Editorial Supplement: **Tunneling & Underground Construction**

www.miningengineeringmagazine.com

SME has come a long way: Society has seen nine consecutive years of growth



by John O. Marsden
2014 SME President

As 2014 comes to a close and we enter 2015, it is a good time to reflect on just how far SME has come in the past decade. The Society is not the same organization that it was 10 years ago and we can be grateful for that – the organization is thriving. In September 2014, SME achieved a ninth consecutive year of operating surplus. This followed nine consecutive years of operating losses between 1996 and 2004, with potentially devastating consequences prior to the turnaround of the organization. Membership of SME hit a low point in 2004 of approximately 11,000 members, but has climbed steadily since that time, reaching more than 15,300 in 2014. This is still well below the high point of 28,000 in 1983, but the trend is firmly in the right direction. The operating surpluses are being put to good use by growing, improving and extending the range of services provided to members, while remaining true to the vision and mission of SME. I would like to recap some of the major accomplishments for you.

During 2014, SME moved forward with the re-design of the website, seeking to make this a more effective and relevant portal for members (and nonmembers) to access SME's products and services. In addition, the implementation of a new management system was advanced, which will make SME more efficient at delivering its products and services. Both of these key infrastructure products are expected to be completed and delivered by the second quarter of 2015.

In 2014, SME paid off its debt. This includes the outright purchase of the new building that houses the SME headquarters in Denver, CO. This is a great accomplishment that will serve SME members well in the future and puts us in a good position for further growth, if this is required at some point.

SME offers a range of products and services, many of which were not available prior to the turnaround. *Mining Engineering* and *Tunneling & Underground Construction* magazines are the premier industry news publications in their sectors and *Minerals & Metallurgical Processing*, edited wonderfully by Komar Kawatra, has increased its citation index above 0.5 (for

those familiar with academic journals, this is a significant and excellent accomplishment).

SME is a leader in mining-related book publications, as a quick look at the publications list will tell you. SME realizes about \$1 million in book sales annually. Perhaps the most significant development is OneMine.org, established by SME in 2008. It provides the most comprehensive online digital library for the minerals industry. This has evolved into a collaborative effort, supported by several professional associations around the world, including AusIMM, SAIMM, DFI and CIM. This contains more than 100,000 books and documents dating from the 1800s to the present day. This is viewed as a major benefit obtained from SME by a significant proportion of our members.

The SME Annual Conference and Expo continues to thrive and grow and has become the premier technical meeting for the industry. The annual meeting set attendance records of 7,202 in Denver in 2013 and 6,722 in Salt Lake City in 2014 (highest at a location outside of Denver).

In 2013 and 2014, under the sage sponsorship of Red Conger and Rick Whiting, along with the efforts of many other volunteers and SME staff members, the SME Foundation was revitalized and re-energized under the banner "Creating Global Prosperity: The Campaign for Mining." A program of corporate sponsorship with focus on year-over-year giving has been advanced, with annual contributions of almost \$1.6 million in 2014. These funds are targeted at supporting the effective implementation of SME Foundation programs including; ABET, Professional Engineer registration, Minerals Education Coalition (MEC), scholarships for study in mineral-relevant programs and tertiary education sustainability (faculty development). It should not go unnoticed that the number of applicants taking the Mining/Mineral Processing PE exam has doubled since 2005. SME is now in the process of implementing a faculty development program for tertiary education, which is a huge step toward ensuring the survival of core mining and mineral processing degrees in the USA.

SME is run by volunteers. The SME Board of Directors and the Foundation Board of

(Continued from page 12)



Permit times could be cut in half; New South Wales premier promises changes to permitting process

NEW SOUTH WALES Premier Mike Baird pledged to speed up the approval process for major infrastructure projects, including mines, by half, *Australian Mining* reported.

During the past six years, the time it takes to have a new mine approved slowed to 1,000 days from 500 days. Speaking at a NSW Minerals Council Awards dinner, Baird said the government needed to make a change.

"I am tonight drawing a line in the sand on this. NSW must do better, and I assure you we will," Baird said. "I commit to halving the assessment times for major projects during the next term of government."

Planning Minister Pru Goward detailed directions to the planning commission, which implements time limits and works to appoint case managers from the premier's department who will manage planning applications.

"The planning minister and I believe these immediate changes alone will deliver time-frame savings of about 170 days for major projects," Baird said.

Baird also spoke out at illegal protestors and said new legislation would "throw the book" at activists who entered mining sites.

The premier said it was

unacceptable that mining companies were responsible for the safety of people who entered their sites illegally.

"For too long protesters have entered mining sites, illegally damaged equipment and disrupted activity and escaped serious penalties.

"What is even more galling for the industry is that current legislation puts the responsibility for the safety of trespassers who enter mining sites illegally on to mining companies and operators.

NSW Minerals Council chief Stephen Galilee said the changes would work to attract investment in the state. ■

Anglo American expects to hit target; Increased production and decreased spending counter lower prices

ANGLO AMERICAN chief executive officer Mark Cutifani said that his company will probably meet earnings targets by increasing production and cutting expenses amid declining commodity prices.

"We have delivered on our major commitments to shareholders," Cutifani said in a statement before the company's investor day conference in London. "We have successfully turned around a number of our priority operations this year, principally in our copper, Kumba Iron Ore and coal businesses."

Seventy-one percent of Anglo's

priority assets are now performing above plans, compared with 21 percent in 2012, Anglo said in the statement.

Cutifani plans to sell assets that fail to meet his goal of increasing the company's return on capital to at least 15 percent by 2016. That includes the sale of four labor-intensive platinum mines in South Africa after a five-month strike that ended in June. He's also seeking buyers for three copper mines and a smelter in Chile, *Bloomberg* reported.

Anglo American, which cut its capital expenditure forecast by a

range of \$500 million to \$800 million for 2014 and \$800 million to \$1 billion in 2015, delivered its Minas-Rio iron-ore project in Brazil about \$400 million under its revised budget, it said.

Anglo American started iron ore shipments from the \$8.8 billion Minas-Rio Mine on Oct. 25. The start of the project, which faced delays and cost overruns since it was bought in 2008, coincides with a slump in iron ore prices as Australian and Brazilian producers expand capacity and demand from China, the biggest user, stalls. ■

President's Page: Share your opinion on the Society

(Continued from page 6)

Trustees are volunteers. These are active and engaged boards that provide strategic guidance to SME's management. The SME strategic and standing committees are manned by volunteers. The SME divisions and program committees are run by

volunteers. The work is executed and managed by paid SME staff (49, Denver-based). All of these individuals do an excellent job of leading, directing, implementing and controlling the programs to deliver products and services to SME members. We owe a huge debt of gratitude to all of the volunteers that

serve SME and to the SME staff. If you have opinions on how you would like to see SME evolve, I would encourage you to take an active role in SME as a volunteer – there are many ways to serve and we would welcome your participation.

I wish you all a happy and healthy 2015. ■

Advanced education sustainability: Critical issues must be addressed by all stakeholders



by John O. Marsden
2014 SME President

There are currently 15 major schools in the United States that produce graduates of mining and metallurgical/mineral process engineering. The future of these specialized, “core” degree programs for the mining industry is in jeopardy. While we have seen enrollments in these programs growing over the past nine years, as evidenced by the increasing size of graduating classes, the situation for faculty is not so rosy. There are approximately 70 faculty members in mining and metallurgical/mineral process engineering programs distributed among these schools, divided between the various disciplines.

This is just over half the number in 1984. By the year 2018, an estimated 30 faculty members will have reached or passed retirement age. Not the mining industries’ problem, you say? Actually, it is. The mining industry needs a healthy, higher-level education program to ensure an adequate supply of appropriately qualified graduates for the mining industry. Two-thirds of the professionals entering the minerals industry who graduated within the past 40 years graduated prior to 1985. Since 1985, we have been living off the legacy of graduation classes from the mid-1970s and early 1980s. It is estimated that we have been producing graduates at approximately 40-50 percent of the sustaining rate since about 1985. Further growth in the domestic industry would increase graduate requirements significantly, and export of U.S. graduates to other parts of the world (as is currently occurring) also impacts the total graduate requirements.

There has been a growing trend for university administrations to consolidate the smaller, less-viable departments with variable enrollment numbers, into bigger and more robust departments. For example, mining engineering into civil engineering; metallurgical/mineral process engineering into materials science or chemical engineering and geological engineering into civil engineering or geological/geophysical sciences. This consolidation has contributed to a loss of a constituency base and a loss of identity for these programs. While this is to some extent inevitable, it is important that core, specialized mining, metallurgical, mineral process and geological engineering programs are maintained. This will ensure that the graduates come out of

school with formal education and training in the specific disciplines required by industry. Sure, we can make mining engineers out of civil engineers and metallurgists out of chemical engineers, but we need a formally educated core to provide the mentoring and training of these individuals once they are out in the industry.

To establish a healthy education system, we need qualified and experienced faculty who want to teach and are rewarded for teaching to ensure the long-term success and viability of our industry. There are three critical issues that must be tackled to address this crisis.

Ph.D. funding and support

Some people were born to teach. Unfortunately, there is a strong disincentive for our brightest and best graduate engineers to pursue Ph.D.’s due to the direct cost (i.e. \$45-\$60k per year) and the lost opportunity of income from employment in the industry (i.e. \$75-\$100k per year). It is not a case of whether someone would like an academic career, but whether they can afford to do it, and this disparity between industry and academia has grown wider in recent years. Similarly, it is difficult for a salary-earning individual employed in the industry to return to school to study for a Ph.D. We have to find a way to bridge this gap. At a steady state (considering current levels of industry activity), we need about three to four Ph.D.s to graduate each year in each discipline. As discussed among the SME’s Education Sustainability Committee, only about 20-30 percent of graduating Ph.D.s are expected to pursue a career in academia, so we actually need to graduate 12-15 Ph.D.s per year.

Faculty retention and career development

New faculty need a funding bridge for a career development path to move toward tenure. Why do we need them to move toward tenure? Because that is the best way to ensure that well-qualified, experienced, full-time faculty are available to teach graduates and to bring stability to these higher education programs. A three-year research fellowship grant would provide Ph.D. graduates with resources necessary to establish their research and teaching credentials.

What about adjunct professors from industry? Why can’t these universities take

(Continued on page 14)



President's Page: SME needs to help solve problems

(Continued from page 6)

advantage of people in industry or recent retirees who are prepared to teach in their spare time? They certainly can, but this presents several problems for academic departments that become overly dependent on these individuals, ranging from accreditation issues to the need to have a critical mass of full-time faculty to meet university expectations. Adjunct professors typically are short-term, contract employees responsible for specific teaching duties, but they do not provide the support of key criteria used to assess program stability. Adjunct or visiting professors can help to provide breadth and depth to academic programs, as well as a tremendous resource for student mentoring and advising. However, they cannot replace the need for an effective core of full-time, tenured or tenure-track faculty in these programs.

Research funding

Funding of university research is generally out of favor among mining companies due to cash flow constraints (rapidly escalating capital and operating costs, fluctuating metal prices, resulting in cutbacks in nonessential spending), perceptions and realities in the quality and value of such academic research, the lack of individual drivers or champions for academic research in industry and intellectual property barriers/disincentives imposed by many university institutions. Federal funding of studies and research in mining has been drastically reduced, and the dissolution of the U.S. Bureau of Mines removed all funding for mining schools under the Mining and Mineral Resource Institutes Act of 1984. The net result of all this is that there is limited, and I would argue totally inadequate, research funding in the United States to support the mining, mineral and geological engineering programs that it needs for a healthy and robust education system. Academic research will solve neither the immediate problems faced by industry nor the problems that must

be addressed in the next few months. However, we cannot let a short-sighted focus on the next round of quarterly results prevent support of longer term academic research.

We cannot look to industry alone to solve this problem. I believe that we need a coordinated approach that includes the following components:

1. Funding of effective Ph.D. fellowships and post-doctorate research fellowships should be provided through the SME Foundation. The word "effective" means that such funding must be sufficient to attract and retain bright, energetic and capable individuals into faculty development programs, and in sufficient numbers to meet the projected faculty requirements over the next 10-15 years. The program should be ramped up over a three- to four-year period to achieve a sustainable level of funding by year four or five.
2. To be eligible to receive such support (see item 1 above), schools with mining, metallurgical/mineral process and geological engineering programs must demonstrate their commitment to maintaining and supporting these programs on an ongoing basis. Put simply, the SME/SMEF cannot and should not support schools that are not fully committed toward establishing and maintaining core, specialized mining/metallurgical/mineral process/geological engineering programs.
3. Corporate funding of academic research needs to be encouraged on a one-on-one and collaborative basis. In order to do this, an approach whereby intellectual property rights reside with the funding entity (or entities) needs to be established. If you fund research, you should be eligible to receive the benefits from such funding.
4. We need to develop, encourage and grow individual champions

for research and professional development within the corporate environment, including nurturing small research project partnerships between individual mining operations and their local universities, and by promoting publication of papers by graduates in industry (which provides a peer review and is an important form of professional development for these individuals).

5. SME should pursue appropriate avenues to reinstate government funding of mining industry research and development programs. SME and the American Geosciences Institute have co-founded the "Minerals Science and Information Coalition," geared toward re-invigorating minerals science and information functions within the federal government. The SME Government and Public Affairs Committee is working with staff of the House Energy and Mineral Resources Subcommittee regarding legislative options and potential hearings to shine a spotlight on the need for federal support for U.S. mining/mineral schools and programs.

The newly formed Education Sustainability Committee is looking into these issues and will provide specific recommendations on how the SME, academia and industry can work together to address these going forward. I have a strong personal interest in these issues and will be working diligently during the coming months to make sure that these efforts bear fruit. I would welcome comments and suggestions from SME members on this.

Acknowledgments: I would like to thank Leigh Freeman (principal, Downing Teal Inc.), Hugh Miller (associate professor, Colorado School of Mines, and co-chair, SME Education Sustainability Committee) and John Hayden (deputy executive director, SME) for their review and contribution to this article. ■

The silent majority?

SME members can lend a voice to shape the discussion



by John O. Marsden
2014 SME President

In a speech in 1931, Alfred E. Smith said, "The thing we have to fear in this country [the United States], to my way of thinking, is the influence of the organized minorities, because somehow or other the great majority does not seem to organize. They seem to feel that they are going to be effective because of their own strength, but they give no expression to it."¹ Eighty-one years later these words still seem to ring true, and nowhere is this more apparent than the public's general perception of the mining industry. Vocal minorities seem to shape the discussion and inform public opinion to a much greater extent than we should allow.

Image is vitally important for our industry, but image based on substance is better.

As individual members of SME, we all can, and should, play our part in giving voice to the majority opinion and help to enhance the image of mining and resources extraction in our communities. A great way to do this is by interaction with our educational institutions. The Minerals Education Coalition (MEC) of the SME Foundation has developed a range of excellent tools for K-12 education that are available to SME members. These materials are targeted at three levels – elementary, middle and high school – and have been developed to provide a balanced, factual and engaging perspective on mining and resources extraction. I strongly urge every SME member to access these tools and provide them to at least one school in your area. If every SME member did this, we would get the materials into more than 12,000 schools in the United States, and more

As individual members of SME, we all can, and should, play our part in giving voice to the majority opinion and in helping to enhance the image of mining and resources extraction in our communities.

than this on a global basis. If you haven't seen "Rock Odyssey," "The Blue Marble" (a lavishly illustrated wall chart of the periodic table in English and Spanish), "Rocks Build America" and the other fact sheets, activities and teaching ideas that have been developed and published by MEC, then you should log on and take a look (www.mineralseducationcoalition.org). These products are available at a modest cost and in some cases are free.

Better yet, offer to give a short presentation on some aspect of the industry with which you are particularly familiar or use the excellent presentation "The Importance of Mining," which can be downloaded for free off the MEC website, to give a higher level, general overview and perspective. Little or no preparation time is required to do this.

Having had the opportunity to do this myself a few times (and not nearly enough, I admit), I am constantly surprised at how much kids of all ages know about our business and how inquisitive they are to learn more. I believe there is an innate understanding of the importance of metals and minerals to society, but often the switch has to be thrown to bring this into the light. I am convinced that the great majority of people in our society understand and accept the importance and relevance of metals and minerals and the need for mining. Let's make the generation of the future an informed majority. ■

¹Constance Bridges, *Great Thoughts of Great Americans*, Thomas Y. Crowell & Co, 1951, pp 191.

GAS-tronomic

Global mining industry can learn from the rebound in oil and gas



by John O. Marsden
2014 SME President

In late April, I had the opportunity to participate in the National Academy of Engineering (NAE) Convocation of Professional Engineering Societies that is held annually in Washington, D.C. This meeting was attended by representatives of the majority of engineering societies in the United States, who, in turn, represent more than two million members of the engineering profession. Several key topics were presented and discussed⁴, but on the top of the bill was the resurgence of oil and gas based on unconventional resources – an issue of significant importance to the mining industry.

Since 2000, the development of shale oil and shale gas has fundamentally reshaped the U.S. energy industry and has made an impact on the global energy outlook. The production of “tight” oil from shale and other sources has increased from 0.3 million barrels per day (bbl/d) in 2003 to more than 3.5 million bbl/d forecast for 2014. Similarly, shale gas production has increased from under 3 billion cubic feet per day (bcf/d) to about 35 bcf/d during the same time period¹. Remarkably, the domestic supply of natural gas is forecast to exceed domestic consumption within about two years, and the United States will become a net exporter of natural gas. Some projections estimate that crude oil production could exceed 13 million bbl/d by 2030, with the United States becoming a net exporter of crude oil in that time. This would have been unheard of in 2000, and anyone suggesting this as a possibility would probably have been ridiculed. Recent estimates indicate economically recoverable natural gas resources of 2-4 trillion cu ft in the U.S. (70-140 years of supply) and 15-30 trillion cu ft worldwide (120-240 years of supply)².

Whatever your politics, this is good for the mining industry in a number of ways. Natural gas is an important bridge to a long-term energy future that is less reliant on fossil fuels. Being self-sufficient in oil and gas means moderated and more stable energy prices in the near-to-medium term (i.e., to 2030 and beyond). This is important for U.S. metal and mineral production to remain competitive in the global market and to allow development of new resources. Also, more moderate and stable energy pricing, coupled with

regional availability of natural gas, is expected to stimulate hubs of U.S. manufacturing capacity and economic growth, which, in turn, will lead to demand for metals and minerals. Additionally, such growth in domestic oil and gas production requires investment in pipelines, refinery operations, gas liquefaction facilities, logistics and other infrastructure.

So, how did this happen? Through technology and entrepreneurial business approaches to resource development. The implementation and adaptation of new technologies for hydrocarbon extraction and processing, the optimization of directional drilling techniques to follow rock strata, enhanced remote sensing and characterization technology and implementation of effective hydraulic fracturing (fracking) techniques have all contributed to this energy renaissance³.

There are several important lessons and messages here for the mining industry. First, if the United States oil and gas industry can be re-energized and re-invigorated in just 13 years, then so can the mining industry. Second, the development and effective application of new technology can transform a business sector dramatically. All of the technologies employed for unconventional oil and gas resource development were known in the year 2000, but had to be harnessed effectively to reap the benefits. There are many emerging and existing (but immature) technologies that can help to reshape the mining industry – we need to recognize them and embrace them. Third, we have the expertise and the entrepreneurial spirit with in the global mining industry to do this. We have tremendous technical capability and human capacity to accomplish great things – the U.S. oil and gas industry has clearly shown that this can be done to an extent and within timeframes that are nothing short of astonishing. ■

References

- 1 Sieminski, A., 2014, “The U.S. and global implications from unconventional resources development,” U.S. Energy Information Administration.
- 2 Holditch, S., 2014, “The resource base,” Texas A&M.
- 3 Spath, J., 2014, “Technologies that have made the (oil and gas) resurgence possible.”
- 4 Other topics reviewed included; Innovation in emerging stationary liquid metal battery technology for high capacity energy storage at MIT and Engineering Workforce Trends in the U.S.

The unsung heroes of SME;

A lot of hard work goes in to the SME Annual Conference and Expo



by John O. Marsden
2014 SME President

The SME Annual Meeting has grown dramatically over the last decade. Last years' meeting was the biggest ever away from Denver, CO (where it is always held in the "odd" years), with more than 6,700 attendees. The 2013 meeting in Denver set a record attendance of 7,202 people. The next Denver meeting (2015) is expected to be an even larger draw, despite challenging times for the industry. The SME Annual Conference and Expo is highly regarded around the world as a premier opportunity for networking and interaction in mining. Also, it is a great draw for students, which is good for the long-term health and growth of SME.

What many may not realize is how much hard work and effort is put into these meetings by SME staff. There is no doubt that the organization and management of technical meetings is a core competency of SME and one that is performed consistently year-in and year-out. Apparently, this core competency is being increasingly recognized by other organizations with mining and related interests. In 2014, SME meetings' staff will plan and execute seven other conferences and symposia around the United States, including the George A. Fox Conference in New York (for the Underground Construction Association Division), the North American Tunneling Conference in Los Angeles, CA, the Arizona Section Annual Meeting in Tucson and other conferences on critical minerals, big data, finance and cutting edge ground water control. And SME is a sponsoring organization of the Offshore Technology Conference (OTC) in Houston, TX.

Next year SME staff will be adding the Minnesota Section Annual Meeting to its portfolio of duties. The conference draws more than 800 people each year. Another 15 conferences are in the planning stages for future years.

This capability to deliver high-quality technical meetings provides tremendous value to SME members and to the industry in general through opportunities for networking, information exchange, mentoring, peer review,

and professional development. It is important to understand this is not an easy or simple task to accomplish. The SME staff must work with a shifting backdrop of prevailing economic conditions and health of the mining industry, which can have major impacts on registration numbers and organizational requirements. Exhibitor and attendee functions must be coordinated and scheduled. Hotel capacities and rates must be established and communicated in advance. The ability to anticipate demands based on attendance forecasts can determine whether a conference is an economic success or failure.

Technical meetings are a critical product of SME, and one that we need to embrace and support going forward. I would like to encourage all SME members to attend at least one conference or symposium this coming year. I would also urge companies and institutions to support the attendance of the SME Annual Meeting by staff from all levels and disciplines within your organizations. Publishing a paper or simply making a presentation on a suitable topic provides a great opportunity for peer review, professional development and growth for junior engineers and young leaders in your organization. Effective networking adds value for everyone — suppliers and vendors, operators, corporate staff, students and academia. This support is vital for several reasons. It helps to make the technical meeting a business success (which is important for SME's overall financial health and growth), but it also contributes to a vibrant and rewarding meeting experience, more diverse and higher quality technical information, and wider ranging networking opportunities. It also helps to broaden the perspective of attendees that may be constrained within a limited work scope or environment. Most importantly, I can personally attest to the fact that it only takes one good idea or learning picked up during the meeting by an attendee to pay for the cost of attending.

In closing, I would like to thank the SME staff for its diligent work in providing consistently high-quality and excellently organized conferences — the efforts of these unsung heroes are very much appreciated by all of us in the industry. ■

Your debt-free SME; Streamlined headquarters building is paid off in three years



by John O. Marsden
2014 SME President

As most members are aware, in December 2010, SME relocated from its limited headquarters office space in Littleton, CO to a larger facility in Englewood, CO. The building was acquired, refurbished and equipped at a total cost of \$3.5 million for the 2,800 m² (30,000 sq ft) facility, taking advantage of prevailing real estate conditions in the Denver area at the time. This change allowed SME to centralize and consolidate its operations into a single location, releasing the requirement for various rental spaces and facilities in the Denver area. SME borrowed approximately \$2 million in funds from the existing line of credit to

cover the cost of the building, together with cash from SME operations.

During the past course of the past three-and-a-half years, SME has steadily paid down the debt on the new building. In addition, the sale of the former SME headquarters in Littleton was completed for approximately \$750,000. As a result of these actions, the final debt payment for the new headquarters was made in June 2014, leaving SME debt-free.

The new facilities have allowed SME to streamline several areas of operations, especially in the shipping and handling of products. Also, the new facilities have resulted in other operating cost savings and efficiencies. All of this puts SME in a good position financially, and it provides an excellent platform for SME to further grow and improve its products and services. Two examples of this are the redesigned SME website and the new management information system that are currently in development. SME staff expects to be able to deliver these updated and improved services by March 2015.

The move to the new headquarters was the result of a vision established by Will Wilkinson, Nikhil Trivedi and Dave Kanagy back in 2009. The staff and board of directors of SME executed this vision effectively by reviewing the options and alternatives for headquarters space, and by ensuring that the most cost-effective solution was adopted. Most importantly, the achievement of debt-free status as a result of this vision over the past three and a half years came down to SME staff executing the task in an effective manner.

This type of transition is never easy. All SME staff members have been affected during the process, some to a greater extent than others. However, their patience and flexibility has been evident throughout, and SME has continued to provide effective products and services to our members during the transition. We thank the SME staff for their hard work and dedication, and we look forward to continued growth and development of SME going forward.

On an unrelated note, the first TMS/SME Summit on Creating and Sustaining Diversity in the Minerals, Metals and Materials Professions was held in Washington, D.C. July 29-31, 2014. The summit honored the first female member of AIME Ellen Swallow Richards. She was the first woman to graduate from the Massachusetts Institute of Technology and the wife of the late, great, metallurgist Robert H. Richards. She will be inducted into the National Mining Hall of Fame in September and you can read more about her on page 56 of this issue.

The conference also explored factors related to the development of a diverse talent pool, which is so important for long-term effectiveness, competitiveness and creativity within our industry at a time when it is proving challenging to attract and retain people with the right skills and capabilities. ■

AIME and the Panama Canal; SME members can take pride in the Society's legacy



by John O. Marsden
2014 SME President

The American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME) was one of the first national engineering societies established in the United States. The organization was originally established in 1871 by 22 mining engineers in Wilkes-Barre, PA. AIME is one of the Engineering Founder Societies of the United Engineering Foundation, along with ASCE (civil), ASME (mechanical), IEEE (electrical), and AIChE (chemical). As most members are aware, AIME is the parent organization of SME, as well as the Society of Petroleum Engineers (SPE), the Association for Iron and

Steel Technology (AIST) and The Minerals, Metals and Materials Society (TMS).

During the recent AIME Annual Board/Trustee Meeting held in Niagara, ON, Canada Aug. 8-10, 2014, we were reminded of the remarkable legacy and history of the organization. One item that was shown to the board was a letter from William Taft (Theodore Roosevelt's secretary of war at the time) to the AIME president dated Nov. 11, 1910, regarding the construction of the Panama Canal, one of the engineering wonders of the world at that time. The letter states, "It is most satisfactory to have the assurance of men who are experts that the great canal construction has been well planned and is being carried out to a successful completion. I thank your American mining engineers returning from Isthmus [the Isthmus of Panama], congratulate you upon good plans, splendid management and satisfactory condition of work...." The canal construction was successfully completed in 1913 and officially opened in 1914.

And now, exactly 100 years later, we are approaching the conclusion of the Panama Canal expansion project, which rivals any major mining project in size and scope. The expansion project was initiated in September 2007 and is scheduled for completion in 2015 at an estimated cost of US\$5.3 billion.¹ Approximately 50 million m³ (1.7 billion cu ft) of material will be excavated along a 6.1-km (10-mile) stretch of the canal, both widening and deepening the shipping lanes. The heart of the project is the addition of a third set of locks that connect the

canal system to Gatun Lake. These locks will be significantly wider and deeper than the previous locks, allowing for much larger vessels to pass through the canal system. Up to this point, the previous locks could handle vessels up to 32-m wide by 294-m-long with 12.1-m draft (105-ft wide by 964-ft-long by 40-ft draft) ("Panamax" vessels, approximately 47 kt or 52,000 st carrying capacity or 5,000 TEUs).² The new locks will increase the vessel size to 49-m-wide by 366-m-long with 15.2-m-draft (160 x 1,200 x 50 ft) ("Post-Panamax" vessels, approximately 91 kt or 100,000 st carrying capacity or 13,000 TEUs). Significantly, the new lock system will add 165 million m³ (5.8 billion cu ft) of storage capacity to Gatun Lake. The expanded canal system will approximately double the capacity, while at the same time accommodating the larger vessels. Interestingly, the United States began excavations for new (larger) locks in 1939, but the construction was abandoned due to World War II, and several subsequent attempts at expanding the canal never got off the ground.

This expansion is good news to some players in the mining industry and not so good news to others. Iron ore and coal shipments are likely to be impacted with larger cargos (e.g. the smaller "Capesize" vessels) passing through the canal rather than the traditional route around the horn of Africa, for example from Brazil to the China seaboard. This will affect transportation costs and therefore the competitiveness of iron ore, coal and other products from different sources. Nonetheless, most sources agree that the expanded canal will have a positive impact on global trade all around.

As we approach the 150th anniversary of AIME in 2021, we should be proud of the mining industry's heritage and the important role that mining, geological and metallurgical engineers have played not only in establishing the foundations for the U.S. economy, but also in helping to shape global infrastructure and the world economy. And, of course, as the Panama Canal expansion approaches completion, some are saying that it might not be big enough to meet transportation needs, suggesting that a fourth set of locks should be added. Oh, what a problem to have. ■

¹ Source: Panama Canal Expansion Project, Project Progress Report, October 2013, Canal de Panama.

² TEU: Twenty-foot Equivalent Units.

Mount Polley spill impacts all of us; Mining industry's credibility is challenged by accidents



by John O. Marsden
2014 SME President

The mining industry was stunned by the news of the failure of the Mount Polley copper mine tailings facility — operated by Vancouver-based Imperial Metals — in British Columbia and the associated environmental impacts that were reported to have occurred on Aug. 4, 2014. Apart from the direct impacts caused at Mount Polley, this type of event poses other potential risks to people, wildlife and the environment, but there are also serious implications for many others involved within and around the mining industry. It is understood that a thorough investigation is currently underway to determine the cause(s) of this failure

and the resulting environmental impacts, and we do not yet know all of the circumstances and factors involved. It is critical that the industry, as a whole, clearly and fully understands the underlying reasons for this event to ensure that such failures are avoided in the future and to ensure accountability. SME waits with interest and concern to hear the findings of this investigation.

This type of event is particularly frustrating when we have the capabilities to properly design, construct, operate, maintain, close and reclaim such tailings storage facilities (and indeed other similar storage facilities) in an effective and responsible manner. The industry has repeatedly shown that these facilities can be designed and operated in a responsible, safe and environmentally sound manner, while meeting applicable local, regional and national regulatory requirements. There are tens of thousands of such facilities around the world that operate effectively and safely day-in and day-out, year after year. Clearly, it is the responsibility of all of us as mine developers and operators to ensure that we have appropriate practices, procedures, monitoring and controls in place to manage these facilities. As an industry, we have a responsibility to construct state-of-the-art tailings facilities and to apply adequate factors of safety to facility designs. We also have a responsibility to ensure effective operation and control of these facilities, and to maintain appropriate safe operating margins and factors of safety during operation and closure. On top of this, many mining companies carry out internal auditing of

This type of event is particularly frustrating when we have the capabilities to properly design, construct, operate, maintain, close and reclaim such tailings storage facilities (and indeed other similar storage facilities) in an effective and responsible manner.

facilities as well as routine independent auditing (by one or more external third party) of their tailings facilities as an additional safeguard to ensure that effective practices are maintained. We have the technology and the capability, and yet failures still occur.

On Oct. 11, 2000, an impoundment owned by Martin County Coal Corp. failed, releasing about 250 million gallons of fine coal slurry into proximate underground workings and nearby creeks and rivers. The U.S. Mine Safety and Health Administration conducted rigorous investigations into the causes of the failure, and its final assessment report identified ways to limit the potential for re-occurrence. Also, in response to this disaster, the U.S. Congress requested the National Research Council to conduct a study on why mine waste impoundments fail and what can be done to reduce the potential for future failures. The study "Coal Waste Impoundments, Risks, Responses and Alternatives" (2002, National Academy Press) analyzed the reasons for the occurrence and identified actions to prevent such accidents from happening again. Even with these forensic investigations, and other remedial investigations before them, the tailings impoundment at Mount Polley still failed.

The credibility of the mining industry as a whole is done great harm by this event. As an industry, we are constantly striving to promote mining as a technologically sound and environmentally respectful activity, which can be maintained while adhering to reasonable and practical sustainable development principles. We have made great progress in many areas. The Global Mining Initiative, which led to the Mining, Minerals and Sustainable Development project, and the International Council on Mining and Metals' adoption of Ten Principles

(Continued on page 18)



Peru could help launch Santa Ana Mine; Once suspended project could become a reality

CANADIAN MINING company Bear Creek may get some help in getting its Santa Ana silver mine off the ground from the Peruvian government, which said it hopes to sway local opposition to the project.

Energy and Mines Minister Eleodoro Mayorga told *Reuters* that officials are rapidly building support for the project in indigenous Aymara communities, and that Peru hopes to be able to allow the company to eventually restart work.

In 2011, Bear Creek's rights to build the mine were revoked after protests against the proposed mine in southern Peru turned deadly.

The company has said the project's suspension violates investor protections under Peru's free trade agreement

with Canada. Bear Creek announced it started arbitration proceedings, in case talks with the government do not produce an agreement.

The company had planned to use Santa Ana to help pay for its bigger, \$700 million silver project in Peru, Corani. Bear Creek expects Santa Ana to produce some 139 t/a (5 million oz/year) of silver and Corani to produce about 362 t/a (13 million oz/year).

Chief executive Andrew Swarthout said in an email that the company would consider calling off the arbitration process if it received "a good signal that we would be making progress toward a resolution."

He said the company cannot disclose how much it was seeking in damages for Santa Ana until its notice

of arbitration has been accepted by the World Bank's arbitration panel in Washington.

Mayorga said he thinks the dispute can be resolved soon.

"I see it with a certain optimism," Mayorga said in an interview. "If we manage to resolve the social license in time, we will be on our way to developing" the deposit.

But without strong local support, Mayorga said, the project will not go forward, and "Peru would be subject to paying the company."

Local residents in southern Peru's Puno region once staged large protests against Santa Ana because of fears the project would pollute water supplies.

Swarthout said the situation has changed. ■

Rare Elements: Institute welcomes REE as affiliate member

(Continued from page 10)

executive officer. "Working together, we believe the public and private sector can successfully re-establish a complete, domestic rare earth supply chain to eliminate many of the issues relating to our current dependence on foreign sources for the vast majority of U.S. rare earth supplies. Rare Element Resources is pleased to have been invited to join CMI and to have the opportunity to contribute to these

efforts and to help build a better tomorrow by ensuring the continued success of clean energy technologies."

The rare-earth elements designated critical by the DOE include neodymium, europium, terbium, dysprosium and yttrium. Rare Element Resources' Bear Lodge project is expected to generate approximately 70 percent of its revenues from these five elements, based on projections in its prefeasibility study completed

in August 2014. The company has developed proprietary processing technology that has produced a 97+ percent, near-thorium free, total rare-earth concentrate in multiple pilot plant tests. Bear Lodge is the most advanced rare-earth development project in the United States. The U.S. Forest Service is currently developing an environmental impact statement on the project with the draft expected in the first quarter of 2015. ■

President's Page: We must learn from Mount Polley

(Continued from page 6)

for Sustainable Development are good examples of industry best practices and our global commitment to social, economic and environmental stewardship. Further, the Cyanide Management Code came out of this effort and has proved to be an excellent management tool for the gold industry worldwide. Many global gold producers voluntarily adopt the requirements of the code as part of

their ongoing business procedures. However, the recent tailings failure is a huge setback that provides fuel to the fire for opponents to mining projects throughout the world. In the short term, this is likely to add cost and time to permitting efforts in support of new mining projects (especially in British Columbia, but also anywhere where there is opposition to mining). In the medium to longer term, this will likely add momentum to increasing

regulatory controls for mining projects and specifically tailings (and similar) storage facilities that may not actually improve the safety or reduce the risk profile of these facilities.

As an industry, we must learn from this event, and the analogous events preceding it, and make sure that steps are taken to ensure that similar failures are not repeated. This is a critical issue for obtaining and maintaining our social license to operate. ■

A convenient excuse: Politics of climate change is bad for the US economy



by John O. Marsden
2014 SME President

I was reminded the other day that an opinion and \$5 will get you a cup of coffee at Starbucks. So, speaking of opinions, I am constantly amazed at how polarized and uninformed/ill-informed the climate change debate has become. A few months ago a prominent mining academic challenged me that the SME really needed to take a position on climate change, assuring me enthusiastically that the entire scientific community was on board with the fact that anthropogenic global warming was now proceeding at an alarming rate. A few days later someone else cornered me in an elevator and advised me categorically that there was no evidence for man-

made climate change, and it was all a big hoax designed to suck the rich dry and plunge us back into the Stone Age. These are not the only opinions I have heard from SME members on the subject. The last straw was when I was talking to a neighbor who wanted to know how it was possible to know whether man-made carbon dioxide was actually increasing atmospheric carbon dioxide levels. How is it possible in this age of information and technology that we have got this so wrong? Clearly, the science has been hijacked by political agendas. There is no longer any attempt at objectivity in reporting the science by the media. Sensationalism and fear-mongering win the day, and any attempt by scientists to question or refute the so-called “scientific consensus” is met with ridicule and scorn. And it appears that we, the mining industry, are a big part of the problem as a major carbon dioxide producer and energy-consumer. Really?

Let's consider a few rough numbers for illustrative purposes. The earth's atmosphere contains about 10^{16} tons of air. Currently we burn about 8.2 Gt/a (9 billion stpy) of carbon, generating 30 Gt (33 billion st) of carbon dioxide. Since 1850, humanity has burned an estimated 590 Gt (650 billion st) of carbon putting an estimated 2,200 Gt (2,400 billion st) of CO_2 into the atmosphere. Depending on whose data you believe (and it doesn't really matter for the purposes of this discussion), the baseline carbon dioxide concentration in 1850 was about 280 ppm. It was much much higher than that during the last interglacial warm period. As we all know, a portion of emitted carbon dioxide is

taken up by the biosphere and another significant portion is absorbed by the oceans contributing to a gradual lowering of pH (an unfortunate chemical reality with real consequences). Both the biosphere and the oceans “breathe,” taking up and releasing in the range of 50-100 times the net uptake/absorption each year. The current carbon dioxide concentration in the atmosphere is around 400 ppm, and it is projected to increase to around 560 ppm by 2075. As carbon dioxide concentration increases, it is expected that uptake by the biosphere and absorption into the oceans will also increase. Opinion: no one really knows by how much nor the effect that this and other positive and negative feedback mechanisms will have on climate (and I challenge you to find this in any of the Intergovernmental Panel on Climate Change reports). And, of course, many factors affect climate, not just atmospheric carbon dioxide concentration.

Climate models are being used to predict future climate change, and the output of these models in terms of global average temperature and sea level rise have been widely reported. During the past 15 years or so, global average temperatures have remained largely the same. Climate change proponents and climate modelers claim this is within the range of variability of their models, which may well be true. As more time passes with little change in average temperature, the climate change proponents will probably continue to say this is within the range of variation of their models, or perhaps add more sophisticated components and feedback mechanisms into the models (“tweaks”). If temperatures increase, the climate change proponents will declare victory, and we will be faced with the same issue we face today — a growing imperative to aggressively tackle climate change. Either way, this issue will not be resolved quickly.

Whether or not you believe that anthropogenically driven climate change is occurring, the current “war on coal” is bad for the United States economy and bad for climate change. Why? Firstly, such a drastic shift away from coal will increase energy costs and will place more reliance on natural gas which, in the longer term, will lead to higher and potentially more volatile gas prices, further affecting energy pricing. The shale gas/tight gas revolution we have experienced during the past 10-15 years has been amazing and beneficial in many ways. On

(Continued on page 30)



President's Page: A common sense plan is needed

(Continued from page 6)

other hand, because natural gas has substantially lower CO₂ emissions per kWh compared to conventional coal generation, this has provided a convenient excuse to attack the coal industry in the United States. Secondly, China, India, Indonesia and other developing economies will rely on coal to provide a significant proportion of their vast needs for energy in the coming decades. If the United States does not take the lead in developing clean coal technology (e.g. high-efficiency, low-emissions technologies such as super-critical and ultra super-critical coal generation, carbon capture sequestration, and other advances), then who will? We should be embracing coal and using our resources to help develop an effective portfolio of energy

generation capability that most cost effectively meets our needs while providing adequate levels of environmental protection. A drastic, rapid reduction in U.S. coal-generated carbon dioxide emissions on its own will do little for global atmospheric carbon dioxide levels.

The bottom line is we simply do not know what the effects of the anthropogenic increase in atmospheric carbon dioxide concentration are, or will be in the future. It will be a long time before the science is settled. This doesn't mean we shouldn't act. We should. A sensible, long-term, forward-looking plan to control and manage carbon emissions makes sense in the face of such uncertainty. But such action must be developed as part of a national energy policy and must consider the costs and benefits of

planned actions. Also, I believe that the mining industry has a critical part to play in helping to shape the longer term energy situation globally by providing the metals and minerals needed for the emerging energy technologies that can provide affordable energy while managing environmental impacts, whether this be clean coal technology, production of metals for efficient energy generation and power transmission, supply of metals for the new generation of transportation systems, or materials for energy storage. Also, we can lead by example in the development and implementation of lower energy-consuming mining, extraction and recovery methods for such metals and minerals. We are part of the solution. And without mining, there wouldn't be any (man-made) energy at all. ■

Stantec

Deep Thinking

Over 200 people specializing in mining in the Western USA. Part of a mining team over 600 strong.

Design with community in mind

stantec.com/mining

Innovation and technology:

An opportunity for the mining industry



by John O. Marsden
2014 SME President

A glance through the abstracts of proceedings from the recent 27th International Mineral Processing Congress (IMPC) held in Santiago, Chile, in October 2014 would tell you that research and innovation are alive and well in the mining industry. The congress was attended by representatives of industry and academia from all over the world. All countries that have significant mining interests were strongly represented, providing a diverse and wide-ranging array of research and innovation initiatives. Chile, Peru, China, Russia, India and Brazil were particularly active participants, with

Australia, Canada, Germany, South Africa, South Korea, Sweden, Turkey and the United States all providing significant and meaningful contributions. Key topics included: sulfide and nonsulfide flotation innovation, fundamentals and application of high pressure grinding rolls, super-fine crushing technology (down to micron sizes), other emerging non-traditional comminution techniques, new methods for reduction of water and energy consumption, tailings disposal and treatment, and a variety of other novel processes and enhancements. It is hard not to come away from such a meeting without a sense of optimism and excitement for the future of mineral processing.

The industry has an enormous amount to gain from turning all of this research and innovation into commercial applications that can improve productivity, reduce costs and increase yields. At a time when some companies are pulling back on research, innovation and technology spending, other companies are quietly and efficiently going about the business of effective development and application of technology to treat increasingly complex and lower grade ores at competitive costs. Among all of the discussion at IMPC 2014, few noted that Freeport-McMoRan had recently commissioned a new mill expansion at Morenci (AZ) based on the use of high-pressure roll crushing (Metso HRC-3000) prior to ball milling to prepare feed for flotation using highly energy-efficient technology. This will add an estimated 120 kt/a (132,000 stpy) of copper production. Freeport-McMoRan is also working on the construction

of the \$4.6-billion Cerro Verde (Peru) sulfide mill expansion that will increase capacity to a staggering 360 kt/d (396,000 stpd) using high-pressure grinding rolls (HPGR) supplied by ThyssenKrupp Polysius, generating an additional 270 kt/a (297,000 stpy) of copper¹. Meanwhile, Rio Tinto is advancing the Mine of the Future program with the development of the world's largest fleet of autonomous haulage vehicles in the Pilbara district, the Rio Tinto Mine Automation System, and the "Excellence Center" technology platform, among other key initiatives². As Robin Batterham reminded us at the IMPC 2014, we can't sit back and wait for innovation to change the game for us, we must go out and grab it. In addition, Anglo American recently announced its FutureSmart technology platform that brings together a number of innovation and technology initiatives, stressing that incremental change is simply not enough³. These are not the only companies engaged in proactive and effective technology development and deployment.

Looking ahead, as the industry faces capital and operating cost headwinds, it is clear that innovation and technology deployment represent huge opportunities for the mining industry. Companies with the vision and foresight to invest in research and applied technology development will reap significant rewards from such efforts. These programs and initiatives are not only important for individual companies and their ability to maintain and enhance competitiveness in the face of declining ore grades and increasing cost pressures, but they are critical to developing and maintaining academic communities (local, regional and national) that are in touch with industry and responsive to commercial needs and drivers. There are great opportunities to partner with universities and research groups around the world to tap into these potential game-changing developments. Sure, there has to be a strong focus on the next three months' performance, but we must keep one eye on the long-term future, even if we have to squint a little while we do it. ■

¹ Freeport-McMoRan, Third quarter 2014 earnings release.

² Rio Tinto 2013 annual report.

³ A Critical Imperative – Innovation and a Sustainable Future, presentation to World Mining Congress, Montreal, Canada. M. Cutifani. www.angloamerican.com/media/files accessed on Nov. 16, 2014.

SME has come a long way: Society has seen nine consecutive years of growth



by John O. Marsden
2014 SME President

As 2014 comes to a close and we enter 2015, it is a good time to reflect on just how far SME has come in the past decade. The Society is not the same organization that it was 10 years ago and we can be grateful for that – the organization is thriving. In September 2014, SME achieved a ninth consecutive year of operating surplus. This followed nine consecutive years of operating losses between 1996 and 2004, with potentially devastating consequences prior to the turnaround of the organization. Membership of SME hit a low point in 2004 of approximately 11,000 members, but has climbed steadily since that time, reaching more than 15,300 in 2014. This is still well below the high point of 28,000 in 1983, but the trend is firmly in the right direction. The operating surpluses are being put to good use by growing, improving and extending the range of services provided to members, while remaining true to the vision and mission of SME. I would like to recap some of the major accomplishments for you.

During 2014, SME moved forward with the re-design of the website, seeking to make this a more effective and relevant portal for members (and nonmembers) to access SME's products and services. In addition, the implementation of a new management system was advanced, which will make SME more efficient at delivering its products and services. Both of these key infrastructure products are expected to be completed and delivered by the second quarter of 2015.

In 2014, SME paid off its debt. This includes the outright purchase of the new building that houses the SME headquarters in Denver, CO. This is a great accomplishment that will serve SME members well in the future and puts us in a good position for further growth, if this is required at some point.

SME offers a range of products and services, many of which were not available prior to the turnaround. *Mining Engineering* and *Tunneling & Underground Construction* magazines are the premier industry news publications in their sectors and *Minerals & Metallurgical Processing*, edited wonderfully by Komar Kawatra, has increased its citation index above 0.5 (for

those familiar with academic journals, this is a significant and excellent accomplishment).

SME is a leader in mining-related book publications, as a quick look at the publications list will tell you. SME realizes about \$1 million in book sales annually. Perhaps the most significant development is OneMine.org, established by SME in 2008. It provides the most comprehensive online digital library for the minerals industry. This has evolved into a collaborative effort, supported by several professional associations around the world, including AusIMM, SAIMM, DFI and CIM. This contains more than 100,000 books and documents dating from the 1800s to the present day. This is viewed as a major benefit obtained from SME by a significant proportion of our members.

The SME Annual Conference and Expo continues to thrive and grow and has become the premier technical meeting for the industry. The annual meeting set attendance records of 7,202 in Denver in 2013 and 6,722 in Salt Lake City in 2014 (highest at a location outside of Denver).

In 2013 and 2014, under the sage sponsorship of Red Conger and Rick Whiting, along with the efforts of many other volunteers and SME staff members, the SME Foundation was revitalized and re-energized under the banner "Creating Global Prosperity: The Campaign for Mining." A program of corporate sponsorship with focus on year-over-year giving has been advanced, with annual contributions of almost \$1.6 million in 2014. These funds are targeted at supporting the effective implementation of SME Foundation programs including; ABET, Professional Engineer registration, Minerals Education Coalition (MEC), scholarships for study in mineral-relevant programs and tertiary education sustainability (faculty development). It should not go unnoticed that the number of applicants taking the Mining/Mineral Processing PE exam has doubled since 2005. SME is now in the process of implementing a faculty development program for tertiary education, which is a huge step toward ensuring the survival of core mining and mineral processing degrees in the USA.

SME is run by volunteers. The SME Board of Directors and the Foundation Board of

(Continued from page 12)



Permit times could be cut in half; New South Wales premier promises changes to permitting process

NEW SOUTH WALES Premier Mike Baird pledged to speed up the approval process for major infrastructure projects, including mines, by half, *Australian Mining* reported.

During the past six years, the time it takes to have a new mine approved slowed to 1,000 days from 500 days. Speaking at a NSW Minerals Council Awards dinner, Baird said the government needed to make a change.

"I am tonight drawing a line in the sand on this. NSW must do better, and I assure you we will," Baird said. "I commit to halving the assessment times for major projects during the next term of government."

Planning Minister Pru Goward detailed directions to the planning commission, which implements time limits and works to appoint case managers from the premier's department who will manage planning applications.

"The planning minister and I believe these immediate changes alone will deliver time-frame savings of about 170 days for major projects," Baird said.

Baird also spoke out at illegal protestors and said new legislation would "throw the book" at activists who entered mining sites.

The premier said it was

unacceptable that mining companies were responsible for the safety of people who entered their sites illegally.

"For too long protesters have entered mining sites, illegally damaged equipment and disrupted activity and escaped serious penalties.

"What is even more galling for the industry is that current legislation puts the responsibility for the safety of trespassers who enter mining sites illegally on to mining companies and operators.

NSW Minerals Council chief Stephen Galilee said the changes would work to attract investment in the state. ■

Anglo American expects to hit target; Increased production and decreased spending counter lower prices

ANGLO AMERICAN chief executive officer Mark Cutifani said that his company will probably meet earnings targets by increasing production and cutting expenses amid declining commodity prices.

"We have delivered on our major commitments to shareholders," Cutifani said in a statement before the company's investor day conference in London. "We have successfully turned around a number of our priority operations this year, principally in our copper, Kumba Iron Ore and coal businesses."

Seventy-one percent of Anglo's

priority assets are now performing above plans, compared with 21 percent in 2012, Anglo said in the statement.

Cutifani plans to sell assets that fail to meet his goal of increasing the company's return on capital to at least 15 percent by 2016. That includes the sale of four labor-intensive platinum mines in South Africa after a five-month strike that ended in June. He's also seeking buyers for three copper mines and a smelter in Chile, *Bloomberg* reported.

Anglo American, which cut its capital expenditure forecast by a

range of \$500 million to \$800 million for 2014 and \$800 million to \$1 billion in 2015, delivered its Minas-Rio iron-ore project in Brazil about \$400 million under its revised budget, it said.

Anglo American started iron ore shipments from the \$8.8 billion Minas-Rio Mine on Oct. 25. The start of the project, which faced delays and cost overruns since it was bought in 2008, coincides with a slump in iron ore prices as Australian and Brazilian producers expand capacity and demand from China, the biggest user, stalls. ■

President's Page: Share your opinion on the Society

(Continued from page 6)

Trustees are volunteers. These are active and engaged boards that provide strategic guidance to SME's management. The SME strategic and standing committees are manned by volunteers. The SME divisions and program committees are run by

volunteers. The work is executed and managed by paid SME staff (49, Denver-based). All of these individuals do an excellent job of leading, directing, implementing and controlling the programs to deliver products and services to SME members. We owe a huge debt of gratitude to all of the volunteers that

serve SME and to the SME staff. If you have opinions on how you would like to see SME evolve, I would encourage you to take an active role in SME as a volunteer – there are many ways to serve and we would welcome your participation.

I wish you all a happy and healthy 2015. ■

SME's faculty development commitment for core mining programs



by John O. Marsden
2014 SME President

In the March 2014 issue of *Mining Engineering*, I reported on the critical situation with faculty at U.S. universities offering core mining and metallurgical/mineral processing programs. To summarize the situation, by 2018, an estimated 43 percent of current faculty in these programs will have reached or passed retirement age. The pipeline of potential new faculty has slowed to a trickle during the past decade. This is largely due to the inherent opportunity cost of completing a Ph. D., the challenges of achieving tenure and the strong hiring practices of the industry between 2004 and 2013.

In late 2014, the SME Board of Directors and the SME Foundation Trustees approved a plan to provide significant, sustained and impactful funding to support faculty development. The approved plan has two main components, summarized as follows:

SME Ph.D. Fellowship Grants

SME will provide Ph.D. Fellowship Grants in the amount of \$60,000 a year for a maximum of four years. This funding is intended to substantially offset the cost of tuition, fees, living expenses, books and other educational requirements for graduates embarking on a Ph.D. with a long-term view toward an academic career. Initially, up to three such grants will be offered in the first year, ramping up to a maximum of 12 grants by year four of the program, depending on the number of eligible and suitably attractive candidates and funding availability.

SME Career Development Grants

SME will provide Career Development Grants to eligible, qualified and suitably attractive candidates in the amount of \$100,000 a year for a maximum of three years. Initially, two grants will be offered in the first year of the program, ramping up to a maximum of six grants by year three of the program, depending on the availability of acceptable candidates and funding. These grants are intended to bridge the gap between Ph.D. and tenure-track positions at eligible institutions, with the funding to be used for research activities, laboratory equipment,

travel and conference registration, publications, course development and other activities to aid in the facilitation of tenure.

Selection requirements

These programs will have a rigorous candidate identification and selection process, and both programs have been designed with recognition of candidate obligations and accountability. A selection committee comprised of SME and SMEF representatives will oversee the application review, selection, award and funding renewal process. To be eligible to receive Ph.D. Fellowship funding, an applicant must be enrolled in a recognized doctoral degree program with the expressed intention of pursuing a position as a tenure-track assistant or associate professor at a U.S. academic institution with accredited undergraduate degree program(s) in mining engineering or extractive metallurgy/mineral processing after graduation.

For the SME Career Development Grants, potential candidates must be employed or selected to be employed as a full-time, tenure-track faculty member at a U.S. academic institution that offers an accredited degree in mining engineering or extractive metallurgy/mineral processing. In both cases, the universities hosting the candidates must agree to specific administration requirements outlined under the terms of the programs. These requirements and application guidelines are available at www.smenet.org.

The program has been developed and designed by the Education Sustainability Committee, established in late 2013, which was capably and efficiently chaired by professors Hugh Miller and Courtney Young. A number of people served on this committee, and they all deserve recognition and appreciation for their participation and contributions — Greg Adel, Jon Kellar, Kray Luxbacher, Mike Moats, Mary Poulton, Mike Nelson, Rick Honaker, Rick Schweigard and Danny Taylor.

This represents a huge step by SME and its members in seeking to address the faculty crisis and to work toward ensuring a sustainable flow of high-quality graduates and research capability for the U.S. and global mining industry. This is a significant financial commitment by SME and the SME Foundation that could reach up to \$1.6 million a year within four years of initiating

(Continued on page 13)

President's Page: SME is ready to face new challenges

(Continued from page 6)

the program, depending on the availability of suitable candidates and the sustainability of funding. Funding for the program will come from the SME Foundation and from SME operating surplus. At the time it approved the program, the SME Board granted \$500,000 toward the program in 2014. The plan was approved at the year-two funding level (i.e., six Ph.D. Fellowships and four Career grants) for which funds are already secured. A plan to secure the additional gap funding to support the full program for a minimum of seven years is currently under way. A projection prepared by SME staff has established that funding commitments have been obtained that support more than 75 percent of the funding required to establish and maintain the program for the proposed seven-year period.

The implementation of this plan

alone will not ensure the long-term sustainability of tertiary education for our industry. There is still a large gap in research funding and support for research U.S. institutions in mining and extractive metallurgy/mineral processing programs, and steps need to be taken to address this. SME and its members will need to face this challenge in the coming years. Nevertheless, together with the significant scholarship funding currently provided by SME, SMEF and WAAIME, this will go a long way toward our goal (education sustainability), and it will make a strong positive impact on the sustainability of our academic institutions and core mining engineering and extractive metallurgy/mineral processing programs.

The application and selection process for these grant awards will begin in February 2015, with the first awards expected to be made by mid year for the 2015-2016 academic year. Go to www.smenet.org for more information. ■

Greenland: Isua project is important for development of mining sector

(Continued from page 8)

the top of Russia. In 2013, China also became a permanent observer at the Arctic Council, the decision-making body for the region.

For Greenland and its government, the Isua project is an important part of a plan to exploit mineral wealth and secure full independence from Denmark. But there are still doubts over the viability of the project.

London Mining estimated last year that operating costs would be \$45/t (\$40/st) while shipping to China would cost an extra \$37/t (\$33.50/st). Iron ore prices are now only \$70/t (\$63.50/st), however, having halved last year as miners ramped up output and demand from China fell.

Even at higher prices, the Isua project is ambitious, with construction

set to take more than three years.

Although the iron ore reserves there are "beautiful" according to one executive familiar with the deposit, extracting them will be challenging, as they lie under a thick layer of ice.

London Mining had planned to pipe slurry out of the mine, which is made more difficult by the cold.

London Mining fell into administration in October after the tumbling price of iron ore increased the financial pressure on the indebted miner. Operations at its sole mine, in Sierra Leone, were also made more complex by the Ebola virus in the West African country and that mine has now been sold. ■



Follow us on Twitter
@MineEngineering

**Accurate Inventory,
Enhanced Safety!**

3D Scanner for Solids



Eliminate climbing silos and enhance mining safety with automated level measurement. Measure powders, granular or lump materials continuously and accurately. Get real-time data to your computer or mobile device to simplify inventory management.



Real-Time Data

- 3D non-contact technology measures and maps irregular material surfaces
- Performs in high dust environments with minimal maintenance and no air purge
- Highly accurate volume, plus minimum, maximum and average levels
- Optional 3D visualization of silo contents to detect buildup and high spots
- MultiVision software for easy viewing of all silos on a single screen
- Systems for a single silo, single site or corporate-wide inventory management

**Fast, free & friendly
consultations and estimates**



**Understanding
Inventory Accuracy
Free White Paper**

BINMASTER®

LEVEL CONTROLS

402-434-9102

www.binmaster.com

info@binmaster.com

©2015 BinMaster, Lincoln, NE 68507 usa



SME President
Jessica Elzea Kogel
VOL. 65 NO. 3 - VOL. 66 NO. 2

March 2013: VOL. 65 NO. 3

Jessica Elzea Kogel: An Interview with the 2013 SME President.

April 2013: VOL. 65 NO. 4

Advocating for Mining; Conversation Does Not Have to be "us" Versus "them"

May 2013: VOL. 65 NO. 5

SME and Sustainable development; Society Needs to Engage in the Dialogue

June 2013: VOL. 65 NO. 6

Stepping Outside Our Comfort Zone to Bridge the Gap Between Fact and Fiction

July 2013: VOL. 65 NO. 7

A Look At the History of Mining: From the Stone Age to Herbert Hoover

August 2013: VOL. 65 NO. 8

Why Do We Need Mining, Anyway? It's Up To Us To Answer That Question

September 2013: VOL. 65 NO. 9

Mining in Africa; A Catalyst For Economic Development

October 2013: VOL. 65 NO. 10

Milos Island – Promoting mining through Geotourism

November 2013: VOL. 65 NO. 11

December 2013: VOL. 65 NO. 12

January 2014: VOL. 66 NO. 1

February 2014: VOL. 66 NO. 2

Mining engineering

OFFICIAL PUBLICATION OF SME

MARCH 2013
VOL. 65 NO. 3



Jessica Elzea Kogel
2013 SME President

Special Editorial Supplement: **Tunneling & Underground Construction**

www.miningengineeringmagazine.com

Jessica Elzea Kogel:

An interview with the 2013 SME President



What is your personal view and assessment of the overall health of the industry in the current global economy?

The economic outlook remains soft for the near future and, although the global economy is showing signs of recovery, uncertainty has tempered the pace of recovery. In addition to uncertainty, we are still facing significant economic challenges in many parts of the world, including Europe and the United States. The rapid expansion of China's economy has recently slowed, further contributing to the sense of uncertainty in the overall health of the global economy. This situation is both a blessing and a

curse, depending on which sector of the mining industry we are considering. For example, coal, industrial minerals, aggregates, base metal and precious metals markets are impacted by different forces and drivers and will experience different outcomes within the same economic environment.

Let me give a few concrete examples to illustrate this concept. The prevailing economic uncertainty that I have just described tends to drive investors toward safe havens. Gold has historically been viewed as a safe haven and as long as investors shy away from traditional investments, gold prices will remain high and gold mining companies will continue to expand and invest capital in their operations. The same sluggish economy that drives gold prices higher has the opposite effect on other segments of the minerals industry. A great example of this is industrial minerals and aggregates used in construction. The markets that consume these minerals have contracted significantly over the past five years. The outlook for this segment is poor, as the glut of available housing continues to inhibit demand for new construction and, thus, many industrial minerals. In addition to this, the federal government's lack of political will to enact long-term legislation funding transportation and infrastructure projects continues to be a drag on the U.S. aggregates industry.

Now, let's look at it from another perspective. It seems certain that population growth and urbanization in China, India and South America will continue to bolster the mining industry by creating demand for the minerals and metals used in those countries' economic development. These same factors will drive the consumption of manufactured goods that will be in increasingly higher demand as the middle class expands in these developing countries. At the same time, there will be a growing need for more energy to support this global population growth.

Coal will continue to be an important source of low cost energy but, over time, other sources, including natural gas, solar energy, wind energy and nuclear energy, will take a larger share of the global energy market. Although these energy sources will erode coal consumption, they will simultaneously create new markets for other segments of the mining industry. For example, the extraction of natural gas by hydraulic fracturing requires minerals. Sand and ceramic raw materials, such as bauxite and kaolin for the manufacture of high-strength proppants,

are used to “prop” open the shale to liberate the natural gas. Another example is increased demand for high purity silica for the manufacture photovoltaic solar cells.

I believe that, although these energy sources will become increasingly important, coal will continue to provide a significant portion of the world’s energy. However, the regulatory climate, especially in the United States, is making it difficult to sustain the coal industry as we know it today. The growth area for the U.S. coal industry is in the export markets. We must also continue to invest in clean coal technologies to ensure coal’s future in meeting domestic energy needs.

So, you can see that there is not a single answer for how the global economy impacts our industry. This is because of the very nature of the mining industry: all mining commodity markets do not move in lock step with supply and demand cycles. Base and precious metal markets are cyclical by their very nature due to the inherent value and international trading of those commodities. Coal is a global energy source and its supply and demand has other pressure points from an environmental and economic standpoint. Industrial minerals have one foot in the global market and one foot in the domestic market depending on the mineral. Aggregates, on the other hand, are the one mined resource that has both feet more or less firmly planted in the domestic market. Due to high volumes and low cost, aggregates are predominately mined and consumed within 48 km (30 miles) of the mine. So, as you can see, over the array of mining industry commodities and markets, it is difficult to conclude whether the entire market is either “up” or “down.” Overall, I feel optimistic and I think that our industry is diversified both domestically and globally in its products to remain robust and resilient, and can weather most economic storms.

What about the long-term future of the mining industry? Do you see any significant changes on the horizon?

There has been a fundamental shift in the world’s economy, and what I see on the horizon is increased globalization, continued population growth, further expansion of the middle class and continued pressure on and need for resources (energy, land, water, minerals). All of these trends will keep the mining sector strong, so I am optimistic about the long-term future of mining.

What are the challenges and opportunities for the minerals sector?

There are many changes taking place in our industry. Some of these are driving opportunity, while others are creating challenges. One of

the biggest challenges that I see is a shortage of qualified professionals. This is a problem that impacts us all and must be addressed. Another challenge is around competing land uses and shrinking resources. As the global population continues to grow, there will be increasing demand for natural resources. This will lead to more debate around and focus on land use issues and how to develop resources responsibly for maximum benefit to all stakeholders. Finally, I see opportunity for our industry in the area of innovation. Automation, for example, will change how we operate our mines and processing plants. It has the potential to drastically alter the work environment by removing people from unsafe or high-risk situations, thus improving overall health and safety of the workforce. Innovation will also lead to new ways to use minerals, thus fueling the continued growth of the mining industry.

You mentioned that we are facing a shortage of qualified professionals. Please elaborate and tell us how you envision SME helping to solve this problem.

Recently, there have been some very interesting and eye-opening reports regarding impending work force changes in the minerals sector. In summary, we are heading for a significant shortage of qualified professionals in mining and geology. This is because the baby boomer generation is retiring faster than they can be replaced with equally skilled younger workers. But that is only part of the story.

Starting in the 1980s, the industry experienced a severe downturn that led to a concomitant workforce reduction. Once job prospects dried up, fewer students enrolled in mining engineering and related programs. As student enrollment dropped, mining engineering programs were eliminated as well. Between 1982 and 2007, the number of accredited mining engineering programs in the United States dropped from 25 to 12. Similar reductions occurred across the globe. The net effect is that, not only are we on the cusp of significant retirements, but there are essentially no or very few midcareer professionals in the pipeline to replace retiring workers, and there are not enough students graduating to fill entry-level positions. All of this is happening at a time of sustained growth in the industry. Because there are now many high-paying jobs in the industry, students are choosing mining once again and universities are responding by expanding existing or even reopening once shuttered programs. However, due to the global mining boom for metals and energy minerals, many U.S. graduates are being lured by high salaries to work in countries that are experiencing this mining

There has been a fundamental shift in the world’s economy, and what I see on the horizon is increased globalization, continued population growth, further expansion of the middle class and continued pressure on and need for resources.

At a time of stagnant U.S. job growth, SME can also provide information to Congress and the current administration about investing in a growing domestic industry to support a workforce that, although it represents only half of one percent of the total U.S. workforce, it contributes between 10 and 14 percent to the nation's GDP.

renaissance. Thus, the U.S. mining workforce is suffering a disproportionately in comparison to Australia or Canada, for example. This has led to another problem. There is a very limited pool of qualified faculty available for hire.

So, how can SME help? First of all SME provides a mechanism for members representing all stakeholder groups (industry, students, academia) to discuss these issues. Through such dialogue and by working together, solutions can be found. SME can also play a role in future workforce development by offering forums for technical training, professional development, and career enhancement. At a time of stagnant U.S. job growth, SME can also provide information to Congress and the current administration about investing in a growing domestic industry to support a workforce that, although it represents only half of one percent of the total U.S. workforce, it contributes between 10 and 14 percent to the nation's GDP. SME has already started this process by preparing a report for the National Resource Council entitled "Emerging Workforce Trends in the U.S. Mining Industry." This report, distributed to key members of Congress, highlights some risks that are looming.

Another trend is a shift toward more contractors and fewer company employees performing essential tasks – this leads to a whole new set of management challenges and risks. Another is an increasing potential for risks associated with a bimodally distributed work force in terms of age and experience. The work force today is dominated by younger, less experienced workers led by a relatively small, but experienced management team that is nearing retirement. This trend will continue and it means that workers will be expected to take more responsibility earlier in their careers without the benefit of experience and long-term mentoring and skill development. This situation could, if not recognized and managed appropriately, lead to risk in a number of different areas. Two areas that immediately come to mind are health and safety and technology.

Finally, I would like to mention diversity. The labor pool for the future is much different than the labor pool that supplied the industry in the past. The next generation of mining professionals will be more diverse in terms of gender and ethnicity. This opens the door to opportunities as well as challenges. Work/life balance will be an ongoing theme as more women enter the work force, for example. There will be other diversity related issues that crop up as a more diverse pool of mining professionals work across the globe in environments and cultures that may be less inclusive than western cultures, for example.

Sustainable development is becoming an increasingly high-profile topic. Why is it so important and how does it benefit the mining business?

This is a subject that I am very interested in and passionate about. For some SME members, sustainable development (SD) may be a new or unfamiliar concept, especially as it applies to mining. But, in reality, all successful mining companies engage in SD practices on a daily basis. There are many ways to define and describe sustainable development in the context of mining. The products we produce help sustain the local communities in which we operate, as well as the global economy to which we contribute. Another way is to think of SD as an umbrella term that captures the myriad of common sense business practices associated with operating our businesses sustainably. For example, energy and water conservation, carbon footprint reduction, safety, innovation, community relations and employee relations all fall under the umbrella of SD. Of course, sustainable development has many more facets than the simplified version that I have presented. The main thing that I think we need to focus on is that sustainable development is common sense development that allows us to not only sustain but grow our businesses without adversely impacting ecosystems, communities and future generations.

As miners, we are responsible for managing unique and valuable natural resources. We are stewards of the land and must practice responsible decision-making based on SD principals. This is what our communities expect of us, and it is what gives us the social license to operate. So often we are caught up in adversarial situations where the mining industry is viewed by the public and environmental interest groups as irresponsible and insensitive to environmental issues. My experience has been to the contrary. During the almost 25 years that I have been involved in the industry I have worked with numerous individuals and for companies that support and promote a culture of environmental awareness and sensitivity. These companies embrace SD because they understand its importance to their future as well as to their triple bottom line today of environmental stewardship, economic development and social responsibility.

My dream is that someday all stakeholders will come together to make the difficult choices that must be made regarding land use and the use of dwindling natural resources. I think that SME has a huge opportunity to contribute to this international dialogue. Decisions about how to best utilize lands with competing uses must be made based on unbiased technical information,

and SME can provide such information as it pertains to mining and resource development. We need to do all that we can to engage in this process before regulators and special interest groups take ownership of the process. As we know, the outcome in that situation is prescriptive regulations and a perpetuation of the perception that mining companies are not interested in, or capable of, balancing economic development with environmental stewardship. Only by having industry at the table for any discussions of applied environmental stewardship will anything ever be accomplished. Industry has much to offer. Industry has money, manpower and motivation. And industry has the technology to make physical changes to the land/environment in a positive way.

What are your goals as SME President?

SME is in a very strong position. Financially the society has been solidly in the black for eight consecutive years and revenues continue to grow as SME expands its portfolio of member-centered products and services. Our sound financial footing reflects the efforts of leaders who have consistently made long-term decisions for the society that are in alignment with SME's strategic plan. SME is also well positioned in terms of membership, which is the life blood of the society. Total membership has increased, as has membership in several key categories, including international and student members. These member categories are critical for the long-term sustainability of the society.

As president, I plan to follow the same approach that has led us to where we are today. A president serves for only one year and, although a president makes decisions that have immediate impacts on the society, a president must ultimately lead to achieve continuity and alignment with SME's strategic goals. Accordingly, I plan to focus on five key areas:

1. Health and safety
2. Sustainable development
3. Global outreach
4. Communication
5. Diversity and mining workforce development.

Health and safety: Health and safety is at the core of our industry and, consequently, must be a central focus of SME. Several years ago, SME President Nikhil Trivedi established SME's first permanent Health and Safety Committee. This committee is responsible for developing health and safety services and products for the SME membership and for giving a permanent home to our members who are health and safety professionals. The committee has worked hard and

has developed informative and timely technical programs at the SME Annual Meeting and Exhibit, produced successful annual joint health and safety workshops with CIM, and established an award that recognizes individuals for their contribution to health and safety in mining. My goal is to take the base that we have established within this committee and carry it to the next level by developing enough membership and momentum around this critical area to eventually establish a new Health and Safety Division within SME.

Sustainable development: As I have already mentioned, sustainable development (SD) is also taking center stage in our industry as a core value and viable business model for mining. As a matter of fact, most major mining companies have well-established and fully resourced corporate SD programs. Thanks to the hard work of a core group of SME members, the society has had a presence in the SD arena for the past decade. SD has not always been popular, and as a community, we have been slow to fully embrace it. However, SME has recently stepped up its role by providing technical leadership by chairing the World Federation of Engineering Organizations' (WFEO) new international task group on Sustainability and Mining. This task group not only elevates SME's role as a technical leader in sustainable development but also gives SME a global platform and reach in the mining community. As president, I will support SME's continued efforts in this area and actively seek new opportunities to expand SME's technical leadership role in SD.

Global outreach: Global outreach, as I have already alluded to, is key to the growth and sustainability of SME. It is also a key component of SME's Big Audacious Goal to be "recognized internationally as the leading professional mining organization." As our industry continues to globalize, it is increasingly important for SME to "globalize" the member base of the society. This will require creating products and services that meet the needs of our global members and, in fact, we already offer many products and services that meet these needs. They include a broad range of virtual or digital products such as e-books, online webinars, our virtual book store, OneMine.org, social media and e-learning. My goal is to develop a targeted program for the focused recruitment of international members. Through these efforts, we will ensure the long-term viability and relevancy of the organization. Another related goal is to continue building relationships and collaborations with our sister international mining societies to bring additional value to the

As president, I plan to follow the same approach that has led us to where we are today. A president serves for only one year and, although a president makes decisions that have immediate impacts on the society, a president must ultimately lead to achieve continuity and alignment with SME's strategic goals.

global mining community through joint programs and initiatives. By joining forces, we will have a stronger voice and, ultimately, be able to serve our members more effectively.

Communication: Two areas where SME excels, in my opinion, is the delivery of technical content and professional networking. These are valuable services that rely on effective communication. Traditionally, communication has taken place at meetings and through hard copy publications. Today, these products are more commonly delivered digitally through social media or by other online forums. This shift in mode and style of communication gives SME an opportunity to expand outreach beyond the bounds of traditional methods and, at the

same time, provides a much more efficient way to deliver products and services to its members. This is particularly important for interacting with our global members. Content (technical information, society business, etc.) can be sent practically anywhere in the world in real time and at relatively low cost compared to printed and mailed media, for example. Information exchange (blogs, discussion forums, use of Skype, Go-to-Meeting technologies, etc.) facilitate professional networking and information exchange. SME has a plan in place for growing its social networking and online presence. These efforts will continue with an even more urgent focus to harness the benefits and power of social media to advance the society and serve our members. This is clearly a top priority for the society and one that will

Path toward a career in mining began at an early age for SME's 2013 President

As a young child, I was fascinated by fossils, rocks, minerals, mud and anything that had to do with the earth. I recall that I had a strong preference for digging and moving dirt and sand with my brother's Tonka trucks over playing with my dolls. I spent hours building roads, creating vast excavations and constructing subterranean worlds in my sand box, under an enormous pine tree that shaded me from the sun during the long afternoons that I played there. My grandmother introduced me to lapidary, another friend took me fossil hunting along the Delaware Canal and another allowed me to experiment with throwing pots on his potter's wheel. From him I learned strange and fascinating terms such as pugging, grog and grit. I overheard him talking about feldspar, cone equivalents and ball clay. All of these experiences reinforced my interest in earth materials. In retrospect, I suppose that it is no wonder that I found my way into geology and, eventually, mining.

There were other early signs that foreshadowed my career path and eventual chosen field of applied clay mineralogy. I grew up on the banks of the White Clay Creek near a small, but once thriving, clay mining town aptly named Kaolin, PA. Kaolin, located in Chester County, is now known for mushrooms rather than as home to one of the first underground kaolin mines in the United States. Clay was mined from the area during the late 19th and into the early 20th centuries. You

can imagine my delight when, as a 10-year-old, I discovered a small forgotten clay pit behind our barn. There, I dug clay by hand to make small pinch pots and projectiles that came in handy when we attacked the kids on the neighboring farm in mock battles. These hands-on experiences shaped my understanding of clay as a material and contributed to my growing interest in science.

As I matured, I eventually abandoned play and substituted serious study while I made my way through middle school, high school and into college. Amazingly, through this process I forgot about mud and clay and my interest shifted to biology and natural history. Fortunately, as I was signing up for courses freshmen year at Smith College, a friend suggested that I take a geology class. I followed this advice; one thing led to another and, before I knew it, I had a Ph.D. in geology and a job in the mining industry.

Of course, there were many steps between the wonder and excitement of my first geology class and a career in mining. First, there was the academically rigorous and very supportive environment for women science majors at Smith. Without this foundation, I doubt that I would have had the confidence to pursue my dream of becoming a research scientist. This dream led me to U.C. Berkeley. There, I discovered clay minerals while taking a class with Dr. Richard Hay. Armed with a degree in earth science and another in paleontology, I moved to Bloomington, IN to start

require investment of time and money over the next several years.

Diversity and mining workforce development:

The final area that I plan to focus on is diversity and workforce issues. SME has already taken the first step in this direction through the publication of the report that I previously mentioned. The issues have been clearly identified and the next step is to develop targeted solutions that are consistent with SME's mission while providing value to our members and the mining industry as a whole. I plan to work closely with SME's strategic committees to do this.

Do you have any parting comments or observations that you would like to share?

Yes, it is a great honor for me to serve as SME's president. I look forward to working closely with SME staff, the Board of Directors, committees and members-at-large. We are a volunteer organization backed by an amazingly creative and talented staff. It will be a great pleasure to work with staff and our member volunteers who demonstrate their devotion to SME by freely giving their time and energy to the organization. My goal is to do what I can to leave the society in a better position than it was in when I took over. Having said that, I recognize that this goal is a lofty one and certainly one that can't be accomplished without the support and hard work of others. This is a lofty goal because the society currently is strong and on solid footing. So, the challenge will be to take a long-term view and position ourselves for long-term growth. ■

the final phase of my academic training at Indiana University. There, I landed in Dr. Haydn Murray's bustling and exciting clay research labs.

Dr. Murray introduced me to many things. One was applied clay science as an academic discipline. Another was the mining industry as a viable and rewarding career choice. Finally, he introduced me to SME. The introduction was classic Haydn Murray. There were about eight or nine of us studying with him at the time, including masters students, doctoral students and post docs. We all had offices adjoining the clay labs where Dr. Murray would visit us from time to time. One afternoon he came to deliver to each one of us a membership application to SME. He didn't say much, just, "I will pay for each of you to join SME." I looked at the application and I had no idea what SME was but I followed his instructions without question because, by that time, I understood that Haydn Murray could change the course of people's lives and that it would be foolish to not take his advice. I returned the signed application and then about a month later *Mining Engineering* arrived in my mailbox. There on the cover was a full size photograph of the SME President. It was Haydn Murray. I decided then that I should look into SME more carefully and maybe get involved in some way. Soon, I found myself on committees, giving papers, meeting my peers and assimilating into the mining profession. A door had been opened for me and I have never looked back.

My path as a geologist has not always followed a traditional trajectory. It has taken me from the bentonite mines of Wyoming to the kaolin mines of Georgia and Brazil and to many places in between. It has taken me from the Tobacco Root Mountains where I mapped the geology of the

Thrust Belt, to eastern Montana where I collected early Cretaceous fossils along the bottom of coulees cutting through the Hell Creek formation. It has taken me from research and development to operations, where I have worked in product development, process engineering, exploration, mine planning and lands management. Along the way I have received four patents, published approximately 30 technical papers in peer-reviewed journals, authored several books and delivered papers at numerous international conferences. About 10 years into my career I decided to drop back to part-time work so that I could spend more time at home with my children. Fortunately, the company that I worked for supported this change, and I enjoyed the best of both worlds for about four years before returning to work full time. I have been employed by a small consulting company (McCrone Associates), a privately held kaolin company (Thiele Kaolin Co.) and now a large publicly traded industrial minerals mining company with operations across the globe (IMERYS).

As my professional life changed and evolved, I remained committed to SME. SME provides a stable professional base, a sense of constancy and, most importantly, an invaluable source of lifetime relationships with colleagues, mentors and friends. I have chaired numerous SME committees, served on the board of directors twice, helped organize three Dreyer Conferences, and edited the *Industrial Minerals and Rocks, 7th Edition*. I am a Registered Member and a Distinguished Member of SME. Now, almost 30 years after starting down this path, I often feel like I did as a child immersed in play moving dirt, taking clay from the earth, and making it into useful and beautiful objects. ■

Advocating for mining; Conversation does not have to be “us” versus “them”



by Jessica Elzea Kogel
2013 SME President

I have a confession to make — for many years I avoided mentioning that I work for a mining company. It was not for lack of pride in my profession, it was because I wanted to avoid the inevitable silence that often fell over the conversation when I spoke about my chosen path. At the time, I was young and I lacked confidence in my ability to speak passionately and unapologetically about mining and the importance of mining. It embarrasses me to admit that I felt this way, but I imagine that many of us have had to come to terms with working in a field that is often misunderstood, unappreciated and, all too frequently, maligned.

Early in my career, a series of articles about the kaolin industry was published in a respected local newspaper. These articles were the beginning of my journey from silence to advocacy. Much to my surprise they were largely biased; they distorted the facts and presented a one-sided view of the industry. The images accompanying the articles seemed to be deliberately selected to sensationalize. I was deeply disappointed. I was disappointed because the media has the responsibility to inform the public by presenting unbiased and balanced viewpoints of news worthy or controversial topics. Clearly, that was not the case in this particular instance. I was disappointed because I knew that, in the absence of other sources of information, many people form their opinions of our industry based on what they read in newspapers or hear on television. Reading these articles forced me to realize that I had to talk about our industry and to educate the public in whatever way I could.

Once I realized that I needed to become a spokesperson for mining, I discovered that I felt conflicted between mining on one hand and my love of nature, my commitment to conservation and my belief in environmental stewardship on the other hand. These things seemed like polar opposites and that I couldn't simultaneously commit to both ends of the spectrum. I thought that I would have to choose sides and pledge allegiance to one or the other. I was proud of mining, I loved the industry, but I was also equally devoted to preserving resources for future generations. After all, I had grown up

viewing images of a fragile blue earth from space, celebrating the first Earth Day as an elementary school student and witnessing the passage of the Clean Water and Clean Air Acts.

I decided in the end that to be a convincing spokesperson, I needed to speak from my heart and from the perspective of someone who is equally passionate about mining and the environment. I decided not to choose sides but to take the more difficult path of merging them. What I didn't understand at the time is that mining, by its very nature, sits at the point where both ends of this spectrum converge.

Since that time, more than 20 years ago, I have been talking about mining and touching as many people with my message as possible – friends, relatives, school groups, civic organizations and even our local chapter of the Sierra Club. We have a great story to tell, and I am immensely proud of the good environmental and resource management practices that form the foundation of our industry. When I talk about mining I set the stage for an open and honest dialogue by first addressing the impacts that most people are familiar with. Namely, that mining affects ecosystems and communities, as does all human activity, competes with other land uses, can permanently change the landscape and has, on occasion, caused pollution and damage (but not because of corporate irresponsibility and greed, as is so often portrayed in the media). It is also true that mining is essential for sustaining human civilization and population growth, drives economies, can be done in an environmentally sustainable way that can return lands that have long-term worth to the local community.

I have found that when I begin my story by describing how mining will benefit the local community in both the short term (i.e., creating jobs) and in the long term (i.e., creating new water sources, recreation areas, community parks, wildlife habitats, commercial or industrial sites or housing sites) that the audience is willing to listen. I refer to mining as transitional land use. I describe how we lease or buy land to remove a valuable mineral that can help sustain the local community and then restore the land so that it becomes another valuable resource (wildlife habitat, park, forest) for the local community.

I discovered that the conversation does

(Continued on page 17)

Exploration spending to dry up in 2013; Report released at PDAC paints a bleak future in exploration

A NEW STUDY from the SNL Metals Economics Group (SNL MEG) found that the three-year surge in exploration spending in the mining industry will come to a halt this year because of weak metal prices and a sharp fall-off in financing for miners with early-stage exploration projects.

The report, released at the opening of the Prospectors and Developers Association of Canada (PDAC) convention in Toronto warned that persistent uncertainty over global economic growth will crimp the spending flow, especially for early-stage, entrepreneurial explorers that are the industry's lifeblood, *Reuters* reported.

"We expect the pullback in junior budgets to be the main driver of an overall decline in industry spending in 2013," said Jason Goulden, head of metals and mining research for SNL MEG.

Reuters reported that Goulden declined to speculate on the size of the anticipated pullback. Still, he noted that juniors typically account for roughly 40 percent of global exploration spending annually.

This year, stagnant metal prices coupled with many multi-billion dollar asset writedowns by some of the world's largest precious and base metal miners have panicked investors. And many are now shunning the sector entirely.

"A lot of investors are just shying completely away from the resource sector and the appetite for risk is

almost nonexistent at this point," said Daryl Hodges, chief executive of Jennings Capital, an independent Canadian investment dealer.

The study, issued in partnership with PDAC, notes that juniors that own really exceptional projects will be able to finance sizable exploration programs, while those with smaller or earlier-stage assets will struggle to attract investment.

The SNL MEG World Exploration Trends report does not bode very well for companies such as Boart Longyear Ltd and Major Drilling Group International Inc - the world's largest metal and mineral exploration drilling companies. Shares of both companies have fallen roughly 10 percent so far this year.

Goulden told *Reuters* that he expected the coming decline in exploration spending to result in lower drilling activity for all metals.

"That said, we do expect gold and copper to continue to account for the largest share of overall exploration spending, so drilling targeting these commodities should hold up better than some others," he said.

Exploration spending rose steadily between 2002 and 2008 on the back of rising demand from emerging economies and a surge in metal prices. The extended boom came to an abrupt end in late 2008 and early 2009, as the impact of the U.S. housing market collapse and financial crisis rippled across the globe.

"We expect the pullback in junior budgets to be the main driver of an overall decline in industry spending in 2013."

Jason Goulden, head of metals and mining research for SNL MEG

Since bottoming in 2009, spending has bounced back strongly and, despite pullbacks in recent months, metal prices over the last two years have remained well above historical levels.

The SNL MEG study, which focuses on nonferrous exploration, found that spending reached an all-time high of \$20.5 billion in 2012. Including estimates for budgets it could not obtain, the group estimates that spending jumped to \$21.5 billion in the year, up from about \$18.2 billion a year ago.

The study pegs iron ore exploration spending in 2012 at \$2.9 billion, up from about \$1.8 billion, a year earlier. The SNL MEG report is based on information collected from about 3,500 mining and exploration companies worldwide.

Exploration allocations for all regions increased to record highs in 2012, according to the report, led in dollar terms, by the largest increases in Latin America and Africa. Latin America remained the most popular exploration destination, attracting 25 percent of global spending in 2012. ■

Kogel: Mining's message needs to get out

(Continued from page 8)

not have to be "us" versus "them." The conversation needs to be about how we, as a society, are going to make intelligent, long-term choices based on science, engineering and unbiased information. I talk about all of the good things that our industry does –

our successes, our commitment to our communities, the significant resources that we devote to environmental rehabilitation during and after mining, our safety programs and the integrity of mining professionals. Almost every one of these conversations ends on a positive note. Not everyone becomes an immediate supporter of mining, but

I like to think that I have paved the way for a change in attitude toward mining or at least a different view of mining. These experiences have taught me that simply by sharing my passion and by telling the story of our industry, each of us can make a difference in how the public views mining. ■

SME and sustainable development; Society needs to engage in the dialogue



by Jessica Elzea Kogel
2013 SME President

During my year as SME president, I plan to focus on five areas. One of them is sustainable development (SD). There are many reasons why the time is right for SME to take a strong leadership position in SD, and I invite you to read an article on this topic published in this issue of *Mining Engineering* (page 54). The article traces SME's evolving role in the dialogue on sustainability and highlights the contributions that SME has made to promote sustainable development practices based on sound engineering and unbiased technical information.

So why is it so important that we engage in this dialogue on SD now?

The short answer is that the mining industry is facing the challenge of economically extracting minerals in an increasingly resource-constrained world. At the same time, the industry must operate in an increasingly complex social environment that requires consideration of local, as well as global, impacts. Furthermore, to preserve its social license to mine, the industry must strive to meet the highest possible standards for making transparent and ethical decisions with a view toward future generations. The bottom line is that success in today's business environment requires highly skilled professionals armed with credible and unbiased technical knowledge, and this is where SME comes in.

One of our missions as an organization is to disseminate technical information. We do this to support individual SME members (i.e. for professional development), and we also do this to support our industry. I can't think of a better way for SME to support the industry than to lead the way in discussions around SD practices and principles for our industry. Through this process, we have a tremendous opportunity to leverage what we do best and to make a lasting positive impact. There is another compelling reason for SME to take a leadership role in SD. If we don't take a seat at the table, there is a risk that other stakeholders (i.e., NGOs, local communities, governments) will make decisions that impact the industry. Without SME's presence and leadership in these global discussions, decisions will be made based on

partial or biased information.

SME also has an opportunity to lead the way by opening the SD conversation to all interested stakeholders. This means that we must be willing to engage in an honest, two-way dialogue to build trust and to cultivate relationships across stakeholder groups. We have an opportunity to redirect the public's impression of the mining industry today to one that embraces environmental stewardship and the industry's contributions to sustainable development. To that end, I recently saw a very good example of this type of relationship-building at the recent PDAC meeting in Toronto, where a very well organized three-day symposium on corporate social responsibility was held. What impressed me most about this event were two sessions in particular. One was *The Business Case for Biodiversity and Ecosystem Services* organized by the Wildlife Conservation Society of Canada and the other was the CEO panel *Mining's Contribution to Sustainable Development*.

The first session was standing room only and demonstrated that NGOs and the mining industry can successfully work together to solve environmental problems using science-based approaches. The moderated CEO panel discussion provided an open forum for honest exchange about the issues and challenges facing mining. The session was open and free to the public. Several members of the public used this platform as an opportunity to voice their opinions about, and frustrations with, the mining industry. The questions from the floor were passionate and some were angry. Although the situation was uncomfortable for both the panelists and the audience, it was handled well by the organizers, and I realized that this is part of the process of earning public respect and credibility. As I walked out of the session, it was clear to me that we are making progress in terms of building relationships; however, there is still much work to do. It was also clear to me that our industry is made up of highly talented and caring people who want to do the right thing for their businesses, communities and future generations. I am optimistic that the global mining community will meet this challenge, and I am confident that SME can add significant value in helping to achieve that goal. ■

Stepping outside our comfort zone to bridge the gap between fact and fiction



by Jessica Elzea Kogel
2013 SME President

Over the past two years SME has diligently worked to develop a presence in Washington, D.C. The primary goal of this effort is to stay in front of national as well as international issues that affect the mining industry and to promote SME as a nonpartisan resource for science-based technical information about mining and minerals. Through this process SME has earned a positive reputation and has established strong relationships with Hill staff, members of Congress, mining trade associations, geological societies, engineering organizations and other scientific groups such as the National Research Council. The

idea is to partner with these organizations to support, as well as advance, our industry.

During a recent trip to Washington, D.C. with SME Executive Director Dave Kanagy and John Hayden, SME Deputy Executive Director Government Relations & Public Affairs, we took this partnering concept in a

new direction by stepping beyond our normal networking borders to reach out to various national and international conservation groups. Three groups met with

us, including Conservation International, World Wildlife Fund and the Wildlife Habitat Council. All three organizations gave us several hours of their time and we had positive, open and informative discussions aimed at identifying common ground where we can work together to support our mutual goals. We discussed many cross-cutting topics including social license to operate, the importance of science-based solutions, the business case for environmental stewardship, and the role that SME can play in advancing our mutual goals.

We all learned something from the experience. On our side we learned that these groups already have longstanding working relationships with several major mining companies who have engaged with them to establish corporate sustainable development programs. We also learned that these conservation groups, like SME, take a science-based approach to their mission. Each group pursues this mission in different ways. These include: developing global best practices and standards; partnering with companies to create locally based grass roots restoration projects; providing ecosystem assessments, and offering certification programs to promote wildlife habitat conservation on corporate lands.

From us, they learned that our industry is committed to operating responsibly and within a framework of sound and reasonable environmental stewardship principles. They learned that our industry is built on a foundation of robust engineering practices, technical competence and innovation. They learned that SME has a diverse and broad membership of experts representing all sectors of the mining industry. They learned that SME is an organization that is committed to bridging the gaps between rhetoric and fact and opinion and science.

We all learned that it can be uncomfortable to open dialogues such as these and that relationships between the groups will require building trust and chipping away at long-held misconceptions. This has to be done on both sides. We agreed that by working together there is a much higher probability of bridging the knowledge gap and finding solutions that are credible, technically solid, economically achievable, and — most importantly — informed by the science and engineering principles that each group brings to the table. We are the mining experts. They are the conservation and biodiversity experts. Together, we must take these first tentative steps down the path towards collaboration and use them to craft a bold vision for the future of our industry as a leader in resource stewardship. ■

We agreed that by working together there is a much higher probability of bridging the knowledge gap and finding solutions that are credible, technically solid, economically achievable, and — most importantly — informed by the science and engineering principles that each group brings to the table.

A look at the history of mining: From the Stone Age to Herbert Hoover



by Jessica Elzea Kogel
2013 SME President

Mankind has engaged in the extraction of minerals and metals throughout human history. Our first exposure to this idea is as elementary school children when we learn that human cultural history is divided into three distinct periods: the Stone Age, the Bronze Age and the Iron Age. We are taught that these periods reflect technological advancements related to the discovery and manipulation of earth materials and their impact on human civilization. The lesson is clear; human culture is bound to the availability of minerals and metals, and our prehistoric ancestors depended on mining just as we do today.

It all began simply enough. During the Stone Age, humans fashioned tools from a variety of rocks, including flint, chert, basalt and sandstone. These materials were initially collected as loose rocks and, as demand grew, openpit and underground mining methods were developed. Several of these prehistoric mine sites are still in existence today. The Neolithic flint mines near Mons, Belgium are one of the most extensive and earliest examples of large scale mining (covering an area of about 100 ha or 250 acres). This site is also of interest because it shows the transition from openpit to underground shaft mining. Several other notable Neolithic flint mines in Europe are Grimes Graves and Cissbury in Britain.

Initially, early humans were motivated to mine for survival. They focused their efforts on manufacturing utilitarian objects such as tools, hunting implements and storage vessels. Eventually, as they became more skilled at survival (partially because of efficiencies gained by using tools), they turned their attention to using earth materials for uniquely human endeavors, such as adornment, art, spiritual practices and ritual.

At some point, and it is difficult to imagine how or why it happened, early humans discovered that certain minerals can be used to make paint. From natural pigments, such as manganese oxide, hematite and goethite, early artists created life-like images of bison, deer, mammoth and other Paleolithic animals. Some of the best preserved paintings from this age are found on cave walls deep beneath the Pyrenees.

These paintings are quite sophisticated in terms of composition, perspective, color, depiction of movement and the use of carefully nuanced light and shadow. Herds of pronged antelope-like creatures gallop in full stride across uneven cave wall surfaces toward an unknown destination. Bears, lions, panthers and hyenas are also captured in expertly rendered images that offer a glimpse into an unfamiliar and mysterious prehistoric world.

What compelled these artists to dig minerals out of the ground, grind them to fine powders, mix them with various binders (animal fat, saliva, water, blood) and apply them to cave walls hidden from view is unknown. Perhaps it was for purely narrative reasons or perhaps there was a mystical or ritualistic motive. The cave painters prized the strong colors derived from ochre minerals and historians believe that they travelled long distances to secure a reliable supply of earth pigments. In fact, wherever cave paintings have been discovered there are usually ochre deposits in the region. These, along with the first flint deposits, are believed to be some of the earliest sites of historical mining activity.

The Stone Age eventually gave way to the Bronze Age when early man discovered the technique of smelting. During this period, the knowledge and skills necessary to work metal and ore deposits were developed. Theories about the origin of ore deposits began emerging at this time, as well. The earliest theories were proposed by Greek and Roman philosophers and were informed by a world view based on myth, superstition and religious beliefs. Scientific observation was not yet part of the human experience, so the earliest theories tended to be based on fantasy and imagination. For example, these ancient philosophers proposed that the earth was a living organism and that ore genesis was the result of metallic exhalations due to metabolic processes. Other versions of the "living" earth proposed that ore deposits grew from seeds within the earth or that the ores were part of a vast subterranean tree system with roots that extended into the center of the earth.

Now fast-forward to the 16th century. By then alchemists believed that celestial influences such as the sun and planets generated ore deposits. Georgius Agricola, a German scholar, rejected this view and wrote *De Re Metallica*

(Continued on page 18)



Two Peabody mines reach safety mark; Pair of mines hit one million hours without a lost time incident

PEABODY ENERGY announced that employees at two of its mines, the Bear Run Mine in Sullivan County, IN and the Kayenta Mine in Navajo County, AZ, have each reached the safety milestone of one million hours without a reportable or lost-time injury.

The Bear Run Mine's year-to-date 0.0 incidence rate compares to a 3.17 incidence rate per 200,000 hours worked among U.S. mines, based on the latest data.

"I'm proud of the Bear Run team for their tremendous industry leadership in safety," said Peabody President – Americas Kemal Williamson. "Safety is a core value, part of our mission and a way of life for all of us at Peabody."

The Bear Run Mine is the largest surface mine in the eastern United

States and shipped 7 Mt (7.7 million st) of coal in 2012. The mine serves industrial facilities and customers that provide power for millions of residents in northern, central and southern Indiana, as well as electric co-ops and utilities far beyond the region.

The Kayenta Mine's year-to-date 0.47 incidence rate is 85 percent lower than the average U.S. incidence rate per 200,000 hours worked, based on the latest data.

"Kayenta's results reflect an intense safety culture that is part of Peabody's mission," Williamson said. "These results demonstrate our continued focus on teamwork, training, communications and best practice. I'm proud of our team for working toward our safety vision of achieving zero incidents of any kind."

The Kayenta Mine, has a history of excellence in safety. The mine has achieved more than one million hours without a

reportable incident four separate times.

The Kayenta Mine shipped 6.8 Mt (7.5 million st) of coal to the Navajo Generating Station near Page, AZ this past year. Approximately 98 percent of the mine workforce is Native American, and mining operations annually inject more than \$115 million in direct benefits to tribal economies. The mine also annually contributes \$1.3 million in tax revenues to reservation schools.

This past year was the safest in Peabody Energy's history. The company delivered a 1.82 safety rate per 200,000 hours worked, a 9-percent improvement from 2011 levels. Through first quarter, seven Peabody operations in the Americas platform operated without a reportable incident.

Peabody Energy is the world's largest private-sector coal company and a global leader in sustainable mining and clean coal solutions. The company serves metallurgical and thermal coal customers in more than 25 countries on six continents. ■



NanoSteel® Overlay Wear Plate Offers Significant Performance Improvement

- 400%+ More Wear Life
- Fewer Change Outs

Exceptional Resistance to Severe Sliding Abrasion

- Has demonstrated 400%+ longer life than 500 Brinell Q&T plate
- Productivity gains can contribute substantially to your bottom line
- Better price/performance ratio

NanoSteel® Plate Specs 66 - 71 HRC Sizes up to 10' x 20'

NanoSteel® overlay wear plate is fabricated by a process developed by Trimay® Wear Plate Ltd. using technology under license from The NanoSteel® Company.

Connect info@NanoSteelco.com • www.NanoSteelco.com • Toll Free 1-877-293-6266

Follow #NanoSteelCo the-nanosteel-company NanoSteelChannel

Kogel: Mining's history is rich as is SME's

(Continued from page 6)

in 1530, which laid the groundwork for modern theories of ore deposition. This important work was not widely read until 1912, when it was translated from Latin into English by Herbert Hoover and his wife, Lou Henry Hoover, who was a geologist and Latin scholar.

Herbert Hoover was not only the president of the United States, but he was also the 1920 president of AIME. So, by tracing the history of mining from prehistoric times to the 20th century, we arrive at SME's doorstep through AIME. This endpoint to a journey spanning human history is a testament to the importance of minerals as a foundation of human culture. It is also a testament to the longevity and relevance of SME as an organization serving the mining profession. Mining will continue to support human culture as it evolves by providing the raw materials needed for technological advancement. Today, however, most people do not recognize the importance of minerals as our early ancestors intuitively did. ■

Why do we need mining, anyway?

It's up to us to answer that question



by Jessica Elzea Kogel
2013 SME President

“Why do we need mining, anyway?” At first I didn’t hear the question because I was lost in my own thoughts as we strolled through the narrow and winding streets of Siena, one of the most beautiful medieval cities in Italy. It was early afternoon and most businesses were shuttered against the midday heat. Sounds of animated conversation punctuated by the clink of silverware against china echoed from tiny restaurants and I suddenly wanted to sit down in one of these places. I wanted to sit so that I could give the question thoughtful consideration and answer it slowly and with detail.

Instead I said, “So that we can have everything that you see around you.” I wasn’t sure how my answer had landed, so I decided to continue. “And so that you can drive a car, use your iPhone to navigate around the city and experience the rich art work housed in the museums that we have been visiting.” I paused and allowed time for some sort of reaction. Nothing. I decided to take it a little further. “Without mining, there would be no pigment for paint, marble for sculpture, or gypsum for frescoes. Imagine Siena without the Duomo, the Piazza del Campo and the works by Duccio and other Siennese masters.” I paused, and then I decided to conclude with a deliberately provocative statement. “I would even go so far as to say that without mining, art would not exist as we know it today.” That seemed to produce a reaction, a slight quickening of my friends pace, a subtle shift in stance as if to say “wait a minute, I see your point.” Instead, she said with utmost confidence and sincerity, “Eventually, we will have the technology to synthesize these things and we will no longer need to mine them.”

At that moment I realized how little most people, even those who are highly educated, know about where things come from. I recall a similar experience with another friend who questioned the need for aggregate quarries and her amazement to learn that roads are made from crushed stone. The idea that everything is ultimately derived from the earth (if it can’t be grown, it has to be mined) is foreign to many people. This demonstrates a deep disconnect between reality and the public’s understanding of minerals and mining. I believe that part of the reason for this is our educational system. Most students are only briefly exposed

to earth science in elementary and middle school. And mining, if mentioned at all, is most often presented in a negative light. By the time students reach high school, earth science is not typically part of the curriculum. More often than not, knowledge of mining is gained through the media and the Internet. The movie *Avatar* is an excellent example of how popular culture shapes our view of mining. Unfortunately, these sources (including *Avatar*) bombard us with images and messages that often tell a tale of environmental abuse, deliberate violations of safety standards, corporate deception and corporate greed. These are difficult images and messages to overcome and it is easy to understand why the public perception of mining tends to be negative.

Education and outreach are key avenues for creating a more balanced viewpoint of mining, and SME has strong programs in these areas. One program that is particularly successful is the Minerals Education Coalition (MEC) program (formerly the GEM and Mii programs). MEC’s vision is to help “create an enlightened and supportive public that appreciates the importance of mining and minerals to their lives and lifestyles.” The MEC accomplishes this through the distribution of unbiased information. MEC provides educational materials, including popular products such as the periodic table and the baby poster. MEC also writes curricula and prepares smart board lessons that teachers can use in their classrooms. I can personally attest to the success of this program. Last fall, I had the opportunity to attend the National Science Teachers Association Meeting in Atlanta, GA, where the Georgia Section of SME and MEC handed out rock and mineral samples to several thousand eager science teachers who were very excited about and appreciative of the samples.

This grassroots outreach is core to what SME is all about. Let’s harness the natural enthusiasm and fascination that kids have about rocks and minerals and make sure that they know where roads, houses and computers come from. Through these initiatives, SME can lead change in the public’s perception and understanding of mining. This is a start, a first step toward an enlightened and supportive public. The next step is for the mining industry to harness the momentum of social change and use it to reinforce a positive image of the industry through responsible corporate citizenship. Through these efforts, we can build a strong future for mining. ■

Mining in Africa

A catalyst for economic development



by Jessica Elzea Kogel
2013 SME President

Africa hosts approximately 40 percent of the world's untapped mineral reserves and is a major global supplier of gold (20 percent), copper (8 percent), iron ore (4 percent) and bauxite (8 percent). The estimated value of these minerals is on the order of trillions of dollars, and bilateral trade between Africa and China alone is expected to exceed \$200 billion this year. But, despite the huge mineral wealth under the African soil, many African countries are locked in a vicious cycle of poverty, conflict and corruption. The statistics are sobering, and the solution is complex.

At least one highly respected economist believes that mining offers a way forward. In fact, Paul Collier, who authored *The Bottom Billion*, a best seller about global poverty, believes that wealth generated from minerals provides a more permanent solution to economic disparity than foreign aid. However, to avoid the "resource curse" that so often befalls poor nations with mineral resources, government policies that promote "transparent, equitable and optimal exploitation of mineral resources to underpin broad-based sustainable growth and socio-economic development" must be in place. The Africa Mining Vision, adopted by African heads of state in 2009, is intended for this purpose.

Recently, I traveled to London to attend Mining on Top Africa: Sharing the Commodity Boom, to learn more about the current state of mining in Africa. The summit was organized around two primary themes — attracting investment to Africa and sustainable mining in Africa. Delegates representing the mining industry, non governmental organizations, financial institutions, governments and various service providers debated these topics in panel presentations and round-table discussions that provided a format for open exchange.

The first day began with ministers from Cameroon, Ghana, Kenya, Rwanda, South Sudan and Zambia giving overviews of the minerals, infrastructure, business environment and political situation in each of their countries. They described the tremendous potential mineral wealth in Africa, as well as the opportunity for

investing in world-class deposits at all stages of development. A common theme was the desire to develop mineral resources in a sustainable way that creates long-term benefits for communities and provides a catalyst for all types of economic development. As the ministers spoke, it also became clear that each country has its own evolving social dynamics and that each is unique in terms of government policies, quality of infrastructure and economic stability. They also highlighted how communities are expecting transparency, as well as direct economic benefit from their mineral resources.

The conversation then shifted toward the hard reality that none of this can happen unless companies are profitable. Risks, such as corruption, high capital costs, political instability and challenges of doing business in Africa, such as lack of infrastructure and resource nationalism, were raised. Several industry leaders stated that the only way to be profitable for the long term is by integrating sustainable development principles into the business operations. Several case studies demonstrating the industry's commitment to operating within the context of sustainable development and ethical business practices were presented. For example, deBeers spoke about conflict diamonds and the industry driven Diamond Development Initiative. Other companies shared their experiences with long-term capacity building and investment in local communities through infrastructure projects (roads, hospitals, power).

During the summit, many perspectives of the issues around mining in Africa were frankly and intelligently laid out. It was remarkable to see a group of people who are passionate about their respective and sometimes divergent points of view come together to solve the wide ranging social, environmental and economic challenges that often arise around mining operations. The summit provided a neutral environment for tackling these important issues. The discussions were serious and collaborative, and delegates came away with a better appreciation for all points of view. Africa is shaping up to be the next mining power house, and there is huge opportunity for local communities, national governments and private industry to work together to create a win-win situation for all. ■

Milos Island — Promoting mining through Geotourism



by Jessica Elzea Kogel
2013 SME President

Recently, I visited the beautiful Greek island of Milos, which is typical of the Cyclades with its relaxed atmosphere, sun-drenched landscape and white-washed homes set against the clear blue Aegean Sea. Before traveling to Milos, I researched the island's attractions using various online resources and guidebooks. Two key aspects of the island were consistently mentioned. One is that Milos is where the famous Venus de Milo, now displayed in the Louvre, was found by a farmer in his field. The other is that Milos has been "scarred" and "ruined" by quarrying that started in the Neolithic Age and continues today.

Despite the guidebook warnings, tourists come to this mostly unspoiled island to enjoy the beaches, explore ancient ruins and experience the unique volcanic landscape that lends the island a dramatic, other-worldly quality. Recently, the island has also been attracting geotourists. This type of tourism is relatively new to Milos and was conceived by government authorities and industry leaders as a way to grow the local economy by simultaneously developing tourism and mining as mutually supportive activities. It is a bold and progressive idea and one that recognizes the unique situation on Milos, where mining and natural beauty coexist in a fascinating outdoor geological museum.

The Miloterranean Geo Experience was born from this initiative and offers visitors many ways to explore the island's rich natural, cultural and mining histories. One that particularly appealed to me is a series of seven Geo Walks linking significant mine, archeological and geological sites through a network of well-marked goat paths and roads that traverse the island. These walks have intriguing names, such as Sulfur Mines and Volcano. High-quality fold out maps are available for each walk, and they are designed so that visitors can take advantage of all that Milos has to offer: spectacular views, small scenic villages with taverns selling cold drinks and secluded beaches for refreshing swims. Armed with these maps, I can easily imagine spending a week exploring the island's many treasures, including early-Christian catacombs, ancient Roman theaters, historic mining sites and small fishing villages tucked into coves.

For anyone desiring an indoor experience, there is a well-designed mining museum that offers clear and informative displays on the technical, as well as social, aspects of mining on Milos. Particularly moving are videotaped interviews of mine workers telling the human side of the story in a way that is open and honest. The workers' words, coupled with their deeply lined faces, express pride, hardship and longing for a life imbedded in the rhythms of the miner's daily physical labors. The stories are compelling and authentic. The museum also traces the mining history of Milos from the Neolithic Age to modern times, starting with the extraction of obsidian and continuing with sulfur, kaolin, pumice, bentonite, barite, perlite, lead and manganese.

In keeping with the concept of proudly promoting mining as a tourist attraction, the museum sells glossy full-color postcards of a beautiful and impressively large bentonite mine. The image proves that mines can be viewed as aesthetically pleasing feats of engineering that are as awe-inspiring as many natural sites. It also raises the possibility that it may not be too far-fetched to consider some of the world's grand scale mines on par with ancient engineering wonders, such as the Great Pyramids of Egypt, the Great Wall of China and the unparalleled Incan architectural achievement of Machu Picchu.

It is fitting that Milos hosted the 6th International Conference on Sustainable Development in the Minerals Industry in June. I can't think of a better place to discuss the public's perception of the environmental and social consequences of mining than in Milos, which provides a natural laboratory for probing these issues through real world examples. The island's mining heritage is directly linked to its strong economy. Today, mining accounts for 40 percent and tourism accounts for 55 percent of its domestic product. Wealth created from mining activity has fueled the island's economy throughout much of its history. Ruins of significant monuments built on this mineral wealth and left behind by thriving ancient civilizations sustain today's tourism industry. Milos is engaged in an experiment. We will know that the experiment has succeeded when the guidebooks recommend a visit to Milos to explore its fascinating 6,000 + year history of continuous mining. ■

A story of opposition: What the Pebble Project can learn from the Trans-Alaska Pipeline



by Jessica Elzea Kogel
2013 SME President

On a recent visit to Alaska, I had the opportunity to tour the Trans-Alaska Pipeline System (TAPS) and the Pebble Project. I couldn't help but notice that the story of TAPS reads like the story of Pebble, which is unfolding almost 40 years after the first oil flowed through the pipeline. Like Pebble, the pipeline, in its early days, was highly controversial, and public opposition was strong. So what are the similarities between these two projects, and what can we learn from a retrospective view of the pipeline?

Chapter 1: Discovery

In 1968, oil was struck in Prudhoe Bay in what proved to be the largest oil field ever discovered in North America. The remote North Slope location presented many challenges. One of the first was finding a way to deliver the oil to market. A pipeline was proposed as the most economically efficient and environmentally sound way to safely transport the oil across Alaska to Valdez Bay.

Fast forward 20 years to the discovery of another world-class deposit. In 1986, a bush pilot led geologists to a remote place in southwest Alaska where the only sign that something unique lay below the surface was a small, nondescript pile of brown pebbles. This seemingly inconsequential patch of ground on top of a low-lying hummock became the namesake for one of the largest known porphyry copper deposits in the world. Like the Prudhoe Bay oilfield, it is located in a remote and undeveloped region of Alaska. Also like Prudhoe Bay, there are challenges around transporting the ore across sensitive wilderness areas.

Chapter 2: Opposition

In the mid-1970s, Alaska was considered the last great American wilderness. Conservation groups believed that the pipeline would lead to unrecoverable loss of wildlife habitat, disruption of caribou migration paths and degradation of environmentally fragile areas of the Arctic region. Local native populations were opposed to the pipeline because it crossed ancestral hunting and fishing grounds.

There were technical concerns as well. A major concern voiced by the opposition was that the pipeline would not withstand earthquakes

or the region's arctic temperatures. Permafrost required portions of the pipeline to be built above ground. There was fear that hot oil passing through it had the potential to melt the permafrost and destabilize the pipeline.

Similar arguments are used against Pebble today. The deposit is located in an environmentally unique and sensitive area that feeds two watersheds, borders several national and state parks, as well as a wildlife refuge. Because of its proximity to Bristol Bay, one of the most popular sport and commercial salmon fisheries in North America, the project is controversial and there is a well-funded opposition movement that has molded public opinion through television ads and other media avenues. Another major point of concern is the large tailings dam planned for the site. The opposition questions the ability of the tailings dam to withstand the region's seismic activity.

Chapter 3: Delays

The construction of TAPS was delayed for years by court orders and congressional hearings. The passage of the National Environmental Policy Act (NEPA) provided a mechanism for stopping the project. This is similar to today's situation with Pebble and the U.S. Environmental Protection Agency's (EPA) threat of a pre-emptive veto. While the TAPS project was stalled, environmental studies and engineering designs were completed. Eventually, the project was given the green light. The path was paved when the Arab Oil Embargo threatened the U.S. oil supply and energy independence became a high priority.

Environmental groups used the NEPA to fight the pipeline and, although an environmental impact statement (EIS) was completed for the pipeline as required by NEPA, the opposition claimed that the EIS was not adequate. This was the first strategy used to legally challenge the pipeline. It set a precedent for how environmental groups today mount opposition through coordinated media campaigns, legal cases and lobbying. NEPA became a mechanism for constraining development. A similar strategy is being used today to slow the Pebble Project and the strategy appears to be working. Anglo American recently withdrew from the project. Chief executive officer Mark Cutifani cited

(Continued on page 22)



President's Page: Pebble project following familiar path

(Continued from page 6)

delays as one of the drivers for this move. "Despite our belief that Pebble is a deposit of rare magnitude and quality, we have taken the decision to withdraw following a thorough assessment of Anglo American's extensive pipeline of long-dated project options."

Chapter 4: 35 years of operation

A total of more than 16 billion barrels of oil have been pumped through the pipeline and significant wealth has been generated for the state of Alaska, including a permanent fund that today is worth more than \$40 billion. There has only been one major oil spill, the *Exxon Valdez*, which was not directly related to the pipeline itself. There have been several minor spills associated with maintenance problems, human error and vandalism, but none of these has caused significant or long-term damage.

To the contrary, decades of operations data show that the effects of the pipeline on the physical environment, including air, water and ecosystems, are relatively minor. Caribou populations for the two herds affected by TAPS have increased. There are no endangered or threatened

plants or mammals along the pipeline corridor. Because of this positive environmental record, the TAPS right of way was renewed in 2004 for another 30 years of operation.

There have been no negative social consequences, either. This is largely because local indigenous populations renounced their claims to the land along the pipeline corridor in exchange for \$960 million and 60 Mha (148 million acres) of land. Similarly, the technical concerns proved unfounded, largely due to innovative engineering design, which was put to the test in 2002 when a massive 7.9 Richter scale earthquake shook Alaska. The pipeline held and functioned as designed. A true feat of engineering.

Chapter 5: A success story

Overall, the project has been an economic and environmental success, and the concerns raised by the opposition have not been realized. Instead, according to a University of Michigan study, the Alaska pipeline "is a model for sustainable development. It was designed with economic efficiency as well as environmental safety in mind." With the help of sound engineering and good management practices, the pipeline has operated

almost flawlessly. The same principles can, and will, be applied to Pebble.

Personally, I find it reassuring that high-risk projects such as TAPS and Pebble undergo scrutiny. Opposition is a necessary part of the process and ensures that all stakeholders have a voice in critical decisions. It also ensures that proper consideration is given to a broad range of social, economic and environmental issues. However, high cost, excessively long legal delays and fear-based public opinion are platforms for building adversarial rather than collaborative relationships.

These projects are on perpetual trial, and that is the social environment in which the extractive industries operate. Decisions for technical projects are not based on pure black and white science and fact. Instead, they are debated within a complex web of opinion and emotion, and this debate usually takes place within the legal system. It is an imperfect process and one that must be improved for the benefit of the industry as well as the public. Despite the delays, projects that are well designed, technically credible and beneficial for society will eventually be given the green light. Pebble will too. It is simply a matter of time. ■

Is there something *missing* from your water treatment toolkit?



American Peat Technology LLC
36203 350th Ave. Aitkin MN, 56431
218.927.7888
info@americanpeattech.com
www.AmericanPeatTech.com



APT[®]sorb
sorption media
may be the *solution*
you're
looking for.

APT[®]sorb is a porous granular media effective in the adsorption of dissolved heavy metals. The patent-pending thermal and chemical treatment processes have been in development since 2004. These processes produce an active media with increased cationic capacity. APT[®]sorb has high granular strength allowing for increased hydraulic loading. APT[®]sorb performs well in standard sand filter equipment, as well as engineered systems.

APT[®]sorb works to adsorb many dissolved heavy metals such as:
Cu, Ni, Pb, Cd, Cr, Zn, Al, Co, and Mn

APT[®]sorb may be the solution you are missing in your toolkit of water treatment solutions.

Contact us to learn more about APT[®]sorb and what it can do for you.

Reflections from below the rim: Presidency sheds light on diversity and talents of SME members



by **Jessica Elzea Kogel**
2013 SME President

It is a cloudless day and the undulating hills in the distance are cloaked in trees that are just beginning to display the subtle autumn colors that mark the fall season here in central Georgia. It is warm enough to drive with my window down and the breeze removes any lingering thoughts from this morning's meetings. I feel a sense of joy and optimism as I turn off the paved highway onto the wide haul road. A large flock of turkeys scatter into the woods, a bearded tom leading the pack. Familiar landmarks come into view – the deer stand that marks the half-way point of my journey; a large beaver pond ringed by Spanish

moss-draped red maples and swamp oak; a dip in the road as it crosses a stream and rises again, making a perfect inflection. Soon, the stockpiles come into view and, as the road ascends to the mine entrance, I feel the last remaining stress and tension of the day drop away.

I drive into the deepest part of the mine where I park my vehicle, turn off the engine and sit for a moment soaking up the silence and serenity of this place. Two black vultures gracefully arc and bank across the sky on extended wings spread wide to capture gentle up-drafts. Their traces reveal the flow of invisible wind currents that also carry the staccato sound of a woodpecker foraging for insects on the opposite ridge.

There is something very powerful about standing below the earth's surface surrounded by walls of strata. Every time I go into a mine, whether it is above or below ground, I am overcome by a sense of awe and wonder. Most people are shielded from this experience by the protective veneer of the surface landscape. Like a surgeon who feels profoundly privileged to touch the living body from the inside, I feel the same way about being inside a mine. To me, it is a sacred space.

I come here to refocus, to reconnect and to breathe deep slow breaths. It is a way for me to rejuvenate and prepare for the demands of life. It is also a place to reflect and today, as 2013 draws to a close, I find myself retracing the trajectory of the past 12 months and recalling the many experiences that I have had during my term as SME president. Although my term

doesn't end until February, now is the time, when daylight hours are shorter and temperatures are dipping, for taking stock.

The SME president does many things, such as provide leadership and direction for the organization, represent SME in various capacities and interact with members. This last role is the one that I cherish the most. Meeting and getting to know our members has been a privilege and honor that has greatly enriched my experience this year. I anticipate that I will look back on the time spent with members as one of the most meaningful aspects of serving as SME's president. Don't get me wrong. I am proud of everything that I have done for SME, and I don't want to diminish the value of these other contributions. However, connecting with members has been enormously rewarding.

When I started my term as president, I thought that I had a pretty good idea of the typical SME member. After all, I had been going to SME annual meetings for more than two decades, and I have belonged to three different local sections. I also knew the statistics that are commonly cited to describe our membership. These statistics, which distill a widely varied group of individuals into easy-to-graph and quote numbers, tell us that SME is comprised of 15,000 mostly male members with a median age of 59. A more detailed analysis reveals that 20 percent of SME members live outside the United States and that the percentage of women in the under 30 age group is close to 20 percent. I was persuaded by these black-and-white member numbers to believe that I knew the profile of the typical SME member. I was wrong.

What these metrics don't capture is a true picture of the people who make up the organization. Within the first month of my term, I discovered that SME members are much more diverse than the statistics or my past SME experiences would indicate. It quickly became apparent that our members represent all parts of the political spectrum. Some are conservative, some are liberal and some don't fit into either group. I met members who voiced strongly and passionately their views on environmental issues. I met members who dispute global warming. Others hold strong convictions that we must preserve our planet for future generations. Some members welcome

(Continued on page 18)



President's Page: SME is a diverse group

(Continued from page 6)

regulations because they level the playing field, while others believe that regulations are running the mining industry out of business. Some strongly support SME's new Mining in Society merit badge. Others have a different view.

The gender and age balance is more complex than the statistics suggest as well. It is true that many of our members are older men, but there are many young men and women, too.

I am struck by how many women hold leadership positions, particularly at the local section level. Although women are still in the minority, the numbers are growing, and I saw evidence of this in most every meeting room that I sat in this past year. It wasn't that long ago when

I could count on one hand the total number of women, no matter the room's capacity. That picture has changed.

One of the absolute delights of my year was interacting with student members in Peru, Mexico and North America. These students break the mold. They are passionate, energetic and talented. They are ready to engage in the profession and in SME. They give me confidence that our industry has a bright future.

We are a diverse group and we share a common home. That home is SME.

So who are the people of SME? Rather than recite numbers that quantify our demographics based on geography, employment sector or industry segment, I believe that the following adjectives collectively describe who we are:

articulate
professional
energized
caring
steadfast
strong
competent
supportive
innovative
curious
tolerant
outspoken
determined
welcoming

eager
balanced
proud
fun
generous
compassionate
independent
creative
talented
loyal
dedicated
warm
passionate

I am proud to have gotten to know the people of SME and to count myself as part of this group of fine individuals.

It has been a great year, thanks to the generosity and support of SME's members who give so much of their time and talent to SME and to the mining profession. ■

UCT is...

- HDD
- Damage Prevention
- Trenchless Rehabilitation

UCT is THE business event in the United States focusing on the total underground construction utility pipe market. 107 educational sessions.

Sessions include: Ethics for Engineers, HDD Operations & Productivity, Safety and more. Register today!



Underground Construction Technology
International Conference & Exhibition
January 28-30, 2014

For details, visit UCTonline.com

twitter.com/UCTonline

Underground Construction Technology

UCT - Underground Construction Technology

UCT is

The Total Source

For the Underground Construction Market
uctonline.com



Gender issues in mining: Complications are high away from mainstream operations



by Jessica Elzea Kogel
2013 SME President

Recently, I have been struggling with gender issues in mining. My struggle is not about my personal experiences. They have been relatively straightforward and more or less devoid of overt gender discrimination. My experience has been quite to the contrary, in fact. Most of my career has been marked by acceptance, respect and only one, perhaps two, barriers that I can directly link to gender. My struggle has to do with defining the scope of mining-related gender issues. On the one hand, gender issues may mean work force diversity, equal pay, equal opportunity and the creation of a more gender-neutral

work environment. These internal gender issues are relatively well understood. They have been part of the dialogue for several decades and are generally regulated in developed nations. On the other hand, there is a whole set of broader gender-related issues that are complex, multifaceted and sometimes contradictory. These issues, which touch practically all aspects of the industry, are not as openly discussed as the more easily solved internal issues that we have control over. The issues that I am referring to are largely hidden from the mainstream but impact the public perception of mining, threaten our social license to mine and have global implications.

The first time I had an inkling that there is a much larger set of problems around mining and gender was at a conference where a tall, handsomely dressed African woman, with striking features, spoke at length and with calm eloquence about an evolving human rights situation in her nation. She began with a simple statistic. Approximately 70 percent of the world's poor are women, and many of these women depend on the land for their livelihoods, as well as those of their families and communities. She continued, stating that there is a commonly held assumption that capital from large-scale mining projects uplifts the economic situation for the entire community as land-based, subsistence economies are transformed into cash-based economies.

The speaker then delivered her next message. Her voice rose slightly and she paused briefly, lending gravity and emphasis to her words, "the risks and benefits of mining are not gender neutral." In fact, studies show that women rarely

receive equal share of the benefits (jobs, income, improved services) and are disproportionately vulnerable to the risks (increased incidence of HIV/AIDS, loss of access to local resources such as land and water, alcoholism, gambling, erosion of stable social structures) associated with large-scale mining operations. But this is only one aspect of the story. In many parts of the world, women are directly engaged in mining but not in the large-scale, technology driven, state-of-the-art mining that immediately comes to mind for many of us. Instead, they practice artisanal and small-scale mining (ASM) using rudimentary hand tools and often working under hazardous conditions in an unregulated environment.

By some estimates, approximately 30 percent of the approximately 15 million ASM miners worldwide are women, and the percentage ranges from 10 percent to as high as 60 percent in parts of Africa. Women are rarely owners or operators and more commonly work as low-paid laborers extracting, transporting or processing ore. They engage in grinding, crushing, screening, washing, sorting and mercury amalgamation in the case of gold ore processing. These activities are sometimes done in homes, thus exposing families to mercury vapor, mineral particulates and excessive heat. Women turn to this type of work to support their families, because it provides higher wages than agriculture or other local industries. They are lured, too, by the promise of social and economic independence and an opportunity to break the cycle of poverty that grips so much of the world's population.

Despite the potential economic benefits, there are significant risks associated with ASM. The women who work in the mines face health and safety risks. There is also reputational risk to consider. ASM often takes place in close proximity to large-scale mining concessions and may occur after closure or on the fringe of actively mined ore deposits outside of legal permit or lease areas. Hazardous work conditions, lack of safety considerations, frequent use of child labor, exposure to chemicals and environmental damage are common characteristics of unregulated ASM operations. Environmental and social problems caused by ASM are often erroneously attributed to nearby large-scale mining operations, which pose a significant risk to the company's reputation and

(Continued on page 14)



Threat of cyber attacks on the rise; Mining companies at more risk as they become more virtual

AS IF INCREASED legislation, longer permitting times and a steady stream of opposition from anti-mining groups wasn't enough to contend with, now there is a report from Ernst & Young saying the threat of cyber-hacking is on the rise for mining companies.

The list of threats includes the usual suspects who would like to disrupt mining operations around the world, criminals looking to manipulate the price of commodities through disruptions, as well government and state-owned firms and even industry players looking for a leg up on the competition.

As the industry becomes more dependent on technology for everything from automated equipment to virtual offices and sites, the opportunity to be hacked increases. In fact, more than 40 percent of metals and mining companies in the survey experienced a rise in external threats during the past 12 months.

"Criminals are attracted to the sector because of the massive cash flows," the report said.

While the threat exists industry

wide, the report found that the most vulnerable miners are small to mid-sized companies that produce strategic metals, such as rare earths, tin and tungsten. Many of the larger companies have tightened security in their systems the past few years.

"The big miners have more sophistication in their risk management systems and probably have already experienced some degree of hacking activity in the last couple of years. For them it's a real-life battle," said Mike Elliott, Ernst & Young's global metals and mining leader.

Reuters reported that, in 2009, former BHP Billiton chief executive Marius Kloppers told a U.S. diplomat in Melbourne he was worried about espionage by China and competitors like Rio Tinto, according to a report on a diplomatic cable released by WikiLeaks.

Elliott said one fairly large miner was hit by a cyberattack in the past two years, which it detected only by accident when it was examining the reliability of a piece of equipment in its supply chain.

The company discovered coding

in the software for the equipment had been changed with an unauthorized amendment.

"It was designed to cause a problem that never eventuated because they picked it up," Elliott told *Reuters*. He declined to name the company that was targeted or where it was located.

"There are a lot more victims of this sort of activity than would be reported, because people don't like to talk about when these things are detected," he added.

Smaller miners are more vulnerable to cyberhacking because they don't see themselves as targets, and, as they look to cut costs, they are increasingly using web-connected technology and automated systems that could be infiltrated.

Web sites are easy targets for political and social activists, or hackers. A hacker defaced and blocked access to rare earths producer Lynas Corp.'s website last year as part of a campaign against the opening of a processing plant in Malaysia.

Lynas has since moved its website in-house. ■

President's Page: Gender issues must be addressed

(Continued from page 6)

the reputation of the industry as a whole. Mining companies may be held responsible, even though they have no direct role in creating the situation. Many human rights groups, for example, broadly distribute information that attacks mining using examples from ASM. Unfortunately, the distinction between responsibly run legitimate mining operations and unregulated ASM operations is not clearly articulated by these groups.

This distinction is important. Mining companies that follow responsible business practices have the potential to help solve these gender-driven, mining-related issues

by implementing programs that stop the cycle of gender discrimination and improve the conditions associated with unregulated ASM. ASM operates outside of the mainstream mining industry and continues because of corruption, poor regulation and lack of government oversight. The industry must tackle this problem head on by engaging with ASM miners to create programs that improve health and safety standards, reduce environmental impacts, promote best practices and set the standard for gender equality. The industry has taken the lead by incorporating gender issues into corporate social responsibility or sustainable development programs.

Mining companies that follow responsible business practices have the potential to help solve these gender-driven, mining-related issues.

These programs tackle many aspects of gender and often focus on training and hiring women for jobs in large-scale mining operations. These are important steps, but they may not be bold enough, or soon enough, to stop gender-biased practices and stem the building tide of increasingly vocal groups who are speaking out against mining. ■

Inspiring the next generation of miners: Mentors pave the way for the future



by Jessica Elzea Kogel
2013 SME President

I have been very fortunate. This is because I have been influenced by teachers and mentors who helped me realize my fullest potential. They pushed me, supported me, recognized my abilities and had confidence in me long before I had confidence in myself. William Arthur Ward stated that, "The mediocre teacher tells. The good teacher explains. The superior teacher demonstrates. The great teacher inspires." Without teachers and mentors who inspire and invest in us, it is much more difficult to succeed in the face of life's many challenges.

Teachers and mentors provide a shield while offering a mirror for self-reflection. They are influential figures who plant seeds of knowledge, stimulate curiosity and encourage exploration. They help us understand who we are as individuals within the larger context of society. They protect us from our weaknesses. When self-doubt threatens our ability to reach and stretch toward goals that allow us to expand and grow, they step in with words of encouragement and support. Or they help us when the ability to stay focused and forge ahead with self-assurance becomes elusive. They are there when we are faced with important decisions that require experience or wisdom that is beyond our years. They share factual knowledge as well as conceptual knowledge and new ways of thinking.

Mentors may come through family, church, school, community, work or professional organizations. Our mentors may perform their role in an official capacity, or they may be silent mentors whose influence is recognized after the fact. My first mentor was the latter type. He came into my life when I was quite young and exposed me to the fascinating material that has become my life's passion. I remember sitting at his side, hands immersed in satisfyingly malleable clay, exploring its plasticity and grit as I repeatedly rolled it between my thumb and index finger. This was my first encounter with ball clay. It was a highly physical experience that touched practically every sense. I clearly recall the warmth of the sun on my back, an earthy smell tinged with a slight sulfur odor that became more intense as my fingers worked deeper into the gray organic rich muck, and the feel of hard quartz grains against my skin. These sensations

Our mentors may perform their role in an official capacity or they may be silent mentors whose influence is recognized after the fact

ignited a lifelong love of clay.

My next mentor came along when I was in middle school and struggling academically. This mentor was a Ph.D. organic chemist at DuPont who saw that I was curious about science. He helped me with my first science-fair project and, just by the fact that he spent one-on-one time with me, lifted my confidence and inspired me to apply myself more seriously. I remember to this day, almost 40 years later, listening to him enthusiastically describe his research on fireflies and his attempts at replicating their light-producing chemical reaction in the lab. I will never forget the time when he came to my house with a large beaker and several bottles of liquid. Imagine the excitement and wonder that I felt when he mixed these liquids together, right there in my living room (probably while we were watching "Rowen & Martin's Laugh-In" or some other popular TV show of the time) and a ball of nylon miraculously appeared. I'm sure that he explained polymerization to me, but I was only 10 years old and the lesson that stuck was the idea that smart people can make new things. At that moment I decided that I wanted to earn a Ph.D. so that I could be a researcher like he. These two individuals exemplify the power of mentors.

Later in life, I was very fortunate to have mentors who guided me along the path that has brought me to where I am today. Some of my most persuasive mentors have come into my life through SME. These influential figures graciously gave me their time and wisely advised me at important junctures. I am deeply grateful to each of them for their support and for engaging in the process of building leaders by developing the next generation.

Now, as my year as SME President draws to a close, I am thinking about what I can do to inspire the next generation of young professionals. The motivation to carry this work forward is strong. One reason is to honor and pay back those who have mentored me. Another is to give back to the profession by

(Continued on page 20)



President's Page: Give back by inspiring the next generation

(Continued from page 6)

helping talented geologists and mining engineers blossom and become high-level contributors. I am also compelled to mentor for purely selfish reasons. It feels good to help someone achieve his or her dreams and goals. Mentoring also opens avenues for making long-lasting contributions, and I can't think of a better legacy than

inspiring others to reach their highest potential. Driving positive change through one-on-one relationships is an honor and privilege that I don't want to miss.

It has been a pleasure serving as SME president this past year. The time and energy that I invested in the organization is small compared to the level of personal satisfaction and

reward that I gained in return. Albert Schweitzer said, "I don't know what your destiny will be, but one thing I do know; the only ones among you who will be really happy are those who have sought and found how to serve."

I discovered the truth in these sage words, and I look forward to continuing to serve the profession as I focus my attention on new horizons. ■

Stillwater: Drilling program would include eight sites

(Continued from page 12)

– 2,200 to 2,680 m (7,200 to 8,800 ft) – some whitebark pine trees may be removed. Stillwater Mining said a U.S. Forest Service representative would review the drill sites prior to "site preparation to pre-approve removal of all large trees and all live whitebark pine trees. Whenever possible, felling of healthy cone-

bearing whitebark pine trees will be avoided."

Whitebark pine is considered warranted for listing as an endangered species because of shrinking populations but has not been protected because of other federal priorities. The trees produce nuts that are an important food for several species, including grizzly bears.

The Beartooth Ranger District, which oversees the permitting

of the project, is seeking public comments on Stillwater Mining's proposal.

Helicopters would fly drilling equipment into the sites, meaning no new roadways would be built. Water for drilling would be hauled in or tapped from nearby streams. The drills may require up to 16L/sec (25 gpm) of water to cool the diamond-tipped bits and flush the cuttings.

Stillwater Mining Co. has posted a \$250,000 reclamation bond and agreed to monitor the drill sites for weed infestations for three years. ■

GOT SLURRY?

bjmpumps.com

Read Our Drillers Mud Case Study

BJM PUMPS

Western Copper and Gold plans new mine in Yukon

WESTERN COPPER and Gold has submitted a proposal for an openpit gold mine in central Yukon, according to the Yukon Environment and Socio-economic Assessment Board. (YESAB)

The proposed Casino Mine would be larger than any mine currently in production in the Yukon Territory.

Western Copper and Gold says a mine at its Casino property, located 380 km (236 miles) northwest of Whitehorse, could produce more than 11,340 kg/a (400,000 oz/year) of gold

and more than 892 t (200 million lbs) of copper.

The mine could employ about 1,000 people during construction and provide 600 full-time jobs during production. Mine life is estimated at 22 years.

"You know it can take 18 months to two years to bring a project of this scale through YESAB," said Paul West-Sells, president of Western Copper Gold and Casino Mining Corp. "This is the first step and, once it's through YESAB, there is a quartz-mining license and water-use license that need to be obtained as well." ■



March 2012-February 2013

SME President

Drew A. Meyer

VOL. 64 NO. 3 – VOL. 65 NO. 2

March 2012: VOL. 64 NO. 3

Drew A. Meyer: An interview with the 2012 SME President

April 2012: VOL. 64 NO. 4

We are off to a fast start in 2012; Clear initiatives laid out for another successful year for SME

May 2012: VOL. 64 NO. 5

Call for nominations; Take part in the leadership of SME by nominating future leaders

June 2012: VOL. 64 NO. 6

SME's Minnesota Section on the rise; State is crucial to US mining and will host 2018 Annual Meeting

July 2012: VOL. 64 NO. 7

Be and advocate for mining; SME has the resources for members to use

August 2012: VOL. 64 NO. 8

Summer's heat does not slow SME; Society's meetings and other initiatives are successful

September 2012: VOL. 64 NO. 9

Success can be traced to its roots; SME one of four AIME member societies that are prospering

October 2012: VOL. 64 NO. 10

United States' competitiveness falls; Country drops to seventh globally from fifth last year

November 2012: VOL. 64 NO. 11

Innovation needs to be celebrated for the US to regain its competitive edge in the world

December 2012: VOL. 64 NO. 12

Boy Scouts of America turn to SME for the development of mining-related merit badge

January 2013: VOL. 65 NO. 1

SME ventures into the international waters; Undersea mining will be an important source of minerals

February 2013: VOL. 65 NO. 2

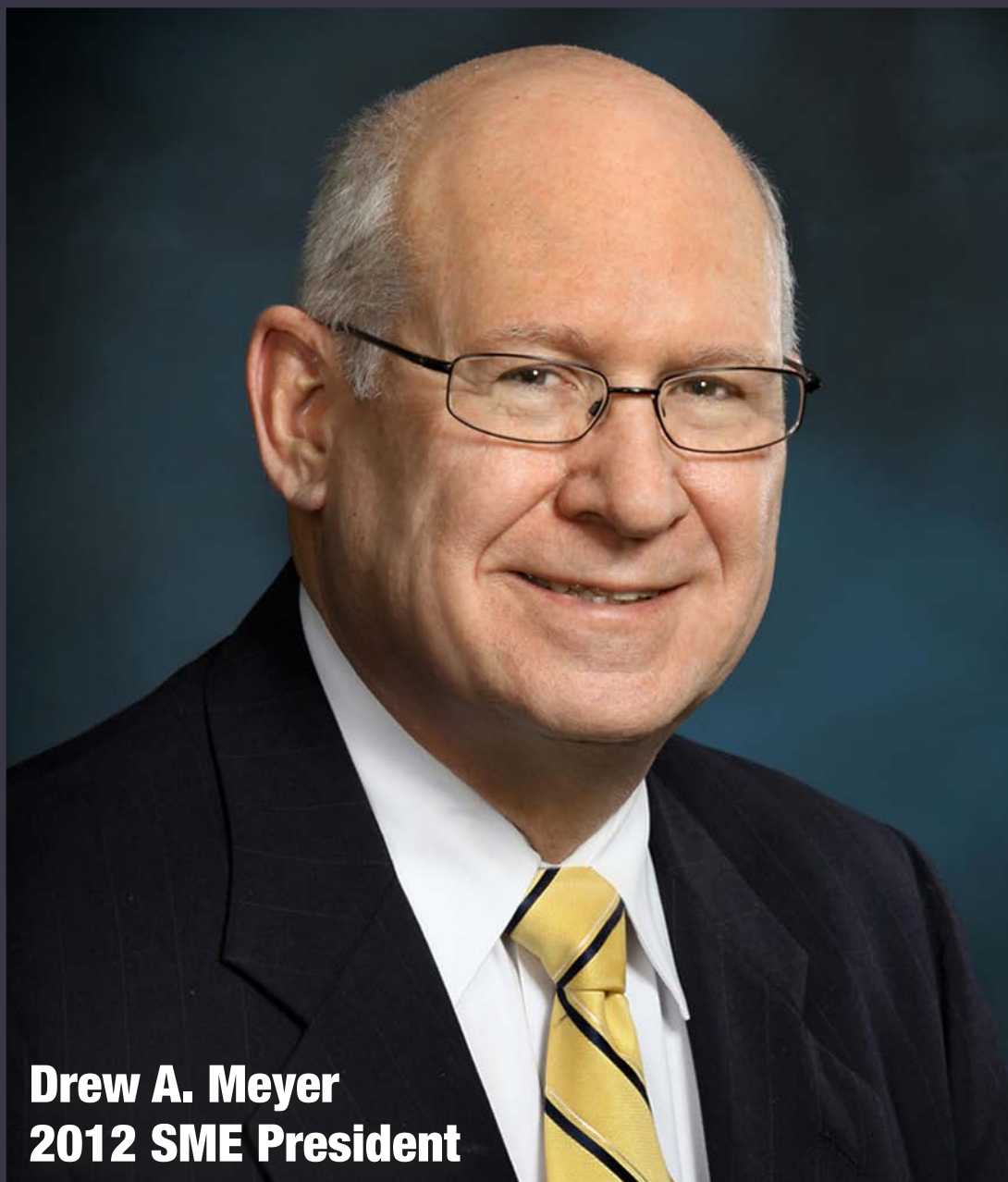
As term comes to a close, it is time to focus on the future of the Society

MARCH 2012
VOL. 64 NO. 3

Mining

OFFICIAL PUBLICATION OF SME

engineering



Drew A. Meyer
2012 SME President

Special Editorial Supplement: **Tunneling & Underground Construction**

www.miningengineeringmagazine.com

Drew A. Meyer:

An interview with the 2012 SME President

The global mining industry will always face significant challenges. Some, though, are bigger than others. What do you consider the major challenges facing the mining industry as a whole and SME in particular?

Without a doubt, the major issue in both coal and metal/nonmetal mining industries is the “graying” of the workforce in all aspects of mining. As the baby boomers continue to age, valuable experience is being lost by industry, government and academia. And there is the potential for SME to lose some of its membership. Now with that said, I should note that, despite the aging of the workforce, SME membership continued to grow by 7.1 percent during 2011.

There is also the need for continuing innovation in using all of the electronic media to facilitate communication, education, productivity and cost improvements at all levels.

The increasing demand for minerals in the developing world is also an issue. This includes countries such as China and India that, in the past, were self-sufficient or net exporters of minerals. China is now a significant importer of a number of commodities, including coal, and has limited exports of rare earth elements (REEs). This rise in demand requires increased production domestically and internationally, and exacerbates the workforce shortages caused by aging.

Another major challenge I see is the need to address society’s legitimate need for the mining industry to operate in an environmentally and sustainable way while delivering the minerals that are vital to our way of life.

As one of the world’s leading professional mining societies, what must SME do to address those and other issues facing the mining industry?

As a result of a strategic plan completed in 2010 under then SME President Nikhil Trivedi, SME is focused on the future of the mining community and our role within it. SME’s plan begins with SME’s Purpose:



To be THE resource and advocate for the mining community.

That unifying purpose and the integral five goals keep the Society focused on the activities necessary to address the major issues facing SME and the mining industry. The list is long and requires a major commitment by staff and a small army of volunteers.

SME has developed several major programs to help us achieve our goals. Some of these include publications, both print and electronic; study courses delivered in person and by electronic means; SME’s annual and regional

Previous SME presidents have left an agenda of change and innovation that I'm proud to continue. But, I also have set several major goals for my term in office.

meetings; social media, which includes the SME Community, Facebook, Twitter and LinkedIn; local sections; divisions; awards; Registered Member; governmental affairs; OneMine.org; standing, strategic and technical committees; scholarships; student chapters, domestic and international; K-12 curriculum development, including books and lesson plans in hardcopy and by the Internet, as well as mining school accreditation and Professional Engineer exam support.

SME, in recent years, has become very proactive in how it supports the mining industry and the professionals that work in it. Is there any reason to think that this approach will change in the coming years?

SME will be proactive. It will be a change from the distant past but not the recent past. Since the change in governance in 2006, reinforced by a string of dynamic presidents and guided by a new strategic plan, SME is well positioned to support the mining community.

What do you see as the major challenges facing the coal, metal-nonmetals industry?

The coal industry always has been a target of the environmental community, and now we have regulatory bodies issuing new regulations to further reduce the maximum levels of a number of pollutants under the Clean Air Act. What are new are the activities of the regulatory bodies in an attempt to limit the production of CO₂ from burning coal.

The combination of nongovernment organizations (NGOs) and governmental activities to reduce pollutants from burning coal will continue to be a major challenge for the coal industry. While coal demand in the United States may not grow as fast as in the past, domestic clean coal initiatives and growth in world coal demand should continue to offer the good challenge of supplying that increase in demand.

In doing so, safety remains a high priority activity, particularly since the loss of 29 men at Massey Energy's Upper Big Branch Mine in 2010. Though the U.S. Mine Safety and Health Administration reported that the 37 fatalities due to accidents in the mining industry in 2011 — 21 in coal, 16 in metal and nonmetal mining — was the second lowest since statistics were first recorded in 1910, the coal industry — and all of mining — will keep safety as its most important activity.

In addressing these and other challenges, it is extremely important to work with all relevant industry groups, and SME is committed to do

so. We start with a large and dynamic Coal Division that has members from all of the major coal producers, handlers and suppliers to the coal industry, as well as government agencies and academic institutions. Many of our local sections in coal-producing states have regular programming during their meetings and have annual conferences as well.

In addition, SME continues to maintain contacts with, among others, the other member societies of AIME; the National Mining Association, the National Stone, Sand and Gravel Association; the Industrial Minerals Association-North America; the American Association of Engineering Societies; the World Federation of Engineering Organizations and the Mining and Metallurgical Society of America, as well as state mining organizations and mining societies in the United Kingdom, Canada, Australia, South Africa and Peru, with all of whom we share joint meetings and cooperative agendas.

You have quite the list of goals for your year as SME president. Elaborate on a few of them.

Previous SME presidents have left an agenda of change and innovation that I'm proud to continue. But I also have set several major goals for my term in office. All of them are the result of my more than 35 years in the mining industry with Vulcan Materials Co. and 45 years as a member of SME and AIME. They are all evolutionary, not revolutionary in nature. And they are developed with the hope and expectation that each will be improved upon by continuing emphasis and attention by all those involved.

My first goal is to continue the programs and activities that currently are active. SME's governance program that includes the immediate past president, the current president and the president-elect provides for a unified and cohesive leadership that, when paired with the board of directors and the executive director and Society's staff, builds consensus on, and continuity of the activities of the Society. Within that framework, there is ample opportunity for each incoming president to build upon those activities, adjusting the required resources as necessary.

My second goal is to build SME's outreach activities to its members using the various electronic media available to us. Having members spread throughout the world, we must strive to serve them through the Internet and through media that can be accessed on a computer anywhere in the world. Although many older members are not heavy users of social



media, the new members joining the mining community, along with other stakeholders, are comfortable with social media and we must have that avenue available to them.

My third goal is really an extension of my second goal. The majority of our members cannot attend the annual meeting where the opportunity for networking and education is concentrated. At the 2011 annual meeting, we had 5,745 attendees registered, 548 of them students, and had 611 papers presented in 103 sessions.

For those who cannot make the annual meetings, our local sections provide the second best method of serving our members and offer them a similar networking and education experience. My goal here is to continue the emphasis on building the local sections that my predecessors have started. Assisting the sections in obtaining programming through webinars and by providing access to archived annual meeting papers would be of significant help to many sections. And, through the SME staff, offering advice in setting up day-long conferences would also be helpful to sections that encompass a large geographical area with many members who cannot easily attend evening chapter meetings.

Continued support of OneMine.org is another important goal. This program, to digitize and metadata tag archived documents, articles, books, proceedings and other publications and to make them accessible free of charge to our membership, has been a resounding success. The process is slow and expensive but continues to receive support from a large number of domestic and international organizations. To date, we have been able to include more than 1.3 million pages from about 97,000 mining and minerals-related documents collected by professional societies from around the globe. Many of these documents were previously only available in print, which severely limited access. More pages and documents are being added to OneMine.org every month.

My fifth goal is to continue support for the Society's workforce initiatives. SME participated in a study conducted by the National Academy of Science and supported by the U.S. Department of Energy, the National Stone, Sand and Gravel Association, the National Mining Association and the Industrial Minerals Association-North America. A final report has been issued that details the many issues associated with the shortages of qualified workers both now and in the future. SME has a number of other programs to address this issue, an issue that is extremely important to the future of the mining industry.

My sixth goal is the continued support of

the Sustainable Development & Mining Task Force of the World Federation of Engineering Organizations' (WFEO) Committee on Engineering and the Environment. This task force will be under the able direction of 2010 SME President Nikhil Trivedi. This is an extremely important opportunity for SME to participate in the mining industry's efforts to define and operate in a sustainable way.

Finally, 2011 saw the first joint CIM/SME (Canadian Institute of Mining, Metallurgy, and Petroleum) symposium on Safety and Reliability in the Mining and Resources Industry held in Canada. The second symposium will be held in the United States (Nov. 13-15, Minneapolis, MN) and represents an important step forward in the Society's effort to contribute to improved safety in mining in the United States and Canada. We must ensure that the second symposium builds on the success of the first.

When you first entered the mining industry out of college, how did the industry look to you and how has it changed throughout your career?

I am a graduate of The Pennsylvania State University with bachelors and masters degrees in mineral economics. Upon graduation, I went to work for Vulcan Materials Co., the largest U.S. producer of construction aggregates. I started college believing in the U.S. mining industry and now, 45 years later, I continue to believe that mining is an industry that offers a tremendous opportunity to serve yourself, your family and your country, whether you work in the U.S. or internationally. Second to agriculture — if you don't have food to eat you will die — mining enables mankind to rise above subsistence to a higher quality of life.

You earlier stated your concerns about the mining industry's "graying" workforce and the need for young people to enter the profession. What would you tell a young person who is considering mining as a profession?

Currently, mining is an outstanding profession, and I believe it will continue to be so in the future. As the world's economies grow, demand for minerals also will grow so that past boom-and-bust cycles will be muted. Mining companies now realize they must maintain a stable workforce in order to ensure that the necessary skills will be available when they need them. That means there should be less fear of being laid off during a downturn . . . a major concern for graduates from the 1980s and 1990s.

The shortage of mining engineers normally only occurs in high demand periods, in between downturns. The historical boom-and-bust cycles in the mining industry have contributed to the current real shortage of mining engineers. The long period of excess productive capacity versus demand led to a decline in the need for mining engineers, the closing of a number of mining schools in the United States and the departure of mining engineers to jobs outside of mining. They are unlikely to return.

Can SME and the industry do anything about this?

Industry and the SME have initiated a number of programs to support the remaining mining schools with scholarships and financial assistance for those seeking advanced degrees leading to tenured teaching positions.

Anything else you would care to add?

We have three vital constituencies within the Society — members, volunteers and staff. We cannot fully achieve our Strategic Purpose to be THE resource and advocate for the mining community without support from each of those constituencies.

It is very much a three-legged stool. Uneven or lack of support from any leg will keep us from achieving our purpose.

Fortunately each of our legs is strong and committed, and I'm confident that we will continue to work together for the good of the mining community. ■

Meyer's leadership dates back to days as an U.S. Army captain

Prior to forming Drew Meyer Consulting, 2012 SME President Drew A. Meyer was vice president, Marketing & Transportation Services, for Vulcan Materials Co., the largest construction aggregates producer in the United States and in the top five in the world. In that position, he was responsible for the marketing, market research, marketing support services, transportation sales and support services departments and economic forecasting and analysis for the Construction Materials Group.

In that role and throughout his career, Meyer has been an integral participant in the marketing, sales, strategic planning and business development functions of the company, responsible for transportation of aggregates by truck, rail and bulk- and self-unloading ocean-going ships.

During the last five years of his service with Vulcan, he and his staff focused on understanding the conditions necessary — and best methods — to improve aggregate pricing and overall construction materials profitability. He spent more than 35 years with Vulcan Materials, during which time he worked at the corporate, group and division levels domestically and in the Middle East.

Meyer served in the United States Army from 1967 to 1970, attaining the rank of captain. He was awarded the Bronze Star Medal for Exceptionally Meritorious Service, the Army Commendation Medal for Meritorious Service, the National Defense Medal, the Vietnam Service Medal and the Vietnam Campaign Medal. He is a graduate of The Pennsylvania State University with B.S. and M.S.

degrees in mineral economics.

Meyer has been an active participant in serving the construction aggregates industry through its associations. He was elected an Honorary Life Member of the National Stone, Sand & Gravel Association (NSSGA) in January 2004. Prior to its merger with NSSGA, he served in a number of leadership positions in the National Aggregates Association including treasurer and vice chairman. In 2003, *Aggregate Manager* magazine selected Meyer as the AGGMAN Professional of the Year for 2002.

Meyer is a Past Chairman of the Construction Materials and Aggregates Committee of SME, a recipient of the AIME Hal Williams Hardinge Award in recognition of outstanding achievement in the field of industrial minerals; a recipient of the President's Citation for Outstanding Leadership and Service to SME (2003), a past member of the SME Board of Directors (2006-2009), past vice president of the SME Foundation (2002-2009) and currently a trustee of the SME Foundation.

In addition to SME, Meyer is a member of the American Marketing Association, the National Association of Business Economists and a member of the Advisory Board of the Minerals Information Institute. He has authored and co-authored many articles and made numerous presentations on subjects related to the aggregates industry, industrial minerals, and the extraction, processing and consumption of magnetic metals from municipal solid waste. ■

We are off to a fast start in 2012; Clear initiatives laid out for another successful year for SME



by Drew A. Meyer
2012 SME president

The 2012 SME Annual Meeting in Seattle, WA, where I began my term as SME president, is over. Through the efforts of the volunteers, the staff, outgoing President John Murphy, and the support of sponsors, members, exhibitors and visitors it was an extraordinary meeting.

We had a record number of exhibitors with 690 booths.

Our attendance of 5,102, was the most for a non- Denver, CO meeting since 5,259 in Salt Lake City, UT in 1990.

We had 93 technical sessions (with 173 papers printed) under the theme, "Mine to Market..... Now it's Global."

In all, 2011 President John Murphy has left a dynamic agenda and I will strive to continue those initiatives and expand upon them.

One of those was the creation of the Minerals Education Coalition (MEC). The MEC is the new vehicle "to further unify and strengthen the development, production and distribution of credible and objective mineral education materials." As stated in the announcement of the formation of the MEC, "The MEC is comprised of SME's former GEM and Mii Programs and will also include curriculum enhancements, expansion to new audiences, and is intended to leverage strategic partnerships, alliances and collaborations. Free or low cost information and materials will continue to be provided to teachers and other education providers." More information about the MEC can be found in this issue (Page 13) and I believe the MEC will be a major contributor to our public and K-12 education programs.

Another initiative is the formation of an international task group on sustainable development and mining in conjunction with the World Federation of Engineering Organizations (WFEO) to develop a policy on sustainability in engineering. Led by Nikhil Trivedi, 2010 SME president, the task group's vision and mission/purpose is as follows:

Vision: The new international task group on sustainable development and mining assists the Committee on Engineering and the Environment (CEE) of the WFEO in supporting achievement of the UN Millennium

Development Goals through the promotion and dissemination of information on the application of:

1. Environmentally sound engineering practices and technologies in the minerals sector.
2. Best practices in social sustainability and the minerals sector including worker health, safety, reliability and training.
3. Best practices in the eco-efficient usage of land, water, energy and mineral resources.
4. Engineering solutions to reusing, repurposing and recycling of mineral materials.
5. Information on risk analysis, mitigation and management techniques in the minerals sector, all with the goal of capacity building for mineral producers and stakeholders including authorities, nongovernmental organizations and the general public.

Mission/purpose: To raise global understanding and application of engineering approaches and technologies so as to increase the contributions of the mining and minerals industries to economic, social and environmental well-being and sustainable development.

Significant progress has already been made in establishing the membership of the committee with representatives from developed and developing nations. We will give periodic progress reports as the committee pursues its activities.

The third initiative I would like to highlight is the formation of the Operating Industry Professionals Committee. Full information about the new committee is contained in an article in this issue (Page 88). Its purpose is "to increase the participation in SME governance, activities and programming by professionals and managers who are affiliated with the operating sector of the mining and minerals processing industries." This represents one more avenue for our members to benefit from the many programs and activities of our Society.

With the annual meeting behind us, it is safe to say that we are off to a fast start to 2012 and I look forward to a great year. ■

Call for nominations; Take part in the leadership of SME by nominating future leaders



by Drew A. Meyer
2012 SME president

One of the most important jobs of the SME president is to ensure that the Society continues to recruit and select qualified members for the various leadership positions. During April, I issued a call for nominations for the positions of SME president, board of directors and the strategic committees that help guide us into the future.

The call for nominations is so important to the future of the Society that I believe it bears repeating. John Murphy, 2011 SME president, said it best in his President's Page last May (**ME**, May 2011, page 6), "We seek the involvement of all members in the operation of the

Society and the input of the membership in the identification of the leadership team. Please consider those who can help to lead SME to the next plateau in serving a growing membership (and self-nominations and volunteers are welcomed and encouraged)."

We believe the process is structured so that we will select the best and most qualified persons for the various positions. But for the process to work, we need the membership to nominate those individuals they believe will represent the Society in the best way. If you have not yet done so, please nominate someone today. Submit your nominations to Mary O'Shea, phone 303-948-4211, e-mail oshea@smenet.org.

Another important activity of the Society is recognizing members who have contributed in some way to the Society and the mining community. The April issue of *Mining Engineering* contained a call for nominations for the various awards of the Society. I encourage you to review the list of awards and previous winners on the SME website (www.smenet.org). I hope that when you do that you will be inspired to nominate someone who should be honored with an award.

While all of the awards are important, I encourage you also to consider nominating a Local Section Hero. Our local sections are extremely important to our Society in many ways, and we have many unsung heroes who work tirelessly and often unrecognized, to provide a meaningful experience. Please go to www.smenet.org/sections/LocalSectionHero/index.cfm to nominate your Local Section Hero.

At the heart of our Society's mission is the provision and dissemination of fact-based K-12 minerals education materials to schools and the general public about the importance of mining and minerals to our lives and lifestyle. One of the avenues for that to occur is the Minerals Education Coalition (MEC) and the support we give to the National Science Teachers Association (NSTA), a 60,000 member-driven teachers association. Each year the NSTA conducts a national meeting and three regional meetings.

Prior to the formation of the MEC, the Mineral Information Institute (Mii) and SME's GEM Committee supported the regional meetings with free rock and mineral kits, literature and educational materials for use by teachers in their classrooms. Last year about 7,500 teachers received materials at the three regional meetings. Each meeting requires significant staff and volunteer input, and would not be possible without the considerable support of companies and sections in the area surrounding each meeting. This year the regional meetings will be held in Louisville, KY Oct. 18-20; Atlanta, GA Nov. 1-3; and Phoenix, AZ Dec. 6-8. If you would like to be involved as a volunteer or wish to provide company support, please contact Mona Vandervoort on the SME staff, phone 303-948-4227, e-mail vandervoort@smenet.org. I can tell you from experience that it is truly rewarding.

Now it is time to nominate some deserving member for an award or leadership position. Don't delay. ■

We believe the process is structured so that we will select the best and most qualified persons for the various positions. But for the process to work, we need the membership to nominate those individuals they believe will represent the Society in the best way.

SME's Minnesota Section on the rise; State is crucial to US mining and will host 2018 Annual Meeting



by **Drew A. Meyer**
2012 SME president

As members of the mining community, we know that mining is the fundamental building block of our existence. I'm sure all of us at one time or another have said, "If it can't be grown, it has to be mined." Some of us (me included) even wear T-shirts that have that in big letters on the front. And, if we're really on a roll, we'll point out that modern agriculture and forestry cannot exist without the metals that are used in the equipment to plant and harvest our food, natural clothing fibers and forest products. And what about the phosphate and potash that are key fertilizer ingredients?

Everyone knows we mine coal. But we cannot find and produce oil and natural gas without a variety of metals and industrial minerals. Indeed, the recent boom in new oil and gas production depends on a number of industrial minerals in addition to the traditional steel used in the drilling equipment.

However, even though we know the importance of mining, we may not know how important it is in dollar terms, or how dependent we are on imports from other countries — some of whom may not be our "best friends," or even "friend."

The U.S. Geological Survey (USGS) has recently published information and estimates about the role of mining in our economy and where we get the minerals that we need to maintain and grow our economy. The publication is the *Mineral Commodities Survey 2012*. It can be found at www.usgs.gov.

In 2011, total mine production of nonfuel minerals was estimated to be \$74 billion. They contributed to major industries that added an estimated \$2.23 trillion, or nearly 15 percent, to the nation's gross domestic product. From 2006 to 2011, metals and coal increased more than 45 percent, adding an estimated \$24 billion to the economy. Industrial minerals decreased by \$2 billion during the same period, primarily due to declines in construction aggregate production from the collapse of construction activity.

Despite the increase in the value of nonfuel minerals produced in the United States, the country continued to increase its dependence on imported mineral materials. Net imports

grew by \$8 billion, or 29 percent. According to the USGS, "in 2011, the supply for more than one-half of U.S. apparent consumption of 43 commodities came from imports, and the United States was 100 percent reliant for 19 of those." That is up from 25 commodities with 50 percent dependence and only seven with 100 percent dependence in 1978. Of those with more than 50 percent import reliance in 2011, China was the largest or second largest supplier for 19 minerals.

The top five states in production of nonfuel minerals in 2011, in descending order, were Nevada, Arizona, Minnesota, Utah and Alaska. Minnesota moved up one position to third from 2010, but the top five otherwise remained the same.

The Minnesota Section of SME is also on the rise. During April, SME Executive Director Dave Kanagy and I participated in SME's Minnesota Section meeting. The section holds a two-day meeting each April in Duluth that is focused on the Minnesota mining industry and its suppliers. Attendance at this year's meeting was more than 500 and the exhibit hall had 150 vendors. It is one of the largest section meetings and rivals some of our UCA of SME Division meetings.

In the months leading up to its meeting, section leadership made a compelling case for co-locating its annual meeting with the SME Annual Meeting in February 2018. After making a presentation to the SME Board of Directors and providing additional information about the suitability of Minneapolis for the annual meeting, the board accepted the recommendation of the Products and Services Strategic Committee to hold the annual meeting in Minneapolis in 2018. The partnering of SME and the Minnesota Section for the 2018 annual meeting will provide attendees even more high quality technical presentations. And the section's extremely active membership will ensure meeting attendees will have a memorable week.

Minneapolis is an appropriate site for the SME to hold its annual meeting. The state has for decades been the nation's leading supplier of iron ore to the U.S. steel industry. And it produces several industrial mineral commodities. In addition, the state is home to some high quality polymetallic deposits. ■

Be an advocate for mining; SME has the resources for members to use



by **Drew A. Meyer**
2012 SME president

In early May, I had the opportunity to attend the 48th Annual Forum on the Geology of Industrial Minerals held in Scottsdale, AZ. I was a speaker at several earlier forums when I worked for Vulcan Materials Co. This time, I was the keynote speaker (www.youtube.com/user/azgsweb). SME and many of its members have a long relationship with the forum. At the beginning of my speech, I asked for a show of hands of those attendees who are SME members. I estimate about two-thirds raised their hand. Many are long-term members, and one indicated he is a more than 50-year member.

The forum is a great mix of technical sessions, where papers were presented on a variety of subjects relating to the geology of industrial minerals. The forum also featured field trips — one of which was overnight — to industrial minerals operations and deposits in the area. SME provided additional support through the Dreyer Professional Development Fund. The fund made the contribution that enabled students to attend and participate in the field trips.

The title of my speech was, “You Need to be an Advocate for the Industrial Minerals Mining Community.” Of course, we need to be an advocate for all mining, but this was, after all, an industrial minerals meeting.

Most every mining professional is aware that there are many advocates against any form of mining. And, because we know that virtually all economic activity starts with mining, I believe we too often think that stating the obvious is

enough. Experience, though, tells us that it is not enough for those most opposed to mining. Our task, then, as members of the mining community is to be an advocate for mining.

It is important to distinguish between the many forms of advocacy. I do not mean focusing on image. I do not mean lobbying. I do not mean strident advocacy that attacks those with whom we disagree. Unfortunately, there are many who are opposed to mining that believe negativity is the best advocacy for their position.

SME, on the other hand, has taken the positive approach to advocacy. The Society’s Strategic Plan states that its Core Purpose is: “To be THE resource and advocate for the mining community.” We do that through the

“Because we know that virtually all economic activity starts with mining, I believe we too often think that stating the obvious is enough. Experience, though, tells us that it is not enough for those who are most opposed to mining.”

large number of programs that are focused on education and fact-based information about mining that we deliver through meetings, publications, the Minerals Education Coalition, webinars, awards, scholarships, technical briefing papers, summer courses for science teachers, fellowships, congressional testimony, e-learning and much more (visit the SME website www.smenet.org for a complete list). Our focus is on building the individual’s ability, both inside and outside the mining community, to improve mining’s contribution to global prosperity.

The bottom line is this — every one of us in the mining community has to be a positive advocate for mining. SME is a resource that will help you to be that voice through example and words. ■

Summer's heat does not slow SME

Society's meetings and other initiatives are successful



by Drew A. Meyer
2012 SME president

As you read this, we are in “dog days of summer.” The expression evokes the image of the normal heat at this time of year (at least in the Northern Hemisphere) driving everyone to find a cool place and just relax. That is not happening at SME. The summer is loaded with activities that are furthering the interests of the mining and tunneling communities.

On June 24-27, SME Executive Director Dave Kanagy and I attended the biannual North American Tunneling Conference (NAT), produced by the Underground Construction Association of SME and SME staff. It was a record-setting event. Along with two short courses and a field trip, there were more than 100 technical presentations in 20 sessions. The exhibit hall was packed with more than 116 exhibitors in 140 booths. Attendance was more than 900.

An outstanding feature of the meeting is that participants receive a copy of *The North American Tunneling 2012 Proceedings* (in hard copy and CD) at the conference. The 868-page proceedings volume – available from the SME Bookstore (\$138 members, \$189 nonmember), www.smenet.org – has more than 100 technical papers in 22 subject areas.

The NAT was a great followup to a new conference co-sponsored by the UCA of SME and the *North American Tunneling Journal* titled “Cutting Edge: Pressurized TBM Tunneling.” Attendance at that April meeting was 238 people. They participated in six technical sessions over two days. The success of this conference provided a perfect start to what we hope will be the first of many such conferences.

Volunteers and staff are hard at work on a number of other important initiatives. Just two are:

- Preparation of more technical briefing papers on mining issues. SME’s Government and Public Affairs Committee (GPAC), supported by 56 panels of experts from our membership, have produced eight position papers, with a ninth, “Mining’s Impact on Water Use, Quality and Availability,” recently released. An initiative

is under way within the GPAC to add technical briefing papers that address specific issues relating to underground construction and tunneling. Go to www.smenet.org/gpac to read/download complete briefing papers.

- The Minerals Education Coalition (MEC) met June 22 to discuss the MEC branding campaign, MEC awards, the National Science Teachers Association, 2012 area conferences, and to review ongoing and proposed MEC projects. Formed from the merger of SME’s GEM program and the Mineral Information Institute, the MEC is our primary vehicle to deliver factual information about mining to K-12 schools as well as to the public.

Another exciting initiative is SME’s continuing efforts in the support of sustainable mining practices. Working with, and through, the

The NAT was a record-setting event, with more than 900 attendees, more than 100 technical presentations in 20 sessions and 116 exhibitors in 140 booths.

World Federation of Engineering Organizations Committee on Engineering and Environment (CEE), SME has been selected to organize and chair a task group on Sustainability and Mining. Chaired by 2010 SME President Nikhil Trivedi, the task group has already secured the participation of many of the countries where mining and/or mineral processing are major activities. Participation has been secured from Australia, Brazil, Canada, Chile, China, Finland, Ghana, Greece, India, South Africa, Spain, Turkey, the United States and Zambia. More will be added in the future. Trivedi said the task group’s operating principles are simple:

“We will operate under strict professional and ethical engineering principles. We will honor the unique cultural and social values of the countries of the world where mining and mineral processing occurs. We will endeavor to encourage adoption of engineering guidelines for responsible mining to ensure that the essential flow of minerals continues to keep pace with ever-increasing global demand.”

It’s hot outside and the “Dog Star” (Sirius) is upon us, but SME volunteers and staff are at work making the Society better. ■

Success can be traced to its roots; SME one of four AIME member societies that are prospering



by Drew A. Meyer
2012 SME president

SME Executive Director Dave Kanagy and I recently attended the American Institute of Mining, Metallurgical, and Petroleum Engineers' (AIME) Board of Trustees annual meeting. It was an enjoyable experience that started me thinking about the history of SME and how it came to be. Please bear with me while I go through the steps. You can forget the dates if you want to, but remember how far back they are.

I joined AIME in 1966 when it was the American Institute of Mining, Metallurgical, and Petroleum Engineers. Since I was pursuing a masters degree in mineral economics at the time, everyone I knew called AIME, the American Institute of Mining Engineers. Historically, that was the correct name when it was formed by 22 mining engineers in 1871 in Wilkes-Barre, PA. At that time, it was one of the first national engineering societies in the U.S. It grew rapidly in size and influence, and in 1904 AIME established the United Engineering Society with the American Society of Mechanical Engineers and the American Institute of Electrical Engineers. In 1910, the American Society of Civil Engineers joined the United Engineering Society. In 1912, the iron and steel division was created. In 1914, the Engineering Foundation was established within the United Engineering Society. Soon thereafter, in 1917, the Women's Auxiliary of AIME was formed with the mission to accomplish charitable works and provide scholarships to mining students. In 1918, the American Institute of Metals was absorbed into the AIME, and student members were admitted as junior associates. The AIME became the American Institute of Mining and Metallurgical Engineers in 1919. In 1922, the petroleum division was formed, followed eight years later by the coal division.

Through the next three decades, AIME continued to grow domestically and with foreign affiliations, and, in 1949, all technical activities were separated into three branches; mining, metals and petroleum.

In 1956, AIME finally became in words what it had become in fact — The American Institute of Mining, Metallurgical, and Petroleum Engineers.

All was right with the world.

Then, just a few years after the centennial celebration of AIME, I started getting information from The Society of Mining Engineers (SME). I, among many others, was confused.

What happened? In 1973, the board of AIME started a decentralization process that culminated in 1984 of the establishment of four separately incorporated societies. Shortly thereafter, AIME became a federation of the four societies — the Association of Iron and Steel Technology - AIST (formed from the merger of the AIME Iron and Steel Society (ISS) and the Association of Iron and Steel Engineers (AISE)); the Society of Mining Engineers (SME) (the Society changed its name to the Society for Mining, Metallurgy and Exploration in 1989); the Society of Petroleum Engineers (SPE) and The Minerals, Metals and Materials Society (TMS). All four have prospered under this structure.

From 22 mining engineers in 1871 to more than 48,000 mining community professionals by its centennial, the membership of the four societies of AIME has grown to more than 145,000 worldwide.

There is a tendency by many to attribute recent success solely to their own efforts. But it is obvious that the success of today's AIME and its four member societies is rooted in our DNA going back to the founding engineers. They started the society with the intent to build professionalism in their profession. They reached out to other professionals in other engineering disciplines, at home and abroad, fostering collaborations and spreading knowledge through publications, education and meetings. The Women's Auxiliary of the AIME (now a division of SME - WAAIME) started a scholarship program in 1914 that today provides more than \$200,000 in scholarships to worthy students, both domestically and internationally. The four societies as independent entities have followed the legacy of AIME to grow and prosper.

We should all be proud of the impact AIME and our societies are having in making the world a better place through the products and services we provide to enable the use of our mineral and fuel resources. We are doing it today, following the example of those who have preceded us. ■

United States' competitiveness falls; Country drops to seventh globally from fifth last year



by Drew A. Meyer
2012 SME president

It is hard for me not to think our country is headed in the wrong direction when most polls indicate a plurality, or majority, of Americans believe that is the case. At the same time, such polls represent an opinion that may be ill-defined, subject to interpretation and, possibly, even manipulated.

For those reasons, if you do not agree with the polls, it is often easy to dismiss them (My 93-year-old father disagrees with almost all polls and thinks polling should be outlawed).

Many of you probably remember that in September, the World Economic Forum issued a report "Global Competitive Report 2012-2013." I am usually dismissive of international studies that criticize the United States because they often seem ideologically driven. This one is different. (Follow this link <http://reports.weforum.org/global-competitiveness-report-2012-2013/#> to download a copy of the 545-page report.)

The World Economic Forum has conducted research on global competitiveness for more than 30 years, but only started the present format in 2005. The evaluation of competitiveness has grown to cover 144 countries. More importantly, the final score is a weighted average of 111 separate categories in 12 different pillars of competitiveness, which are also weighted. The 12 pillars are grouped under three headings: Basic Requirements, Efficiency Enhancers and Innovation and Sophistication Factors. The final result, then, depends on a range of factors that I believe yields a balanced result.

The report this year is the most comprehensive. It ranks the United States as seventh in global competitiveness out of 144 countries evaluated. Now, I am never happy when the United States is anything but number one in the good things that matter. What is disturbing is that we were number five last year and number one in 2006 and 2007. To state the

obvious, that is not the right direction.

With a report this detailed, I have not analyzed every aspect of the rankings. However, the summary for the United States (all 144 countries are summarized) points the way to what is happening to us. The Basic Requirements heading of indicators (22 in all) examines the minimum standards a country should have to compete in the global market. Such standards relate to the country's conduct and efficiency of four of its pillars: institutions, infrastructure, macroeconomic environment, and health and primary education. One would assume that the nation should rank very well in this category. One would be wrong. We rank 33rd in this category, while in the other two headings, Efficiency Enhancers, and Innovation and Sophistication categories, the United States ranks second and seventh, respectively. So, our problem is in the Basic Requirements category.

The report ranks the United States as seventh in global competitiveness out of the 144 countries evaluated. What is disturbing is that we were number five last year and number one in 2006 and 2007. To state the obvious, that is not the right direction.

Within the Institutions pillar, if you think more regulation is always good, you will be happy to note that the United States is ranked 76th in the Burden of Government Regulation. First means the burden is small, 76th means it is worse than 75 other countries. Scariest of all, we rank 111th in the third Pillar of Macroeconomic Environment, and 136th in the category General Government Debt percent of GDP. Greece is 143rd.

It is interesting to note that the decline from number one in the overall ranking began during the Bush administration. The decline has continued and accelerated under the Obama administration. How we answer the question "How do we reverse the decline?" may be the single most important issue for the future. ■

Innovation needs to be celebrated for the US to regain its competitive edge in the world



by Drew A. Meyer
2012 SME president

Last month I wrote about the “Global Competitive Report 2012-2013,” issued by the World Economic Forum. The report assessed the competitiveness of 144 countries. The disturbing part about the report was that the United States had fallen from first in 2006 and 2007 to seventh in 2012.

It is tempting to look at that downward trend and predict that it will continue to decline in the future. The good news is that a continuation of the downward trend is not certain. The bad news is that neither is a reversal certain. Based upon the competitiveness report, the United States fell from the top spot

by, among other things, increasing the burden of government regulations, failing to improve the macroeconomic environment, and massively increasing the government debt. I closed the column with the statement, “How we answer the question, how do we reverse the decline?” may be the single most important issue for the future.”

Yogi Berra is a baseball Hall of Famer whose career spanned 43 years as an all-star catcher, coach, and manager with 13 World Series championships while a player or coach. Despite those achievements, he is best known for his “Yogi-isms.” Two of the best known are, “The future ain’t what it used to be,” and, “It’s difficult to make predictions, especially about the future.” Those statements strike at the heart of the problem we are experiencing today.

Too many of our leaders believe they can shape the future because they think they can see the future. They need only look at today and see that today (yesterday’s future) is not what they thought it would be a few short years ago. Directional drilling and “fracking” have changed the energy outlook domestically and around the world. Wind energy and solar power, which were

supposed (predicted) to save us from the scourge of fossil fuels, have been marginalized by a single technological innovation.

The supply of natural gas has grown, forcing down natural gas prices and depressing demand for coal. An abundance of cheap natural gas leads to the prediction of continued decline of coal consumption. But natural gas has many other uses. Further innovations in clean coal and maybe even improved carbon capture technology, along with demand for natural gas from uses for which it is uniquely suited, will return coal to its natural place as the fuel for electrical generation. And, when the economy recovers, coal’s application in metallurgical uses will also recover.

How will we reverse the decline in our global competitiveness? The first step is to reduce what seems to be an unprecedented amount of uncertainty. By the time you read this, the makeup of our government should be decided.

Too many of our leaders believe they can shape the future because they think they can see the future. They need only look at today and see that today (yesterday’s future) is not what they thought it would be a few short years ago.

You may not like the outcome, but the future direction of the country should be clearer, hopefully for the better.

When we return to stronger growth, revenues will increase. This should reduce the deficit and provide more flexibility to pursue more pro-growth policies. If we can reduce the burden of governmental regulation and return to sensible environmental policy and regulation, the cost of nearly everything will be reduced.

And, finally, we must return to the day when innovation at all levels of our economy was celebrated and rewarded. We know the path to exceptional competitiveness, we just need to take down the barriers. ■

Boy Scouts of America turn to SME for the development of a mining-related merit badge



by **Drew A. Meyer**
2012 SME president

It is always a pleasure to be able to announce an achievement that is the result of the diligence and hard work of a number of members and staff over a long period of time. When there are so many individuals who are willing to make the commitments of time and money to make something special happen, it is important to recognize their dedication early and often.

After years of often frustrating effort, SME was notified in October that the Society has been designated by the Boy Scouts of America (BSA) to be the lead organization for the development of a mining-related Merit Badge. To quote an unnamed politician (in a shortened, sanitized form), "This is a really big deal." Because there are so many who have helped bring this effort to this point, I won't recognize them individually in this limited space. However, during the next 15 months as development continues, we will endeavor to recognize all of those who have helped.

As just a bit of background, for our proposed mining-related Merit Badge to have arrived at this level of development, a rigorous process has been followed. The concept was reviewed in a Youth Initiative Survey by several hundred Boy Scouts and subsequently reviewed by two adult groups of BSA volunteers, the Program Content Committee and Merit Badge Task Force. The professional staff of the Boy Scouts also has our appreciation as we move forward.

To develop the new Merit Badge in collaboration with the BSA, as SME President, I have designated a new ad hoc committee that will report to the board of directors. The committee will include a content development team and an advisory panel to draft and review all documents and components for the badge in alignment with BSA requirements. SME members will be hearing a lot more about the work of these groups in the future.

I sure there are many of you who, like me, were not aware that the Boy Scouts did not already have a mining-related Merit Badge. It was not always so. In fact, in 1911, one year after the Boy Scouts of America was incorporated,

a Mining Merit Badge was created, along with more than two dozen other badges. Today, there are 130 badges covering a range of subjects. (For a complete list, go to the following website: <http://www.scouting.org/scoutsource/BoyScouts/GuideforMeritBadgeCounselors/IntroToMeritBadges.aspx>.)

In 1937, the mining badge was discontinued and replaced by the Rocks and Minerals Badge. In 1953, the Rocks and Minerals Badge was replaced by the Geology Badge, which remains in effect today. Through that sequence of badge changes, mining was retained as a part of the Geology Badge. The Geology Badge has four options, with the completion of any one option sufficient to earn the badge. The options are: Surface and Sedimentary Processes, Energy Resources, Mineral Resources and Earth History. So it is possible to obtain the Geology Badge without any consideration of mining. It is important at this point to emphasize — without in any way diminishing the importance of geology, indeed acknowledging its fundamental importance in locating and developing mineral

Because there are so many who have helped bring this effort to this point, I won't recognize them individually in this limited space. However, during the next 15 months as development continues, we will endeavor to recognize all of those who have helped.

deposits — that it was believed mining should be accorded an emphasis similar to geology in liberating the minerals from the ground and preparing them for conversion to useful products, as well as introducing Scouts to the opportunities related to mining possible in their own futures.

In 2011, according to the U.S. Geological Survey, domestic mineral raw materials from mining were valued at \$74 billion. Mineral materials processed domestically accounted for \$633 billion. Value added to the nation's gross domestic product by major industries that consume processed mineral materials is valued at \$2.23 trillion. Beyond its value is the fact that everything depends to some extent on mining. It is imperative that the next generation of leaders, as prepared by the Boy Scouts of America, know and understand the importance of mining to our economy. ■

SME ventures into international waters; Undersea mining will be an important source of minerals



by Drew A. Meyer
2012 SME president

Expansion of the Society's international involvement continued in October. SME Executive Director Dave Kanagy and I traveled to China for two purposes. First, we met with the leadership of the China Nonmetallic Minerals Industry Association (CNMIA). The association represents about 1,000 companies in China. The meeting continued a dialogue which was formalized with a memorandum of understanding signed in June for further cooperation between SME and CNMIA.

The other purpose of the trip was to participate in the 41st annual conference of the Underwater Mining Institute (UMI). The conference theme was "Marine Minerals: Finding the Right Balance of Sustainable Development and Environmental Protection."

The International Marine Minerals Society (IMMS), a division of SME, is the primary sponsor of UMI. This year the conference was held at Tongji University in Shanghai. In previous years it has been held in Canada, England, Korea, New Zealand, Germany, Japan, Russia and the United States. Attendance was more than 130 including Dave and myself, and SME staff members Carol Cudworth and Tara Davis. Attendees represented 22 countries ranging from developed countries to emerging nations to the Cook Islands. Carol and Tara assisted with conference management, registration and on-site coordination. Dave and I gave a report on SME activities during the meeting and participated in the executive board meeting of the IMMS.

The conference included field trips, five poster presentations and more than 40 papers on a wide variety of subjects that fit into the conference theme. Despite a lack of the land use and environmental issues normal in land-based mining, underwater mining has its environmental issues. Steven Scott, director of Scotiabank Geology Research Lab, writing in the journal *Sea Technology*, states that biological impacts such as destruction of exotic colonies of animals associated with the hot springs that form sulfide

ores and the sediment plumes arising from excavation of phosphates and nodules which can smother the gills of filter feeding animals are significant problems that must be addressed. There were 11 presentations at the conference that directly addressed these and other environmental issues.

Oceans cover more than two-thirds of the earth. The vast majority of this area has not been explored. Though the areas outside of territorial waters cannot be claimed by individual countries, the United Nations, through the Law of the Sea Convention, "defines the rights and responsibilities of nations in their use of the world's oceans, establishing guidelines for businesses, the environment, and the management of marine natural resources." (Wikipedia, United Nations Convention on the Law of the Sea). Organization and control of all mineral-related activities in the international seabed area beyond the limits of national jurisdiction

Oceans cover more than two-thirds of the earth. The vast majority of this area has not been explored. Though the areas outside of territorial waters cannot be claimed by individual countries, the United Nations, through the Law of the Sea Convention, "defines the rights and responsibilities of nations in their use of the world's oceans, establishing guidelines for businesses, the environment, and the management of marine natural resources."

is the responsibility of the International Seabed Authority (ISA), an intergovernmental body established by the Law of the Sea Convention. The ISA has awarded 11 contracts for exploration to seven countries (the Russian Federation, the Republic of Korea, China, Japan, France, India and Germany); one joint organization consisting of Bulgaria, Cuba, Slovakia, Czech Republic, Poland and Russian Federation and two private companies sponsored by the island nations of Nauru and Tonga. The United States is not a signatory to the convention and therefore participates in ISA only as an observer.

Undersea mining will become an important source of minerals in the future. In the meantime, professional societies, such as the IMMS and other divisions of SME, will provide valuable forums to advance the science and technology necessary to successfully produce and process minerals from the undersea environment. ■

As term comes to a close, it's time to focus on the future of the Society



by Drew A. Meyer
2012 SME president

This issue completes my term as the 2012 SME President. Usually, the final President's Page is used to write about the activities and accomplishments of the Society during the previous 12 months. The good news is that both activities and accomplishments were again extraordinary. In order to give those activities and accomplishments suitable recognition, we will again issue an annual report – started last year – which will be made available to all members on the SME website in the members-only section. The annual report will allow me to focus my last page on the future rather than the past.

We are fortunate to have a strong professional staff under the able direction of Dave Kanagy and, equally important, a very large number of dedicated, highly competent volunteers who have given their time and expertise – many for years and decades. And we cannot forget to recognize the support of the many companies that make monetary contributions to SME and support their employees in volunteer activities. None of this comes without cost or without sacrifice. Nor does success come without focus.

The governance changes made in 2006 and the Strategic Plan completed in 2010 have been a crucial part of keeping our Society – leadership, volunteers and staff – focused on what is important to members and enabling our limited funds to be directed to the areas that most benefit the greater mining community.

As a society of professionals, education, in all its forms, is an essential part of our mission for all who produce and benefit from mining and its products. The awarding of scholarships is likewise an essential part of our support of education. The importance of our commitment to scholarships was brought home to me when recent articles in the *Wall Street Journal* and *USA Today* highlighted the sharply rising cost of tuition at our nation's colleges and universities. There are many reasons for the increase, and

public and private institutions as well as those that are not-and-for-profit are affected, albeit to different degrees.

According to the U.S. Department of Education, average total tuition, room and board rates charged by public four-year institutions rose from \$2,550 for the 1980-1981 school year to \$15,918 for the 2010-2011 school year. For the same period, the total cost was more than double for private not-for-profit and for-profit four-year institutions – \$5,594 to \$32,617 respectively. On average, it now takes \$64,000 to \$130,000 to obtain a four-year degree. It's no wonder that student loan debt is approaching \$1 trillion, most of it held by the federal government. For perspective, auto loan debt is about \$750 billion and credit card debt is about \$700 billion.

The governance changes made in 2006 and the Strategic Plan completed in 2010 have been a crucial part of keeping our Society – leadership, volunteers and staff – focused on what is important to members and enabling our limited funds to be directed to the areas that most benefit the greater mining community.

SME provides scholarships through its SME Foundation, as well as its divisions and sections, with the Woman's Auxiliary of AIME (WAAIME Division) leading the way with more than \$260,000 domestically and internationally, in 2012. As SME approaches \$500,000 in scholarship distribution annually, we are providing a significant benefit to those students interested in pursuing a career in mining. We realize however, that we can and must do more. At the 2013 Annual Meeting in Denver, we will announce a major new initiative to dramatically increase the funds available for all of the Society's programs, but scholarships in particular, and education in general, will be in the forefront.

We can all be proud of our past going all the way back to the formation of the American Institute of Mining Engineers in 1871. Now we look forward to the future of SME and the greater mining community, and realize it is our time to help shape the future by supporting those who are the future. ■



SME President
John N. Murphy
VOL. 63 NO. 3 – VOL. 64 NO. 2

March 2011: VOL. 63 NO. 3

John N. Murphy: An interview with the 2011 SME President

April 2011: VOL. 63 NO. 4

Thanks for a great meeting; 2011 SME Annual Meeting saw record attendance

May 2011: VOL. 63 NO. 5

Is there a minerals crisis? 2011 SME/CMA keynote addressed this issue

June 2011: VOL. 63 NO. 6

We need your help Member input is crucial to the Society's most important roles

July 2011: VOL. 63 NO. 7

A report from the United Nations SME is represented at sustainable development commission

August 2011: VOL. 63 NO. 8

What it takes to build an engineer: Fas²R – do we have all the tools?

September 2011: VOL. 63 NO. 9

SME Community; Newest networking tool is now available to SME members

October 2011: VOL. 63 NO. 10

Midyear assessment; Implementation of strategic goals remains top priority

November 2011: VOL. 63 NO. 11

How do we ensure that SME continues to be a resource for its members?

December 2011: VOL. 63 NO. 12

Section networking; Local sections play an important role in SME

January 2012: VOL. 64 NO. 1

What makes SME tick? A note of appreciation to the dedicated volunteers and staff

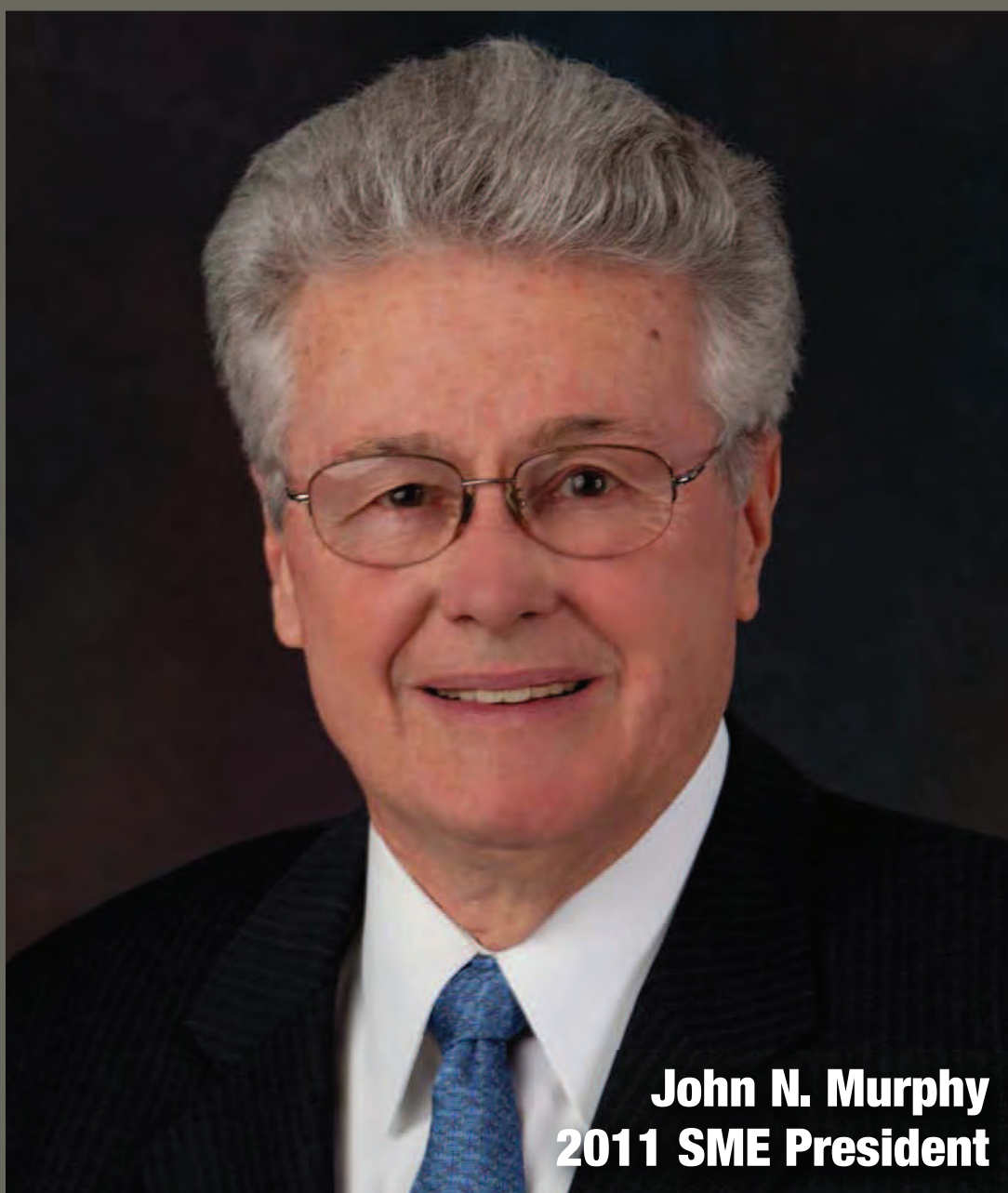
February 2012: VOL. 64 NO. 2

SME continues to grow Great team effort yields favorable outcomes for the Society

Mining engineering

OFFICIAL PUBLICATION OF SME

MARCH 2011
VOL. 63 NO. 3



John N. Murphy
2011 SME President

Special Editorial Supplement: **Tunneling & Underground Construction**

www.miningengineeringmagazine.com

John N. Murphy:

An interview with the 2011 SME President

What is your assessment of the status of the mining industry as we see some evidence of an economic recovery?

I am optimistic about the short and midterm prospects for the industry and, hence, for the professionals in the industry that constitute the majority of the SME membership. All who will read this interview recognize that the quality of life we enjoy today is largely a result of our achievements in the mining and minerals processing sectors. I believe that the sustainability of that quality of life and the aspirations of other sectors of the global community to attain that same lifestyle will significantly depend on the continued successes of these industries.

Looking at some of the traditional economic indicators, we see predictions of continued increases in gold prices during the next 12 months as a new round of quantitative easing keeps real interest rates low and drives excess capital flows from countries with trade surpluses — who have traditionally parked their money in U.S. government bonds — into other investable assets, such as gold.

On the fuel side of the industry, we have during the last decade seen a steady rise in the cost of coal, and some of the recent spot prices have seen dramatic increases. Some suggest that coal prices may rise sooner than anyone expects, as global reserves are revised downward. This is based on the hypothesis that some of the main coal-producing countries are overestimating supplies and that coal prices could start rising far sooner than anyone thinks — with obvious serious implications for energy policy. Those forecasters note that, for the past couple of decades, global supply has been dropping at a faster rate than consumption.

Even with an optimistic vision for the mineral industries, there are going to be challenges along the way. These challenges are likely to be “internal” and “external;” i.e., from an internal perspective with industry-initiated efforts to ensure favorable outcomes from



mining and mineral processing operations — domestically and abroad, and externally from the public and regulatory bodies, principally focusing on health, safety, environment and sustainability.

I believe that SME is well poised to have input into those initiatives. The Environmental Division continues to grow and provides quality programming. And the recently formed Health and Safety Committee has the opportunity to consolidate — and expand, as appropriate — the many health and safety related initiatives within SME.

SME has seen a number of new initiatives and changes in the recent past. Is SME positioned to serve the membership?

SME's primary goal is to serve the membership. I believe that during the past five years, SME has become increasingly responsive to member needs through the enhancements in member services. SME has seen six years of uninterrupted membership growth in spite of the worldwide economic situation. Some of the recently added SME benefits include the introduction of, or the expansion of, publications, topical meetings, short courses, E-books, and OneMine.org and OneTunnel.org. As the mining

In a broad sense, our mandate for the coming year is to meet member needs in a fiscally responsible manner and to identify needs and new opportunities that serve the membership and the profession.

and minerals processing industries increasingly become global enterprises, today's SME is at the forefront of disseminating reliable, technical information to its members by electronic media and advanced communications technologies.

There are more products and services on the way, including the anticipated rollout of SME Tech Online in the spring 2011. This service will provide online training, and CEU credits will be available for completed courses. Details of this emerging program are available on the SME website, both for users as well as prospective authors.

Organizationally, there have been changes in the past few years through mergers and acquisitions, including the Underground Construction Association (UCA) becoming the UCA Division of SME (2006), the Women's Auxiliary of AIME (WAAIME) joining SME as the WAAIME Division of SME (2007) and the Mineral Information Institute (Mii) joining the SME Foundation (2008). I expect to see more consolidations and mergers as we move forward.

A recent development within SME dictates that we look at the best organizational configuration for GEM. In September 2010, the SME Government and Public Affairs Committee recommended and the SME Board of Directors approved the establishment of the position of the Director of Public Affairs and Government Relations for the Society, and sought to recruit someone from the Washington, D.C. community who understands the technical issues of mining and understands federal government operations. In February, SME hired its first Director of Public Affairs and Government Relations. This decision redirects the "G" from GEM —

Government, Education and Mining — to the new Public Affairs and Government Committee. I will elaborate on this position later in this interview.

While products and services have been enhanced, it is also appropriate to note that the Society has seen six years of positive operating income. This is a tribute to keen fiscal management, increased operating revenues from well-received products and services and dues revenue from a growing membership base.

In a broad sense, our mandate for the coming year is to meet member needs in a fiscally responsible manner and to identify needs and new opportunities that serve the membership and the profession.

Is there a plan to realize these mandates?

Under the leadership of 2010 SME President Nikhil Trivedi, SME updated its strategic plan. The complete plan is available on the SME website, but I would like to highlight a few key aspects. Recognizing that our core values are as follows, we believe in:

- Members first: Customer satisfaction.
- Ethical behavior: Inclusiveness; accountability.
- Professional excellence: Partnering and networking; knowledge sharing and educational support.
- Innovation.

Through the 2010 strategic planning process, the SME leadership team identified the Society's future goals and assigned them to the SME strategic committees as follows:

- SME will be its members' indispensable resource for professional services (Education & Professional Development Strategic Committee, Jon Price 2011 chair).
- SME will be the primary resource of mining and underground construction information for all stakeholders (Products & Services Strategic Committee, Nikky Manke 2011 chair; Joe Driscoll serves as board liaison).
- SME will maintain a financially secure and stable organization in order to execute its strategic plan (Finance Strategic Committee, Bob Schafer 2011 chair).
- SME will establish strategic partnerships/relationships, alliances and coalitions (Outreach Strategic Committee, Tom Peyton 2011 chair).

- SME will review and reshape its infrastructure to better align with and support its strategic plan (Structure and Governance Strategic Committee, Bill Hancock 2011 chair).
- In addition, Barb Arnold assumed the presidency of the SME Foundation at the 2011 SME Annual Meeting in Denver, CO in February.

As part of the 2010 SME Strategic Planning Meeting last spring, it was decided that the SME board members do not have to be the chair of the strategic committees. In cases where the strategic committee members select another committee member to serve as the chair, the board member will serve as the liaison to the board.

I have listed above the 2011 chairperson of each of the strategic committees. As we all work to gain the insight of the membership — needs and opportunities — the SME leadership team and myself welcome input from the membership. I encourage members to reach out to these leaders as they seek to make the Society more responsive to the needs of the membership.

Strategic planning is a continuing process, but the 2010 update to the SME strategic plan was the first formal revision of the plan since 2005. Hence, there is some notable work for the strategic committees as we move forward and develop the tactics to implement the plan. Obviously, this is not a one-year initiative, but a process of continuous improvement that I have the opportunity to lead for the next year.

What are your goals for 2011?

There has been a lot of positive change in SME. What we need is steady direction, not a stack of new initiatives. SME is fortunate to have an integrated management team, including the past president, president, president-elect, president-elect designee, the directors at large, the executive director and the staff. Continuity of leadership and a very collaborative working relationship among the leaders has significantly facilitated growth in the products and services that SME delivers to the membership. In addition to the formal leadership team, several past SME presidents continue to contribute to the progress that SME makes.

There are many members who give tirelessly and selflessly for the Society. To all of you who have contributed and continue to contribute, I extend my thanks and appreciation. While we have many contributors, I know that there are some members who are uncertain how to get involved, either at the section level or on a national level.



How do members find opportunities to get involved with SME?

For all who would like to explore becoming more involved in SME and are uncertain of where to start, I welcome your inquiry. Hopefully, there will be sufficient expressions of interest that it may take some time to get you aligned with the right point of contact within SME. But it is my intent to respond to all expressions of interest. Please send your inquiries to me at smeresident2011@smenet.org.

This is your SME. SME is only as good as you perceive it to be, and as good as you elect to help make it.

Are there parts of the new strategic plan that are more challenging to implement?

Within the overall SME strategic plan, there are a few focus areas that I would like to highlight. Let me start with mechanisms for members to learn more about SME governance and operations and how to get involved:

National: At SME annual meetings, there is an orientation session for members who are assuming a leadership position for the first time. This is not a by-invitation-only meeting, but the staff would appreciate knowing that you wish to attend, so that the proper amount of seating and materials are available. By the time members read this interview, the annual meeting will be past. But do not wait another year to learn more about SME and areas where you can contribute. As indicated earlier, for all members who would like to explore getting more involved in SME, and are uncertain where to start, I welcome your inquiry. I welcome your expressions of interest by e-mail at smeresident2011@smenet.org.

Also, as I noted earlier, hopefully there will be sufficient expressions of interest that it may take some time to get you aligned with the right point of contact within SME, but it is my intent to respond to all expressions of interest.

The demographics of SME membership is

bimodal, as it is in the profession. There are many who are approaching retirement and there is a second set of members who are at the start of their careers. It is important that we provide opportunities for the younger members to contribute to SME and grow in the Society as they grow professionally. The Young Professionals in SME (members less than 36 years of age) has matured significantly in the past few years. It is a dynamic organization that has provided an effective forum for younger members to network and to develop programming to meet the needs and the interests of this section of the membership.

For all who would like to explore becoming more involved in SME and are uncertain of where to start, I welcome your inquiry. Hopefully, there will be sufficient expressions of interest that it may take some time to get you aligned with the right point of contact within SME. But it is my intent to respond to all expressions of interest.

If you are a young professional within SME, I strongly encourage you to contact the 2011 chair, Justin Anderson, or Mona Vandervoort, the SME staff liaison. I note that, while the SME Young Professionals are very active at the annual meeting, they network regularly and effectively on a regular basis using Internet-based tools. So, if you have an interest in contributing to this area, investigate the opportunities.

Local: The majority of the membership does not regularly attend the annual meeting. Instead, their primary connection to SME is via the Internet and through the local sections. As previously noted, SME has effectively developed Internet-based resources to serve members wherever they may be, and there is a commitment to continue to enhance and expand these capabilities. In addition, there are some members who, due to schedules and/or lack of proximity to the location of their section, find it difficult to regularly participate in section activities. So their connection and member benefits are via the Internet and products that can be mailed. We need to be diligent in continuing to serve that sector of the membership.

The size and level of activity in the sections varies. During the coming year, I plan to engage in dialogue with section leadership to learn of variations in activities, needs and to explore ways that the Society can help the sections, and how the sections can help the Society. To the extent feasible, I will personally visit with the sections, but getting to all of them will not

be feasible. I am exploring the use of video teleconferencing to increase the interactions with all of the sections.

One of the great services that SME facilitates is mentoring. There is a formal mentoring program that is organized in conjunction with the annual meeting. I have heard some interest in a mentoring program that accommodates members who cannot attend the annual meeting. Of course, as with any mentoring program, this would require a mentor and a mentee presumably located in the same geographic region. As noted earlier, I welcome input from the membership. If you have an interest in such a program, or suggestions on the implementation of same, please let me know your thoughts.

2010 SME President Trivedi initiated the "Local Section Heroes" column in *Mining Engineering* that recognizes contributors at the local section. Realizing that at the core of each local section is a group of dedicated volunteers who recruit members, organize section activities, work with local SME student chapters, raise money, provide educational outreach and more, a "Local Section Hero" will be profiled each month in *Mining Engineering*. This column will highlight an individual or a group of individuals who carry out unique and exemplary activity at the local section level over a sustained period of time. I encourage all members to nominate someone who is providing exemplary service to their local section, and to share with the membership the great examples of activities that makes SME the premier professional organization that it is.

It is important to recognize the professional achievements of our members and to thank those who contribute to the growth of SME. An ad hoc committee established by Trivedi and chaired by Drew Meyer is reviewing SME's existing awards programs. It will recommend to the SME Board changes, where warranted, to SME awards, divisional awards and standing committee awards and recognitions. The committee is free to establish the scope of its work keeping in mind the goal, which is to ensure, as a minimum, that all awards are consistent with their original intent. I look forward to the product of the committee's work, as it is essential to recognize the members' achievements and contributions.

Please elaborate on the new Director of Public Affairs and Government Relations position.

In September 2010, the SME Government and Public Affairs Committee recommended and the SME Board approved that SME establish a position of Director of Public Affairs

Murphy brings a distinguished career to the SME presidency

John N. Murphy is a research professor in the Department of Chemical and Petroleum Engineering and executive director of the McGowan Institute for Regenerative Medicine at the University of Pittsburgh.

He served as the research director at the Pittsburgh Research Center of the U.S. Bureau of Mines from 1978 to 1997. The principal research focus of the center was mine health and safety, but other studies were directed toward new mining technology and mine environmental issues. He served as a senior scientist at the Pittsburgh Research Laboratory, National Institute for Occupational Safety and Health, and visiting research professor at the University of Pittsburgh from 1997 to 2001.

Murphy is a registered professional engineer. He holds an undergraduate degree from the University of Pittsburgh and a master's degree from Duquesne University. He holds two patents and has authored/co-authored more than 90 technical publications.

During his tenure with the U.S. Bureau of Mines, he received the Department of Interior's Distinguished Service Award, the Presidential Rank Award for Meritorious Executive and the Presidential Award for Distinguished

Executive. He is the 2010 recipient of the PCMIA-Donald S. Kingery Memorial Award.

He continues to serve as the chair of the Executive Committee of Longwall USA and chair of the Visiting Committee for the Mining Department at West Virginia University.

He is a Distinguished Member of SME. Murphy served as president of the SME Foundation from 2004-2009. He is a past chair of the GEM Committee, a former director of the Coal & Energy Division and a past chair of the Pittsburgh Section of SME. Murphy has also served as director of the Pittsburgh Coal Mining Institute of America. He is a member and past president of the National Mine Rescue Association, a member and past president of the Mine Rescue Veterans of the Pittsburgh District, a member of the National Society of Professional Engineers, a senior member of IEEE, a member of the American Institute of Chemical Engineers, a member of the Mining & Metallurgical Society of America and past chair of the Pittsburgh Federal Executive Board. He is active in the Boy Scouts of America and the Carnegie Science Center Awards for Excellence program. ■

and Government Relations for the Society, and seek to recruit someone from the Washington D.C. community who understands the technical issues of mining and federal government operations.

It is important to note that SME, as a 501-C(3) organization, has significant restrictions on lobbying activities imposed by the Internal Revenue Code and other laws. Under IRS rules, there is a clear distinction between providing information to governmental officials, including elected representatives, and lobbying. SME needs to avoid activities that can be construed as lobbying in the course of providing factual information on mineral-related matters.

In February, John Hayden joined SME as its Director of Public Affairs and Government Relations. He has spent the past 16 years in the Washington, D.C. area, leading various environment, health and safety issues for the National Stone, Sand and Gravel Association. SME is fortunate to have Hayden join the organization as he works with SME members on issues of importance to the organization. We look forward to being more responsive to informational needs through this new capability.

As noted earlier, establishing the position of Director of Public Affairs and Government Relations effectively takes the "G" out of GEM – Government, Education and Mining.

To date, GEM volunteers have effectively and passionately carried out the "E" in GEM. The target audience has been predominately the public, teachers and students. The GEM Committee needs to look at the best way to configure the revised organization to effectively deliver our message. I also believe that the leadership of Mii needs to be a partner in this assessment. I have appointed an ad hoc committee of GEM, Mii leadership and staff to review the current situation with Mii and GEM. The charge to the committee is as follows:

To analyze, evaluate and recommend to the SME Foundation (SMEF) Board of Trustees' changes to the necessary operational structure for GEM and Mii to ensure that the industry, SME and the SMEF receive the greatest value from the outreach efforts of these two groups.

I look forward to the committee's assessment and recommendations.

Are there other needs that SME should focus on?

One of the challenges that faces the profession and the industry is how do we maintain a sufficient supply of professors to keep mining departments in this country viable? Mary Poulton and other academic leaders have clearly verbalized that the prospects for PhD-trained personnel will be insufficient to meet the

needs of institutions to replace retiring mining and minerals processing faculty. The lack of research funds has curtailed the training of PhD candidates, and the lack of research funds also decreases the possibilities of entry-level faculty meeting the requirements for tenure. This need and these issues are broader than the SME span of control, but the consequences of inaction clearly impact SME and our members. We will continue to help “spread the word” and explore opportunities to aid in the resolution of these issues.

I mentioned previously the formation of the new Health and Safety Committee within SME. By way of background, 2010 SME President Trivedi formed an ad hoc committee to review the many relatively separate health and safety initiatives within SME and recommend if actions

I believe that SME has the infrastructure and resources to achieve its mission of being the premier professional society serving the mining industry worldwide. As SME president, I look forward to leading the Society on the pathway to make SME a compelling stop for all mineral industry professionals as they journey through the industry regardless of their job function and regardless of their location.

or organizational changes were warranted in how SME addresses programming and other activities related to health and safety. After an in-depth study, the ad hoc committee recommended and the board approved the formation of a standing technical committee to address health and safety within SME. I am pleased to say that the inaugural meeting of this committee took place at the 2011 annual meeting under the leadership of Bob Washnock, chair.

Relative to changes at SME, I would be remiss if I did not mention the new headquarters building. The new facility will be occupied by the staff in March 2011 and will permit the consolidation of work and storage areas into one facility and provide the requisite space for a growing organization.

Talk about the SME initiatives related to outreach.

As previously discussed, the SME strategic plan includes an initiative for “SME to establish strategic partnerships/relationships, alliances and coalitions.” SME partners with the other societies in AIME, and has ongoing relationships with many domestic and international organizations.

One source of partnerships has been via the opportunities afforded through OneMine.org and OneTunnel.org. Participating societies in OneMine.org include SME, AIME, the

International Marine Minerals Society, the South African Institute of Mining and Metallurgy, the Rocky Mountain Coal Mining Institute and The Minerals, Metals, and Materials Society. In addition, the U.S. National Institute for Occupational Safety and Health has agreed to fund the posting of materials from the former U.S. Bureau of Mines and other agency publications on OneMine.org.

What do you see as the role for the SME Foundation in the continued growth of the Society?

Having served as the president of the SME Foundation, I have a good appreciation of the role that the Foundation plays in the daily operations of SME. The Foundation fiscally supports the annual operations of the ABET Committee, the GEM Committee, the PE Exam Committee and the Mineral Information Institute (Mii). Last year, these programs required a commitment of more than \$650,000 from the Foundation.

In addition, the Foundation administers the MMSA/SMEF Presidential Scholarship, Syd S. Peng Ground Control in Mining Award, Syd S. Peng Ground Control in Mining Scholarships and the McIntosh Engineering Fund.

The SMEF General Endowment Fund has lost focus as the SMEF leadership team has appropriately addressed the annual needs of the programs I just listed. One of the renewed initiatives of the SMEF is to grow the general endowment again.

What does the future look like for SME?

I believe that SME has the infrastructure and resources to achieve its mission of being the premier professional society serving the mining industry worldwide. As SME president, I look forward to leading the Society on the pathway to make SME a compelling stop for all mineral industry professionals as they journey through the industry, regardless of their job function and regardless of their location.

I am honored to serve my fellow professionals and the mining industry as president of SME for 2011. As noted earlier, today's SME is a product of the vision and hard work of many of our past leaders and many members who have ensured the progress that has been made. As we continue to work together, we can continue along the pathway to reach our strategic goals.

As I noted earlier, this is your SME. SME is only as good as you perceive it to be, and as good as you elect to help make it. We welcome the continued contributions of the members and seek the involvement of the rest of the membership. ■

Thanks for a great meeting; 2011 SME Annual Meeting saw record attendance



by John N. Murphy
2011 SME president

The 2011 SME Annual Meeting was held Feb. 27 to March 3 in Denver, CO in collaboration with the Colorado Mining Association. Thanks to all who contributed to the success of this meeting, including participating members and guests, exhibitors and the SME staff. The participation statistics are quite favorable:

- Registration: 5,745 (4,973 in 2010).
- Exhibits: 683 (630 in 2010).
- Students 548 (372 in 2010).
- 611 papers presented in 103 sessions.

Prior to the meeting, SME once again contributed to the community in which its meeting was held with the second annual Miners Give Back function. This year, more than 50 SME members packed boxes for the Food Bank of the Rockies, filling approximately 500 boxes of food for the needy in the Denver metro area.

In addition to the traditional scientific programming and networking among long-standing colleagues and new acquaintances, division meetings and luncheons, etc., much was accomplished in the furtherance of the Society's operations and recognition of members for contributions at the national and local levels. Some selected highlights include:

Scholarships and mentoring: The divisions and the foundation awarded 14 scholarships to 35 students with a total value of \$98,800. In addition, the WAAIME Division of SME continued in its outstanding service to the students and the profession by awarding 202 scholarships with a total value of \$202,000. The WAAIME Division and new division chair, Susan Harwood, are to be commended for their contributions to the development of mining professionals at the undergraduate and graduate levels.

As we reflect on the younger members of SME, let me share the continued progress in the development of the Young Leaders Program. Now 29 members strong, this group continues to provide programming, networking and mentoring for members under 36 years of age. Congratulations, and keep up the good and effective work.

The formal mentoring program at the annual meeting has always been one of the highlights for students and young professionals. This year was no exception, as about 240 students and 170 mentors participated in the program. Since its inception, thousands have participated in the mentoring program. I am also pleased to report that the Educational and Professional Development Strategic Committee is exploring the feasibility of offering year-long mentoring via the new SME electronic services.

SME has been developing a new way for members to communicate privately, share documents securely and post messages and questions for other members to respond to. This new service will be called the SME Community. It is a professional collaboration site created using the Higher Logic software, exclusively for the members of SME. Members will have the convenience of secure file sharing with their committees, sections and other interest groups while having discussions, using the membership directory and event calendar to coordinate meetings and events. Each section and student chapter will have its own dedicated page with the ability for every member of that group to post events and updates on activities.

All of these features will be integrated into the current SME website using the same login that members currently use. There are currently several SME committees engaged in BETA testing. More features like a Wiki Glossary, mentor/mentee features and mobile membership options will be coming soon. Look for more details prior to the official launch that is expected this summer.

Member recognition: At the division lunches and the SME-AIME dinner, more than 64 awards were presented. The awards will be listed on the SME website. I would like to highlight here the awards presented by President Nikhil Trivedi to recognize the longstanding contributions at the section level.

- Michael Korb, President's Citation for Local Section Service.
- Rohini Sharma, President's Citation for Local Section Service.

Other Presidential Citations were awarded to:

(Continued on page 18)



President's page: SME plots its course forward

(Continued from page 6)

- Hassan El-Shall.
- Jessica Elzea Kogel.
- Gary Huber.
- Brian Shaffer was given the GEM Individual Award.

We will continue to seek out and recognize contributions at the local level as well as the awards that are traditionally presented for national recognition.

Implementation of new initiatives: Under the leadership of 2010 President Nikhil Trivedi, SME established two new standing committees — Health and Safety, and Governmental and Public Affairs. Both committees had their inaugural meetings in Denver and the following is a brief synopsis of the outcomes of those meetings:

- The Health and Safety Committee, under the leadership of Bob Washnock and with the staff assistance of Bill Gleason, will assist current SME divisions in health and safety programming by developing programming and offering technical support and other services relevant to health and safety. The committee will participate in a joint safety and reliability conference with the Canadian Institute of Mining in October in Calgary, Canada and will explore partnerships with other societies and organizations with the goal of being the primary resource advocate for mine safety and health.
- The Government and Public Affairs Committee, under the leadership of John Marsden and with the staff assistance of John Hayden, will focus on strengthening SME's advocacy role for the mining and minerals profession

by providing relevant, nonpartisan, fact-based professional and technical information to government officials and others involved in public policy, regulatory affairs and others that impact the mining community. This will be accomplished by leveraging the expertise of SME's nearly 13,000 members to develop public policy technical briefing papers on issues affecting the mining industry; expanding SME's brand with stakeholders such as trade associations, engineering and geoscience societies as well as with Congress and the regulatory agencies and developing a proactive and reactive rapid response system to respond to technical inquiries from those stakeholders.

- The SME Sustainable Development Committee, which is not new, has a new initiative that received board approval; the committee will represent SME at the American Association of Engineering Societies

and World Federation of Engineering Organizations. One of the first activities will be participation in the UN organized Commission on Sustainable Development (May 2011).

These are just a few select highlights of the outcomes from the 2011 annual meeting. SME is advancing on many fronts and as I have said in the past, we seek increased participation from members who are not actively contributing in their areas of interest and competency. If you have an interest, and are unsure how to take the next step, I would like to hear from you.

The next annual meeting, in Seattle, WA (Feb. 19-22, 2012) is 11 months away. While I encourage you to save the date, we have lots of work to do in the interim. I thank the many members who are contributing and welcome the opportunity to introduce others to the current leadership of committees of activities that you have an interest in.

By the time you read this column, we will have celebrated Engineers Week, but let me belatedly extend to all in the profession best wishes for a successful year. ■

Exploration: budgets are expected to be healthy in 2011

(Continued from page 12)

rare earth elements continued to increase in 2010, exploration budgets for these commodities jumped to almost four times the amount spent in 2009," MEG noted. "Nevertheless, they remain a relatively small part of the industry's overall exploration effort."

Aggregate uranium budgets were up 24 percent in 2010 with uranium spending representing more than 7 percent of the \$11.5 billion

worldwide exploration budgets.

MEG observed that the emphasis continues to be on late-stage exploration, which increased 52 percent last year to account for about 42 percent of worldwide exploration. "With companies of all types focusing less on grassroots work, there is some concern that many companies, and perhaps the industry in general, may be sacrificing long-term project pipelines in favor of short-term growth." ■

Is there a minerals crisis? 2011 SME/CMA keynote addressed this issue



by **John N. Murphy**
2011 SME president

Many of you attended the SME/CMA Keynote Session at the annual meeting (Feb. 28, 2011) entitled “Shaping a strong future through worldwide mining.” First, I would like to extend our appreciation to Bill Langer and his 2011 Program Committee for organizing an excellent keynote session and as well as a great overall meeting. The following is my brief synopsis of the session and my reinforcement of the principal messages that came from the presenters.

By way of introduction, the keynote session was designed to address the issues and opportunities facing the United States related to the rapidly increasing worldwide demand for minerals, from “common” commodities such as fertilizers, to critical and strategic minerals essential for our way of life and national defense. As the session announcement stated, “the United States has become the world’s most powerful and prosperous nation by leveraging its vast natural resources in an array of products essential to modern life. Cell phones, automobiles, computers and virtually everything we use, requires minerals. This appetite for minerals will continue to grow.... meanwhile the U.S. is becoming increasingly dependent on foreign minerals. For example, the United States is 100 percent import dependent on 19 key minerals including rare earths, which are essential for military and renewable energy technologies. America also imports most of the silver, tungsten, titanium and palladium used to manufacture everything from automobiles to solar power.”

Domestic issues, as most of the SME membership is well aware, include permitting delays, the increasing burden of government regulation and the lack of public awareness of the benefits of mining/minerals. These issues have discouraged domestic mineral investment in recent years, notwithstanding increases in commodity prices. A recent survey of mining executives shows that companies spend less than 10 percent of their exploration budgets within the United States.

The session announcement also introduces

the issue that, as the developing countries continue to grow their economies, competition for resources are certain to grow as well. The issue brings significant domestic implications, unless the U.S. adopts, and successfully implements, strategies designed to secure its energy and mineral security. This will involve developing the resources we have here in the U.S. and abroad.

In my opinion, the keynote session clearly fulfilled the charter of identifying the issues and opportunities related minerals availability. For those who did not attend the keynote session, the presentations are available online at www.smenet.org/meetings/annualmeeting2011/sessions/index.cfm.

The following are introductions of the panel and my brief synopsis of each presentation.

Russell Ball, executive vice president and chief financial officer, Newmont Mining Corp. Ball addressed sustainable mining and access, as well as the substantial increases in demand for resources, especially from developing countries such as China and India, and hence the substantial increases in prices (realized and anticipated). As an example, Ball noted that by 2025, China will use more copper than is produced worldwide today. Hence, he concludes, all countries will be forced to compete for more limited global resources — with growing demand. He suggests that the keys to meeting these challenges are engagement, leadership and transparency.

Hal Quinn, president and chief executive officer, National Mining Association (NMA). Quinn addressed the U.S. endowment and the issues related to access to federal lands, permitting and the relative rates of taxation in the U.S. vs. other countries. He introduced the new NMA initiative “Mining Vision 2030,” designed to demonstrate the value proposition of mining to the public and policy makers.

Stephen D’Esposito, president, RESOLVE. D’Esposito introduced his strategies on the use of collaborative strategies and tools and how these resources can be used to improve interactions with stakeholders.

Vince Matthews, director, Colorado Geological Survey. Matthews provided a chronological log of key developments related

(Continued on page 16)



President's page: SME plots its course forward

(Continued from page 6)

to critical and strategic minerals; included in his log were:

1914	Established national defense stockpile.
1980s	U.S. decides to sell minerals stockpile.
2003-08	Mineral prices soar and China begins to buy up mineral resources around the world.
2006	Japan doubles the size of its minerals stockpile.
2008	South Korea starts stockpile.

He cited two National Academy of Sciences (NAE) reports issued in 2008 that reported the following:

- Need for improved minerals-related data collection and dissemination.
- The fact that the U.S. minerals stockpiles were inadequate and that the Department of Defense (DOD) was vulnerable due to inadequate stockpiles, and further — the DOD was unaware of the predicament.

Matthews advised that the U.S. has stopped the sale of 13 minerals from the national stockpile based on the NAE report. He also shared the observation that U.S. imports of fertilizers (phosphate, potash, nitrogen) are increasing, as are the prices for same. Hence, from his perspective, the minerals shortage issues are a lot broader than the traditional list of critical and strategic minerals — or perhaps we could say that all minerals are becoming critical and strategic.

Matthews used the following quote from Tom Freedman's Book "The World is Flat" to characterize the environment in which these international minerals-related issues are being played out:

"The world is a football field and you've got to be sharp to play on the team that plays on that field. If you're not good enough, you're going to be sitting and watching the game. That's all!"

Rajesh Rao, founder and CEO of Dhruva Interactive

I believe we lost the game relative to rare earth availability. The question is, will we lose the broader game relative to other aspects of minerals availability?

Matthews concluded by citing a section of the keynote program announcement "we need more than a national minerals or energy policy. The U.S. needs a revolution in public awareness of the essential role that mineral products play in our society. This will require companies to effectively deploy programs to gain such acceptance through sustainable and environmentally responsible mining."

It is interesting to note where you find these minerals-availability issues being raised. A Google search returns a multitude of hits, mostly introducing the issue, but there are relatively few recommended plans of action to solving this ever-increasing need.

I noted with interest that the podcast series hosted by Steven Cherry for IEEE Spectrum's "This Week in Technology" has addressed these issues. The program "No Data Mining Without Mineral Mining" (Nov. 17, 2010), available at <http://spectrum.ieee.org/podcast/green-tech/conservation/no-data-mining-without-mineral-mining>, is an interview with James Burnell, a geologist with the Colorado Geological Survey, where he reviews the fact that "China has cornered the market for the world's rare earth metals, mining 95 percent of them. There was a fear that China would use that near monopoly, and sure enough, in September, the country began blocking shipments — mostly to Japan, with whom it has territorial disputes, but also to the United States and Europe. Rare earth metals are needed for all sorts of high-

tech products: iPhones, flat-screen TVs, electric cars, even wind turbines and photovoltaic cells. Politics aside, China has plenty of manufacturing reasons to hoard its rare earth metals — demand greatly exceeds the supply."

Also note the IEEE Spectrum's article "The Rare-Earth-Metal Bottleneck" (Jan. 2010), available at <http://spectrum.ieee.org/consumer-electronics/gadgets/the-rareearthmetal-bottleneck>, where the issue of China producing most of the world's rare earth metals, and how soon it will need all that it produces, is addressed.

So...how do we address this important and rapidly increasing set of issues?

- We do need a national energy and minerals policy. Multiple administrations — for decades — have skirted this issue. Many of us complain about too much governmental involvement in the way that we conduct business. But, in this case, the lack of involvement has led to serious consequences and the continued lack of such policies will lead to even more dire consequences.
- As the introduction of the annual meeting keynote session stated, "we need more than a national minerals or energy policy. The U.S. needs a revolution in public awareness of the essential role that mineral products play in our society. This will require companies to effectively deploy programs to gain such acceptance through sustainable and environmentally responsible mining."
- Can I be so bold as to suggest that partnerships — public/private and private/private — are the way to move forward? I see inaction in some aspects of this situation and advantages to coordination of ongoing activities. ■

We need your help

Member input is crucial to the Society's most important roles



by John N. Murphy
2011 SME president

One of the most important functions of SME is to provide mechanisms to recognize the professional contributions of its members. On an annual basis, SME administers nearly 50 awards recognizing individuals and groups for contributions to the Society, to the profession and to the public. Although many awards require SME membership, there are a few SME sponsored awards in which SME membership is not a prerequisite. In these cases, the award is a vehicle to provide recognition for outstanding contributions in the mining and minerals processing areas independent of the contributor's

affiliation with SME. The range of awards is too extensive to list here, but all SME awards are listed online at www.smenet.org/awards.

While SME administers these awards, the nominations come from you – the SME members who are the subject-matter experts and whose opinions the Society relies on. The nomination deadline for most SME awards has already passed (June 1), however, it is not too early to be thinking about nominations for next year's awards. For most awards, SME's active award nomination period is April 1 to June 1, but award nominations are accepted throughout the year. While the nomination process for all SME awards is relatively straightforward – and certainly not complex – the competition is intense, so we should all “play to win,” i.e., nominations need to be well prepared, with sufficient details on the contributions of the candidate so that a selection committee can clearly delineate the contributions of each nominee.

Just remember:

1. Waiting until the last minute to prepare a nomination likely reduces the quality of the write-up and, hence, the chances of your candidate being the recipient and;
2. Nominations can always be submitted early, but they are never accepted after the deadline ... so why procrastinate — identify the matches between available awards and great candidates, and start preparing the nomination now.

While SME administers these awards, the nominations come from you – the SME members who are the subject-matter experts and whose opinions the Society relies on.

Still to come this year – SME will soon begin accepting nominations for the following AIME awards, which are now (effective this year) being administered by SME: Frank F. Aplan Award; James Douglas Gold Medal; Robert Earll McConnell Award; Charles F. Rand Memorial Gold Medal; Environmental Conservation Distinguished Service Award; Mineral Economics Award; and Mineral Industry Educator Award. Look for more information on these awards and their nomination deadline on the SME website in the coming weeks.

Another form of awards is scholarships, and there are a multitude of scholarships available from SME through its divisions and the SME Foundation. Details are online at www.smenet.org/scholarships. The application period for the majority of SME scholarships runs from Aug. 25 to Oct. 25. I encourage all of our student members to review available scholarships and start lining up their required documents now. While all of the SME Divisions have excellent scholarship programs, I note with appreciation that during the 2011 Annual Meeting in Denver, CO the WAAIME Division awarded 106 scholarships with a total value of \$205,500 to students pursuing degrees at U.S. institutions. In conjunction with its international sections, WAAIME also awarded an additional \$60,000 to students at international universities. WAAIME has been providing financial support to mining and minerals industry students for more than 84 years. We truly appreciate their support of our students.

We also seek your help in identifying the future leaders for SME. In the April issue of *Mining Engineering* (page 110), I issued a call for candidates as we began the annual process to select the new members of the SME national leadership team for 2013 and beyond. My request to all SME members was that they identify potential candidates for the

(Continued on page 31)

President's page: get to work on your nominations for leaders and SME awards

(Continued from page 6)

SME Strategic Committees and the SME Board of Directors starting in 2013 as well as for candidates for the SME President for 2014. The recommendations will be carefully reviewed by the nominating committee that I chair, and the committee will prepare a slate of nominees to be approved by the current SME Board of Directors.

We seek the involvement of all members in the operation of the Society and the input of the membership in the identification of the leadership team. Please consider those who can help to lead SME to the next plateau in serving a growing membership (and self-nominations/volunteers are welcomed and encouraged).

As noted in prior correspondence, if you, or a colleague who is a SME member, want to get involved, but are not certain in the path to contribute, we welcome your expressions of interest as well as your questions.

If you have not submitted a candidate, additional submissions are welcomed until July 15. Please contact Mary O'Shea at oshea@smenet.org for additional information.

I thank all in advance for your recommendations. ■

Joy Global to acquire LeTourneau for \$1.1 billion

JOY GLOBAL INC. will expand its product line significantly with a \$1.1-billion acquisition of LeTourneau Technologies from Rowan Cos. The deal will enable Joy Global to enter the oil-and-gas mining market.

Caterpillar Inc.'s \$7.6 billion deal for Bucyrus International Inc. late last year left Joy Global as the only remaining pure play in the surface — and underground — mining equipment market. The company has seen orders improve in recent quarters as higher prices for commodities such as copper and coal spur mine operators to revive expansion projects and plans for new mine sites shelved in late 2008 when demand and prices collapsed, *The Wall Street Journal* reported.

The deal for LeTourneau gives it access to two business segments — mining and drilling products. The mining products business manufactures large wheel loaders for surface mining, while the drilling products business designs offshore jackup drilling rigs and other components for the rigs. ■

Local service, global support



Outotec innovates, develops and delivers sustainable solutions to the minerals, metals, chemical and energy industries. Outotec's lifelong collaboration with its customers helps optimize the utilization of raw materials and energy efficiency, as well as minimize the environmental impact and operating costs.

Now that Outotec's expertise in minerals and metals processing is enhanced with Larox's expertise in solid-liquid separation they can serve you even better.

Outotec operates through a global network of service centers committed to providing support whenever its needed. From equipment transfer and training, to maintenance, onsite inspections, upgrades, modernizations and ultimately decommissioning, Outotec is your trusted partner for the life of your operation.

services.na@outotec.com

www.outotec.com

Outotec

A report from the United Nations SME is represented at sustainable development commission



by John N. Murphy
2011 SME president

The SME Board approved a plan for SME to be represented at the United Nations Commission on Sustainable Development meeting held in New York in May 2011. A part of the deliberations addressed the development of policy statements related to sustainability in mining. SME members in the delegation included Dr. Deborah Shields, Dr. Jessica Elzea Kogel and Dr. Michael Karmis, with input from the SME Sustainable Development Committee and other members.

I have asked Dr. Shields to summarize the activities and the outcomes, as I believe that we need to be at the table and that the SME membership must be aware of these initiatives and the possible outcomes. The following is a synopsis of the meeting, and may I extend SME's appreciation to the delegation for sharing their expertise and time to represent us in this important meeting.

Deborah Shields' synopsis

During the first two weeks of May, SME members participated in the United Nations Commission on Sustainable Development (CSD-19) meeting held at United Nations (UN) headquarters in New York. The purpose of the meeting was for member states to negotiate and agree on draft text pertaining to international policy in five thematic areas. These included waste management, transportation, chemicals, mining and sustainable consumption and production.

This is the second year of a two-year cycle for these five thematic areas. The first year was a review of the state of the world. During the second year, member states have focused on formulating policy statements. The starting point for the deliberations on mining was based on two documents: the Chair's draft negotiating text and the Intergovernmental Forum Policy document (<http://www.smenet.org/page/index.cfm?id=920>).

Negotiations were carried out between member states during open sessions where nongovernmental stakeholders (representatives of the UN CSD's official Major Groups) were allowed to observe the process. Each member state expressed its views and proposed alternate

text consistent with these views. Discussions were orderly and adhered to a standardized format. However, as is often the case when substantive international issues and policies are being discussed, divisions among the various member states and their respective positions on mining and sustainable development became clear early in the sessions.

Debate mostly centered on mining's potential contribution to sustainable development, the environmental and social impacts of mining, and the need for corporate social responsibility. Other issues that garnered attention and proved contentious in the end focused on language addressing the distribution of benefits from mining, the need for good governance and transparency, and reference to specific International Labor Organization (ILO) conventions. Two areas of agreement were the need for technology transfer, and the removal of references to free, prior and informed consent.

At the Chair's discretion, selected Major Groups were invited to make brief statements to the assembly. The Major Groups are women, children and youth, indigenous peoples, nongovernmental organizations (NGOs), local authorities, workers and trade unions, business and industry — which included the International Council on Mining and Metals (ICMM)— scientific and technological community (STC) and farmers.

SME participated in CSD-19 as a member of the World Federation of Engineering Organizations' (WFEO) delegation to the STC. On two separate occasions, the STC Major Group was invited to provide input on mining. Formal statements emphasized that policy should be informed by sound science, engineering expertise and economic realities. The facts that science and technology are integral to achieving sustainable development goals, that research and innovation are essential, and that implementation of existing technologies can help address many of the issues being raised and debated within the CSD, were also presented.

The Major Groups also had the opportunity for dialogue and input through workshops, roundtables and side events, including one hosted by the STC in which the role of

(Continued on page 17)

President's Page: SME participates in UN Council

(Continued from page 6)

mining in sustainable development was highlighted. Additionally, stakeholders participated in informal side discussions with delegates from various member states, reiterating messages such as the importance of engineering education and innovation.

Participation in CSD-19 proved to be a very positive opportunity for SME on several important levels. One of the foremost is that SME demonstrated international leadership in the area of sustainable development and mining. In addition, several key messages were communicated, namely mining has a positive contribution to make to sustainable development, mining professionals are part of the solution to sustainability and not part of the problem, and sustainability depends on the application of

appropriate technology throughout the mine life cycle. Our messages were heard because we participated as a neutral, unbiased voice for WFEO and minerals professionals, a position consistent with the SME strategic plan and 501(C3) status.

Unfortunately, although the mining text was agreed upon among the negotiating member states, overall agreement on a final CSD 19 text could not be reached due to differences of opinion in several areas, including waste management, intellectual property rights and means of implementation. So the meeting ended without adopting a decision. Negotiations will resume in Rio de Janeiro, Brazil next year at CSD 20 (Rio +20).

Nonetheless, the mining text as it stands, is significant in its

scope (17 paragraphs) and the repeated calls for capacity building and technology transfer. SME clearly has an important role to play in providing the technical and engineering information required to ensure that mining makes a net positive contribution to sustainable development. Furthermore, SME's continued engagement in this process will help ensure that mining's story is told in a balanced fashion and that UN mining policy be based on sound and unbiased science and engineering.

In closing, I believe that SME has an opportunity to build on the strong presence we had at UN CSD by providing international leadership on technology transfer and capacity building through the WFEO Committee on Engineering and the Environment. ■



Feel Like You're Missing Something?

The SME Membership Directory is Online!

To access the online SME Membership Directory, follow these simple steps:

1. Go to www.smenet.org
2. Click the 'Log In' button on the left side of the page and log in using your SME member number and password
3. Click the 'Directory' button in the upper right of the page
4. Search for any member using any of the provided fields

Mining
engineering

OFFICIAL PUBLICATION OF SME

SME
Society for
Mining, Metallurgy
& Exploration

Contact SME's IT Department:
Email: webmaster@smenet.org • Phone: 303-948-4200

What it takes to build an engineer: FAS²R – do we have all of the tools?



by John N. Murphy
2011 SME president

For those who have matriculated in the profession, you will recall the steps and the resources required to reach your current professional position, namely an accredited undergraduate program, taught by skilled faculty, in many cases with fiscal support for students such as scholarships, and finally registration as a professional engineer; i.e. FAS²R, or:

- Faculty
- Accreditation
- Students
- Scholarships
- Registration

ALL of these tools (or resources) are required to realize the desired end product. Let me briefly review these areas and share my assessment of the status of each:

Faculty:

A university needs qualified (and qualify-able) faculty. I suggest that “qualifiable” may be the key component in the current environment. For a university department to be viable and sustainable there must be tenured faculty and there must be opportunities for new faculty to achieve tenure.

Achieving tenure requires research that produces scholarly, peer reviewed publications (in addition to other requirements). Research requires funding, which is in short supply these days. Since the closure of the U.S. Bureau of Mines, the sources of funding for faculty in mining and minerals-related departments have been tenuous at best. Further, available funding tends to flow to more experienced faculty.

While my dialogue with many mining engineering department chairs has a similar chord, I would like to synopsise the situation with data recently shared by Michael G. Nelson, chair of the Department of Mining Engineering at the University of Utah. Nelson notes that “in 2007, M.K. McCarter identified 75 faculty members in the 15 accredited U.S. mining or mineral engineering programs and that the average age of these professors was 52.1 years. [McCarter, M.K., 2007. “Mining Faculty in the United States: current status and sustainability,” *Mining Engineering*, Sept, pp. 28-33]. In 2010,

the chairs of the country’s mining engineering programs identified 15 vacant faculty positions, and counted a total of one or two graduating doctoral candidates who had expressed interest in an academic career.” Hence, there is currently a shortage of faculty in mining engineering departments, and with the expected retirements in the next 10 years, the shortage is likely to increase.

University regulations require the individuals hired as tenure-track faculty members hold a Ph.D., and as Nelson notes, such individuals are rare for several reasons:

- Few of the mining engineers who graduate with bachelor’s degrees are interested in pursuing a Ph.D. because the starting salaries offered by industry are so attractive.
- Industry has recently begun to recognize the value of post-graduate training, particularly in areas like rock mechanics and mine ventilation, and such individuals are often offered even higher salaries for positions in industry.
- Individuals considering a university career are often put off by the prospects of the academic tenure process.

General estimates to a level of support to gain tenure suggests that in the first five years of service, a new professor must receive two or more significant research grants, of \$200,000 to \$500,000 each, and publish two to three refereed papers per year.

SME initiated in 2007 a Ph.D. scholarship program, but the level of funding is clearly insufficient to meet the need. To date four scholarships have been awarded – far below the required level of activity in this area.

As noted above, the opportunities to compete for and secure for research funding is difficult at best under the current arrangements. I suggest that industry needs to step up and get engaged for its own self interest.

In terms of serving current industry research needs, a five- to six-year Ph.D. program is typically longer-term than the industry has the patience for. Based on my past experience, there are ways to have such programs win-win through a segmented program that provides intermediate

(Continued on page 16)



President's Page: Engineer shortage continues

(Continued from page 6)

a segmented program that provides intermediate deliverables of use to the operating sector of the industry.

Accreditation

ABET, Inc. (formerly Accreditation Board for Engineering and Technology) serves as the accreditation body for undergraduate educational programs in the areas of applied science, computing, engineering and technology in the United States and abroad.

SME participation in the ABET accreditation program ensures that there are accredited degree programs that provide qualified professionals who may become licensed professional mining and mineral processing engineers. SME contributions to the accreditation of mining and minerals processing academic programs includes the training of evaluators, annual update sessions and the cost of the required observation visits once the person is trained and before an official evaluation visit is assigned. The average annual support from the SME Foundation is about \$35,000.

In general, this aspect of what is required to build an engineer is effectively managed and is "under control."

Students

An SME staff analysis suggests that for the next 10 years, the U.S. mining industry will need to recruit 300 mining engineers per year. In 2010, there were 285 who received a B.S. in mining engineering. However, only 178 (60 percent) started their careers in the mining industry, with 20 percent going to the construction/aggregates industry and 20 percent going to the underground construction industry. In addition to the "migration" to other industries, many believe that this shortfall is because students are unaware of the opportunities for mining engineers or because they have a negative perception of the mining industry.

Collectively, we need to better

promote the career opportunities in the industry.

Scholarships

There are a multitude of scholarships available from SME, the divisions and the SME Foundation. Details are online at www.smenet.org/ scholarships. While all of the SME Divisions have excellent scholarship programs, I note with appreciation the WAAIME Division that has a long tradition of supporting student training. For example, at the 2011 Annual Meeting, the WAAIMEs awarded 106 scholarships with a total value of \$205,500 to students pursuing degrees at U.S. institutions.

Companies in the mining industry routinely support students through scholarships, by grants to departments, and through part time/summer employment. I am not aware of any estimates on the level of corporate scholarships. But, at the current level of student enrollment, my assessment is that with the combined scholarships from all sources, there are adequate scholarships to address the need. If we achieve the required growth in mining engineering students, there will be a need for additional scholarship support.

Registration/Licensure

On the surface, it may appear that one who wishes to be a licensed professional mining or mineral processing engineer — after meeting the pre-exam requirements — just needs to pass the exam. In fact, there are many activities behind the scenes that are required before anybody can sit for the exam. As SME leads the way in maintenance of the infrastructure for the mining and minerals processing exam, and the SME Foundation funds these activities, let me briefly synopsise these events:

- While the National Council of Examiners for Engineering and Surveying (NCEES) is responsible for the nationwide administration of the P.E. exams in all states, for

all engineering disciplines, the SME Professional Engineers Exam Committee is responsible for the development of the mining and minerals processing examination.

- Periodically, SME is required to conduct a Professional Activities and Knowledge Study (PAKS) to lay the foundation for future P.E. examination specifications.
- These activities require on average support from the SME Foundation of approximately \$40,000 per year.
- In addition, SME annually sponsors a training course for those who intend to take the exam.

In general, this aspect of what is required to build an engineer is effectively managed and is "under control."

What is not under control?

As previously described, some of the components of this overall process are covered and have adequate resources. However, the following need attention:

- Student recruitment.
- Faculty recruitment and retention.

Student recruitment

Mining engineering departments currently recruit new students through:

- Word of mouth.
- References from alumni employers and others.
- High school recruitment.
- On campus recruiting for entering students who are interested in engineering but have not selected a specific discipline.

We collectively need to increase

(Continued on page 17)

OceanaGold: Didipio gold mine is expected to have 14-year life

(Continued from page 10)

life of the mine,” said chief executive officer Mick Wilkes. “This robust project will be transformational for OceanaGold and give us a significant platform to expand further into the Philippines and throughout Asia Pacific.”

The project is estimated to cost \$185 million to develop, with around \$12 million already spent to date. Wilkes said that the board of OceanaGold has now formally approved the remaining capital

expenditure to complete the development of the Didipio project.

Mining at Didipio would be undertaken in six stages, over a 14-year period, taking the openpit to 270 m (885 ft) to the valley floor. The maximum planned mining rate was estimated at around 21.7 Mt/a (24 million stpy).

The access to the underground area through a decline from the side of the openpit is planned to start in 2016, with underground production currently planned for 2020 and ramping up to 1.1

Mt/a (1.2 million stpy) by 2023.

The underground mining is expected to take place for at least six years of the mine’s life, and would run concurrently with the openpit operation. The process plant would start operation at 2.3 Mt/a (2.5 million stpy) and would eventually ramp up to 3.1 Mt/a (3.5 million stpy) by the end of the second year.

The Didipio project has an estimated gold reserve of 52.2 t (1.68 million oz) and an estimated copper reserve of 207 Mt (229 million st). ■

President’s Page: Need for qualified people is high

(Continued from page 16)

the promotion of careers in the minerals industries, but we also need to ensure that there are viable academic programs for the students, as discussed below. There are long-term programs like the SME GEM and Mii programs that are designed to raise awareness of our mineral-based economy. What needs enhancement are methods to reach high school and university freshmen on the career opportunities in mining and minerals processing.

Faculty recruitment and retention

As previously noted, ensuring an adequate number of faculty for mining and minerals processing engineering academic programs requires research funding for new faculty for the first five years. In the United States, the private sector supports mining education in four ways: providing scholarships for students, providing direct cash grants to mining engineering departments, providing endowments to support faculty positions or research and providing direct cash support for research.

There are examples of more extensive of industry support for mining engineering programs in other countries:

- In Australia, coal producers contribute approximately A\$20 million annually to a program of collaborative research that is conducted for the benefit of the coal mining industry.
- Many mining companies contribute directly to the funding of research through the Australian Mineral Industries Research Alliance (AMIRA). Projects typically last three years, and are funded at about A\$1 million per year.
- I learned from my discussion with Nelson that, as an alternative means to meet faculty needs, the Chamber of Mines of South Africa has coordinated a program in which qualified personnel from industry are seconded to the University of Pretoria for a specified period of time, usually three to five years. With this support, the department has had sufficient faculty and has been able to almost double its enrollment, thus coming close to meeting the demand for graduate

mining engineers in the South African mining industry.

I leave you with these thoughts:

- When I say “the industry,” I mean more than mining companies. The beneficiaries of a good supply of graduating mining engineers certainly includes equipment manufacturers, supply companies and consulting companies — in addition to mining companies.
- I have shared some examples of initiatives in other countries only to say that the mining industries in some other countries have recognized the need and have devised solutions to address that need. In the United States, the parties need to come together and decide on the best means to meet the needs in this country.

The starting point to address these needs is to begin the dialogue. This is an open invitation to all interested parties to join SME in affirming the magnitude of the need and to explore solutions. ■

SME Community; Newest networking tool is now available to SME members



by John N. Murphy
2011 SME president

One of the functions of SME is to facilitate networking among members. This service is important for the work of SME committees and planning activities, as well as for members' professional pursuits. While the annual meeting is one of the premier networking events within SME, networking needs to be regular and frequent versus once a year. For the remaining 51 weeks of the year, the majority of us currently rely on the traditional tools of telephone, list serves, chat boards — such as Yahoo Groups or e-mail chains — to have discussions about meetings, SME committee activities, other SME events or professional activities.

During the past few years, we have received many suggestions about how the efficiency and effectiveness of SME volunteers would be increased with an electronic community that had linkage to SME's digital resources.

Some of the challenges encountered with the old way included blocking attached files from e-mails by some companies so members would have to put files to be shared up on a hidden link from SME's website for the committee members to download. Other companies block social networking pages like Yahoo Groups because they believe they are not productive when used on company time.

SME got the message more than a year ago and the SME staff has been implementing a solution to meet the needs and requests of the membership. With the help of many members who have participated in the Beta tests, the system — named SME Community — is now ready for all to use and enjoy. I believe that this private member community will enhance the way we will communicate and build relationships within our community.

With the SME Community, our members can participate in the Community discussion groups, post files and search the resource library, add and search events on the calendar and contact colleagues while making new connections in a members-only network.

For the initial launch, the SME Community currently has five products:

1. Directory 2.0: Having the Community

linked to the SME member database gives members the option and the convenience of having their profile information listed for them within the Community. There is no need to go in and start from scratch to build another networking profile. You can create a comprehensive and interactive profile that will represent you professionally and individually within the SME Community. Your profile is similar to an online resume, but with volunteer engagement feeds and member connections. Users will not only be able to browse information and facts, but they can interact with you. For example, users can see your committee participation levels, volunteer activities, attendance at education events and contributions to the advancement of SME and the profession. You work hard, why not show it?

You should think of your profile as your personal platform among your peers and colleagues within SME. You have the option to search for other members, browse other profiles and identify potential contacts and groups of like-minded people. Connect with colleagues and friends in a matter of minutes, essentially building a professional network map you can access from anywhere in the world. A variety of security settings exist so that you can set access to various parts of your profile and decide how your profile should be used.

A feature of the software provides the opportunity to recognize members for their contributions to SME in their Community profile. SME can assign a pendant (digital ribbon) recognizing a member's committee participation and awards.

2. Discussion forums: Are you looking for recommendations or have a question you would like to ask your network? Using the SME Community's discussions, users can post, respond or browse discussion threads. You will receive an easy-to-read e-mail that contains a picture of the author (assuming the author has added a picture to his/her profile) linked to the author's profile, a link to the online archive where all postings are automatically stored and a mistake-free link to respond to either the author or the entire group. You can start new conversation topics or conduct research. You will be amazed at the collection of information

(Continued on page 17)

President's Page: Login to the SME Community

(Continued from page 6)

and data SME's discussions can generate every day.

3. Resource library: The resource library is a treasure trove of user-generated content posted by members for members. You can securely share documents and work collaboratively with other members while institutionalizing content into SME Community's knowledge base. The resource library can hold multiple kinds of documents, including streaming video, PowerPoint presentations, PDFs, images, Microsoft Office and Apple iWork documents. And the automated tag cloud provides a way to see the most frequently used definitions.

4. Event calendar: Members like to share their local chapter events and meetings on the calendar. It is open to all members for searching. They can search by event type or keyword to view all of the events that are taking place in our Community. And you choose the format you want the display (graphical or list view). It also includes the archive of past events.

5. Blogs: Another feature of the Community is blogs. We have created a Presidential Blog as a means to facilitate dialogue between me and the membership. You can blog as well — try it and assess how these resources can help you.

The future of the SME Community

The staff is building new features into Community. The next features to be released include:

Wiki glossary: This collaboration and reference tool was created with the member in mind, and we need your help to keep it up to date and accurate. SME's Wiki glossary will be designed to be a constantly evolving storehouse of terms. Users can add or modify entries all in one place. SME's Wiki glossary will be set up with easy-to-use content creation interfaces, so members can post and modify new definitions, as well as rate, comment and view related terms.

The mentor/mentee module: This new feature will allow members to establish a mentor or mentee profile and let them connect with other mentors/mentees. This will keep our program active throughout the year — not just at the annual meeting as we currently do. The enrollment feature will allow users to choose how many people they are willing to mentor and even offers the ability for mentors to temporarily opt out if they are unavailable due to other commitments.

To join, go to the SME Community website at <http://community.smenet.org>.



org. Login using your SME login and password, then go to the Community home page by clicking on the SME Community logo. Follow the steps in the "Getting Started" box and start connecting today. For some who have used other electronic communities, getting started will take minutes. For others it may take some time to realize the full capabilities of the system. My initial experience suggests that much of the navigation of the site and the application of the tools are relatively intuitive. I look forward to meeting you on the SME Community and realizing the benefits that it offers.

The implementation of the Community has been a great team effort and I want to extend our thanks to Chris Buck, Paul Hoiberg, Heather Gravning and Jan Samuelson for bringing this to fruition. For questions or suggestions relative to Community, the go-to person is Heather Gravning, gravning@smenet.org. ■

MagneLink: Magnetic waves work through rock

(Continued from page 10)

compliance with the law.

MagneLink transmits magnetic waves through the earth without the transmission wires and in-ground infrastructure currently required to communicate via standard radio communications, according to Lockheed Martin, which says it is a portable system for two-way voice and

text communications that operates at ranges sufficient to communicate from the surface into shallow-to-deep underground mines.

"The system will bring a tremendous emergency communications capability to the mining industry in the event of an accident where miners are trapped and have no other means of communicating with rescue teams on

the surface," according to the company.

The demonstrations took place in December 2009 at a mine in Dilliner, PA and in March 2010 at a mine in Mavisdale, VA, where two-way text and voice communications were tested successfully to a depth of 472 m (1,550 ft) and two-way text communications in excess of 472 m (1,550 ft) and in June 2010 at the NIOSH Test Mine in Bruceton, PA. ■

Midyear assessment; Implementation of strategic goals remains top priority



by John N. Murphy
2011 SME president

It seems hard to believe, but my term as the 2011 SME President has passed the half-way point. This is an appropriate time to assess the status of SME and the progress that we have made toward the implementation of our strategic plan. The following is a synopsis of that assessment, and comes at the conclusion of the mid-year SME Board Meeting. The meeting was held in Pittsburgh, PA, where approximately 85 SME volunteers representing the board, the strategic committee, SME Foundation trustees and SME staff met to continue the planning and implementation of our strategic goals.

The following are our six strategic goals, the strategic committee that has the lead role (in parenthesis) and a few select highlights of accomplishments or work in progress relative to each strategic goal:

Goal A: SME will be its members' indispensable resource for professional services (Education & Professional Development); strategies and highlights include:

Enhancements to SME's web-based services for improved delivery and access to education, meetings, networking and outreach. Launch of eLearning, the SME online learning system in which members — and others — can take courses of their choosing at their own pace and at the location of their preference (www.smenet.org/elearning);

Continued expansion of eBooks: Where all recent SME books are now available in electronic format as well as the traditional printed format (www.smenet.org/store);

SME has made available online select sessions from the annual meeting (www.smenet.org/meetings/annualmeeting2011/sessions/index.cfm) and we are exploring expansion of these services;

Online networking via SME Community, a social networking site allowing SME members the ability to collaborate and communicate securely. This site will empower governance groups, such as the regional boards, committees and sections, to more effectively work together. Try it (www.smenet.org/page/index.cfm?title=SME_Community_Overview), I'm sure you will like it.

Developing online meetings. Dave Kanagy, SME Executive Director, and I made a presentation to the SME Georgia Section in August via the "Go-To-Meeting" web-based meeting system that permits slide sharing and audio exchange via the internet. While there is no substitute for being at a meeting in person, the virtual presentation system was an effective means to present when other commitments precluded being at the Georgia Section meeting. Thanks to Bob Pruett and the Georgia Section for their willingness to try this alternative approach. SME will continue to explore the use of internet delivery for improved member services.

Reviewing and rejuvenating the local section organizations. Kanagy and I have been scheduling conference calls with each of the section leadership teams to learn more of section activities and needs. Our thanks to all who have participated to date and we look forward to scheduling a call with the remaining sections.

Developing international meetings and developing protocols for joint meetings with like societies — Space does not permit a full description of the activities in this area, but two fine examples include the CIM/SME joint symposium on Safety and Reliability in the Mining and Resources Industries (www.smenet.org/page/index.cfm?id=963), and recent affirmation and amplification of the agreement with the IIMP in Peru.

Goal B: SME will be the primary resource of mining and underground construction information for all stakeholders (Products & Services); strategies and highlights include:

Expand online offerings and links to information about mining and natural resources to key stakeholders and the public, and provide factual mining information to policy makers and the general public — SME's Government and Public Affairs Committee was established to serve members and to advise members on legislative matters affecting the mining industry. The committee has the lead on preparing SME's technical briefing papers on key legislative issues. This is your one-stop shop for access to regulatory activities of agencies and the White House. The

(Continued on page 17)

Joy Global reports jump in profits; Mining equipment maker had increased bookings in third quarter

THE STRENGTH OF the global mining industry, combined with favorable impact that came with its purchase of LeTourneau's mining equipment business, has paid off handsomely for Joy Global, which reported that its fiscal third-quarter profit jumped 46 percent.

With increased sales in the company's underground mining equipment business as well as increased bookings, Joy Global again lifted its full-year view, calling for earnings from continuing operations of \$5.70 to \$6 a share on revenue of \$4.3 billion to \$4.5 billion. In June, the company projected \$5.30 to \$5.60 a share and \$4.1 billion to \$4.3 billion, respectively, *Dow Jones Newswires* reported.

"Commodity and energy fundamentals remain intact despite expectations of slowing industrial production and global economic growth. We have not encountered any instances of projects being deferred, delayed or de-prioritized," said chief executive Mike Sutherlin.

Higher demand for mining equipment has pushed Joy Global's earnings up and the company has been busy acquiring other companies. Most recently, Joy Global announced plans to acquire Chinese mining equipment manufacturer International Mining Machinery Holdings Ltd. (ME, Sept. p. 15) The acquisition would give Joy Global access to smaller Chinese mine operators.

Earlier this year, Joy Global acquired LeTourneau Technologies Inc. from Rowan Cos. for \$1.1 billion, giving it exposure to oil- and gas-drilling equipment. On Aug. 23, Joy Global announced it planned to sell the drilling products business of LeTourneau to Cameron International Corp. for \$375 million in cash.

For the quarter ended July 29, Joy Global reported a profit of \$173.1 million, or \$1.62 a share, up from

\$118.5 million, or \$1.13 a share, a year earlier. Net sales climbed 34 percent to \$1.14 billion. Analysts polled by

Thomson Reuters expected earnings of \$1.53 a share on \$1.17 billion in revenue. ■

President's Page: Progress is being made, but work remains

(Continued from page 6)

web page is updated every two weeks with new information. Let this page be your gateway to the government and to SME's activities on Capitol Hill. You can access it at www.smenet.org/gpac.

Identify and deliver new Mii products and curriculum to SME stakeholders — Following the recommendations of the ad hoc committee that was appointed to explore ways to better align the GEM and Mii services and activities, at the mid-year meeting, the SME board and the SME Foundation Trustees approved the committee's proposal to consolidate the two entities. More details will follow.

Goal C: SME will maintain a financially secure and stable organization in order to execute its strategic plan (Finance). Under Kanagy's keen leadership, SME continues to be fiscally strong, with a projected surplus for the current fiscal year ending Sept. 30, 2011.

Goal D: SME will establish strategic partnerships, relationships, alliances and coalitions (Outreach).

Expand OneMine.org to include other organizations. Societies around the globe that are now part of OneMine.org include: The American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME); The Australasian Institute of Mining and Metallurgy (AusIMM); Deep Foundations Institute (DFI); International Marine Minerals Society (IMMS); National Institute for Occupational Safety and Health

(NIOSH); The Southern African Institute of Mining and Metallurgy (SAIMM); Society for Mining, Metallurgy, and Exploration (SME) and The Minerals, Metals & Materials Society (TMS).

Develop relationships with trade and government associations with an initial focus on co-hosting conferences. As noted under Goal A, select examples include the CIM/SME joint symposium on Safety and Reliability in the Mining and Resources Industries, and recent affirmation and amplification of the agreement with the IIMP-Peru.

Goal E: SME will review and reshape its infrastructure to better align with and support its strategic plan (Structure and Governance). Strategies and highlights include evaluating and reshaping, as appropriate, the structure/task and process of current SME committees. As noted under Goal B, this year the consolidation of GEM and Mii is pertinent.

SME will also look at the volunteer force's return on time (ROT) and establish ways to promote recognition, motivation and mentoring as a key to volunteers. The SME board is actively addressing this important issue and looking at better ways to recognize volunteers' contributions and means to facilitate more participation via electronic resources.

In summary, we are making significant progress in the implementation of our strategic plan. Much remains to be done, but with the continued dedication of the members and the staff, our goals are in sight. ■

How do we ensure that SME continues to be a resource for its members?



by John N. Murphy
2011 SME president

The short answer is to ensure sustained growth in membership. I write this column to share the fact that the SME membership age distribution is bimodal (Fig. 1), and the recruitment and engagement of students and young professionals is essential for the continued growth of SME and the ability of SME to serve the profession.

There are a number of initiatives at SME directed toward realization of SME's ability to recruit and retain young members. I note that the continued engagement of young professionals and students is not unique to SME. I recently received a copy of a column authored by

Paul Weimer, president of the American Association of Petroleum Geologists (AAPG) (Sept. 2011 issue of the *AAPG Explorer*), where he summarized the analogous situation at AAPG. Since AAPG is addressing similar demographics and is also planning for the future, in the following remarks, I have included some of Dr. Weimer's observations as they are equally applicable to SME.

SME membership continues to grow (estimated to be a 5.7 percent increase for 2011) with a total membership approaching 14,000. As Fig. 1 shows, the majority of members are over 50 years of age. A recent SME commissioned study shows that by 2029, the mining industry will have to replace at least 61 percent of the workforce (professionals and skilled technical personnel).

Hence, the mining industry workforce needs and the SME membership needs are similar. The members (and prospective members) in the 18- to 35-year-age group is the focus of this column.

Retaining and growing members in this age group is

crucial to the future success of SME. All of the programs we offer – services and science – are contingent on sustained membership growth in the 18- to 35-year-old category. This fact has been recognized in the SME strategic plan, and there are a set of new products and services that are tailored to meet the needs and interests of younger members.

As Weimer shared with his membership, on average, professionals in this age group are probably not thinking too far into the future at this point in their career. Most have finally graduated (or are about to), and the graduates are getting paid reasonably well for their efforts. Still, there may be student loans to pay. So... why should a student or young engineer spend money to join professional societies like SME? How can it possibly help their career?

Well, about 2,500 years ago, Heraclitus stated that the only constant in life is change. For a young professional's career, this means waves of changes that continuously intersect to form intriguing challenges – and opportunities, Weimer wrote.

The first wave is the rapid evolution in technology. With every passing year, new tools and techniques let us design and operate in new ways, in more challenging deposits, and in more challenging regulatory conditions. The other phenomenon is that the boundaries between disciplines are continuing to blur. We need to rapidly absorb the basics of related fields, as needed.

The second wave is fluctuating business cycles. Worldwide, mining and mineral processing generally run on periodic demand cycles. To retain our value as experts, we need to predict what skills will be useful this year and in subsequent years. Statistically speaking, you will likely work for several companies in your career, whether it's a major, an independent or your own consultancy.

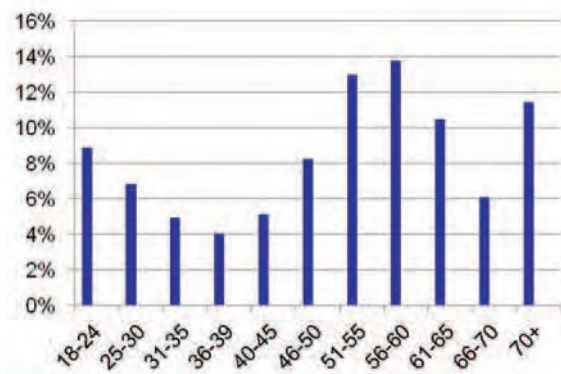
Finally, the third wave is you. As you work on different projects, your interests may change. So you may need to learn new skills, and maybe even get a different job, to focus on what your interests are.

What does all of this mean?

If you intend to successfully ride these waves of change, you must plan in terms of how you approach your work. Learn as much as you can,

(Continued on page 38)

Figure 1
SME membership age.





President's Page: mentor to help SME's future

(Continued from page 6)

approach your work. Learn as much as you can, stay up on technology, develop good networking abilities and continue updating your education all of the time. It is reported that our half-life in scientific knowledge is now just five years. This means that every five years you have to reinvent yourself. As many readers of this column know, this rapid change is the basis of the continuing education requirements for professional engineers.

To succeed amid these waves of change, you will need resources to call upon, resources that are greater than yourself. Consider professional societies such as SME as one of the few constants in your professional career. You will need up-to-date scientific knowledge to keep up with and ahead of trends. You will need to know people who can help you find jobs, network about

professional challenges, recognize your achievements.

SME is one of our best career resources. At a minimum, SME (as AAPG serves the counterpart professional community) is a kind of professional insurance policy – be aware of and use the SME resources. You can also take it a step further and become a leader, at the local, national or international level. My observation is that the more you engage the SME, the better chance you have for success in your career.

So here are more specific products and services from SME that are applicable to your continued professional growth: Information can be found about each through the SME website www.smenet.org.

- OneMine.org.
- SME Community.
- eLearning.
- Books and eBooks.

- Social networking.
- Registered member status.
- Training for PE exam.

For those in the 36 and over category, you have a role as well. Pick a colleague who is younger than you and serve as a mentor (ad hoc or through the SME mentoring program). Talk about how you are riding these waves of change in our profession. And, while you are at it, mention how SME has helped you. Treat this as a conversation between fellow travelers on the same path, not a monologue from an elder statesperson.

It's so simple for you to do. But the interest you take in others will ultimately form your legacy and help SME enormously. With good planing, SME, as well as AAPG, will continue to grow and serve our respective memberships — young and old. ■

Coarse to Fine Grinding Solutions

Test before you buy in our full scale test lab



Cage Mill™
Feed sizes up to 3-1/2" with capacity up to 200 TPH



Micro-Max™
Feed sizes up to 3/8" mesh, final product ranges from 20 mesh down to 10 microns




Aurora™ DR
Ideal when lump breaking for pneumatic conveying or unloading



STEDMAN™
SINCE 1854

129 Franklin St. • P.O. Box 299 • Aurora, IN 47001
Fax: 812-926-3482 • Email: sales@stedman-machine.com

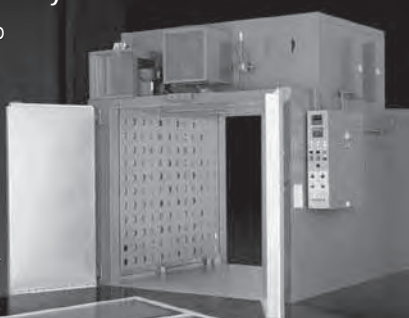


GRIEVE

OVENS AND FURNACES FOR EVERY INDUSTRY

Large-Capacity Walk-In Ovens

- Standard sizes to 786 cu. ft.
- Special sizes to your specs
- Gas & Electric models
- Choice of air flow patterns
- Temps to 1200°F



One little click...one BIG website!
www.grievcorp.com 847-546-8225

Section networking; Local sections play an important role in SME



by John N. Murphy
2011 SME president

One of my priorities this year has been to meet with as many SME section chairs as possible to learn about the activities and needs of each section. I realized at the outset that my aspiration to have a face-to-face meeting with each of the 56 sections was not realistic, so the plan was to organize as many section visits as feasible and seek to hold conference calls with each of the other section leaders. Relative to the section visits, with the help of 2010 SME President Nikhil Trivedi, 2012 SME President Drew Meyer, SME Executive Director Dave Kanagy and myself, the SME leadership team has had the pleasure of attending many section

events. We all appreciate the hospitality and assistance provided during these visits.

Dave Kanagy and I have found the conference calls with section leaders to be enjoyable and informative. Our thanks to the leaders that we have spoken with, and to Tessa Baxter, SME Section Liaison, who has organized the calls. While there are still a few sections that we are working to schedule a call with, I would like to take this opportunity to share the predominant feedback received to date from the section visits and calls, give you some insight on what resources are available to help with identified needs, and to introduce some possible approaches to address the other widespread needs.

As expected, every section has its own culture and mode of operation — such as the type and frequency of meetings and the number of social events. This is good, as each section needs to serve the needs of the local membership. I believe that the “success” of a section is determined by the members’ perception of “value added,” and the number of members who participate in section sponsored events. My belief that “value added” for these types of events equates to the applicability and quality of the program, and the opportunity to network with friends and colleagues.

The dialogue with the section leaders affirms that the predominant item in determining the level of attendance at section-sponsored meetings is programming, and the second factor for many sections is that the geographic

dispersion of the members in a section limits participation.

Another observation is that the more dynamic sections have multiple members in leadership roles, that there are sufficient members contributing and that key roles are periodically held by different members. A section that has the same one or two leaders who have served for many years is generally not a dynamic and growing section.

Many sections are organizationally isolated from other sections and from SME headquarters. I believe that there are advantages for the leadership of all SME sections to be able to network and share best practices. Also, there are headquarters services available, such as membership lists and literature, of which some sections were not aware.

Let me say that there were numerous other section-specific needs and requests that have been identified and are being investigated for possible implementation. As we have a more detailed assessment, I will report on the feasibility of SME responding to the identified need. For this column, let me address the broad-based items:

Programming: In recent years, one of the aids to program development from SME headquarters has been the Krumb Lecture Program, where a select number of individuals agree to visit with sections and serve as the speaker at an event. In the past, the number of lecturers was limited to about five; hence, the number of topics was limited and, in many cases, did not match the interests of the section. This year the number of Krumb lecturers has been doubled, and some prior issues such as the availability of travel funds have been resolved. The Krumb lecture program will not single-handedly solve the program development, for a section that has one meeting per month, or the periodic day-long program, but this lecture program is a resource that is not fully utilized by the sections. SME will continue this program, and expand the number of lecture topics if feasible.

While the Krumb lecture program is a resource, it is not a substitute for annual program planning so that quality section events can be developed well in advance and effectively

(Continued on page 32)



President's Page: Assistance is available from SME

(Continued from page 6)

Geographic coverage: As noted above, some sections cover wide geographic areas, so the possibility of members traveling across the state for a two-hour meeting is generally an unrealistic expectation. I believe there are two possible approaches to minimize this issue — form subsections that serve a different geographic region and possibly a different set of interests, or broadcast the presentation over the internet (Webinar) for members who are at remote locations. If anybody is interested in either approach, I would be pleased to discuss these possibilities in more detail.

Networking: My belief in the merits of section-to-section networking were outlined above. To facilitate more networking, I have planned the following:

1. We will be launching a section leaders' forum on SME Community, the new SME electronic bulletin board. When ready, all section leaders will receive an invitation and introduction, and:

2. New events will be offered for section leaders at the SME Annual Meeting (Feb. 19 to 22, 2012 in Seattle, WA). Announcements and invitations will be forthcoming and, if a section leader is not able to attend, please send a representative to the section leader events in Seattle, WA.

This column addresses the topics that were addressed with all of the section leaders, and shares some services and initiatives to address these topics. More research is under way on the section-specific items and I will report later on those items.

To all section leadership teams:

- Thank you for your commitment and service to SME and the members you serve.
- Be aware of the SME products and services that are available from SME headquarters to assist in section operations and membership recruitment.
- Meet and share needs and success stories with your fellow section leaders across the country.
- Let me know if you want to have more dialogue on your needs or my proposed initiatives.

For more information about local sections visit the SME home page at www.smenet.org. ■

Leading the way in the development of a low cost ion exchange media



Peat based chelating ion exchange media effective on dissolved heavy metals including Cu, Ni, Pb, Cd, Cr, Co, and Zn.

Visit our website or give us a call for more information

American Peat Technology, LLC

1132 Airpark Drive Aitkin, MN 56431

www.AmericanPeatTech.com

218-927-1888

info@americanpeattech.com

UBB Mine: Security manager found guilty

(Continued from page 14)

would prove that Stover had lied about inspection tip-offs. The attempted disposal also violated repeated warnings from the mine's then-owner, Massey Energy, to keep all records while the disaster remained under investigation. Massey officials told investigators of the trashed documents, which were recovered.

Prosecutors said the documents were dumped around 6 a.m., and after being placed in trash bags. Hauling them out in their cardboard storage boxes would have drawn notice, as would Stover performing the deed himself, prosecutors argued.

In urging jurors to acquit, Wilmoth argued that Stover's actions amounted to innocent mistakes, citing how several witnesses had described him as by-the-book and honest. Rather than targeting mine executives or engineers who may be at fault for the deadly blast, prosecutors have seized on Stover in a game of "government gotcha," Wilmoth told the jury.

Three investigative reports issued so far on the disaster have each concluded that poorly maintained machines cutting into sandstone created a spark that ignited both a small amount of naturally occurring methane gas and a massive accumulation of explosive coal dust. Malfunctioning water sprayers allowed what could have been a small flare-up to become an epic blast that traveled 11 km (7 miles) of underground corridors, doubling back on itself and killing men instantly. ■

What makes SME tick?

A note of appreciation to the dedicated volunteers and staff



by John N. Murphy
2011 SME president

As we begin a new year, I would like to share my observations — and extend my appreciation — on the great team that is responsible for SME's sustained pursuit of the Society's mission and the implementation of the Society's strategic plan, namely the many volunteers and the headquarters staff who work together addressing the strategic and tactical aspects of our programs. I continue to be impressed with the commitment made by many members in the development and implementation of our existing programs and the identification of new opportunities for SME. At the national level, there are more than

250 volunteers and staff that make SME tick.

As I reflect on how I first got involved in SME, it was through my local section. As I shared with you in my December column, the interviews and visits that SME Executive Director Dave Kanagy and I have had with many of the section leadership teams show that there are some very vibrant SME sections and a few sections that are struggling to maintain a critical mass and dynamic programming. SME will continue to work to maintain the vitality of the sections. Some of the concepts to accomplish this outcome were outlined in my December column, but suffice it to say, so go the sections, so goes SME.

As previously noted, there are many local section members who do outstanding work on behalf of the Society and the profession. Please continue to use the SME Local Section Hero recognition, established by 2010 SME President Nikhil Trivedi, to say thanks to these engaged volunteers who are making noteworthy contributions at the section level and to let other sections learn of the inspired contributions being made by their fellow members across SME.

The sections have been, and will continue to be, an important "feeder system" for those who wish to contribute on a national level to SME's mission. If you are interested in exploring more involvement in SME national and are unsure of the opportunities and pathways, please share your interests with me, the staff or other senior-level volunteers.

Another relatively new mechanism for members to learn of SME's programs and opportunities to contribute is the SME Young Leaders program. For members under the age of 36, this is an excellent forum to meet peers and to serve as a pathway for your increased involvement in SME.

It is clear that one of SME's strengths has been its members' commitment to the organization and their willingness to volunteer their time to SME activities. All associations — including SME — are seeing evidence that there has been waning levels of volunteerism in recent years. I sense that, for the many "committed" SME members, their level of involvement remains constant or, in fact, is increasing. Primarily, the shortfall is in the number of members who are able/willing to step up and share their skills and experience. I note that this outcome is not unique to professional societies, as I see the same phenomena in my other volunteer engagements such as scouting, community groups, etc. Unfortunately, it is a national trend.

SME is working to make the limited time that members may have to volunteer more productive. Time is precious and recognizing that fact, SME is moving to:

- Engage a broader range of technologies for meetings to help increase committee attendance, reduce travel and make meeting preparation more efficient. Examples include consideration of Webex, Go to Meeting, Skype and the new SME Community.
- Encourage our lead volunteer (committee chair) to communicate more regularly and personally with the other volunteers on the committee.
- Celebrate the personal and organizational success stories by inviting more testimonies from committee members regarding their experience on an SME committee and to share those experiences with the membership.
- Affirm our appreciation to volunteers, SME will begin a more formal program of recognizing and thanking members who have served

(Continued on page 19)

China reduces silver exports; Reduction in 2012 could boost silver prices

THE PRICE OF silver, already volatile during the past year, could see more movement in the coming year as China is expected to reduce its exports by 5 percent.

Domestic demand from investors is expected to surge in China, the world's largest silver exporter, and with the surge in demand, the price of silver could rise. The metal advanced 10 percent in 2011.

According to a statement from China's ministry of commerce, the 2012 export quotas for silver from the Asian country have also been reduced by 5 percent. This amounts to a cut of 283 t (312 st) in its 2012 silver export quotas from 5,670 t (6,250 st) in 2011, *Mineweb* reported.

Roughly 70 percent of China's silver demand comes from the industrial sector. Analysts say

shipments are also set to decline with customs data showing a drop in exports. Chinese customs data showed export growth falling more than expected in September, while import growth also declined.

Silver imports into China fell by 39 percent year on year and 16 percent month on month to 265 t (292 st) in September, the lowest level since February. Silver exports also declined by 44 percent year on year to 83.5 t (92 st), keeping China a net importer of the metal for two consecutive years on a monthly basis, data showed.

China's third-quarter gross domestic product was up 9.1 percent from a year ago, slowing from 9.5 percent growth in the second quarter and 9.7 percent growth in the first, according to China's National Bureau of Statistics. This marked the slowest

pace since the third quarter of 2009.

China, the biggest emerging market user, is said to be expanding at more than five times the speed of the United States, driving consumption of the precious metal most used in the industry. Analysts say demand is also coming from investors looking for an alternative to cash and gold, which costs about 50 times more than silver.

Data showed that U.S. consumers were at their gloomiest in 2.6 years in October, which fed a safe-haven demand for gold. According to some analysts, safe-haven demand will continue in Asia as macroeconomic and geopolitical risks remain elevated. Investment bank Goldman Sachs has also raised its forecasts for gold and silver prices, citing expectations of continued low interest rates in the United States. ■

President's Page: mentor to help SME's future

(Continued from page 6)

in significant capacities. We can do a better job of saying thank you.

I started this column by saying that I appreciate and want to say thanks to the volunteers and the staff who are doing wonderful work but I have spent much of this message introducing the challenges that we face in accessing volunteers

time and some strategies to help engage members and recognize their contributions. Engagements must be win-win — the Society and the volunteer member must see the engagement as a meaningful experience. I can personally say that has been my experience.

As I conclude and extend a sincere thanks to all of SME's volunteers and staff, let me also invite you to

share your expressions of satisfaction through your participation in SME activities (email: jmurphy@pitt.edu). Expressions of dissatisfaction are welcomed as well. Further, suggestions of mechanisms to engage members and make their participation more time-efficient are welcomed.

Again, many thanks and best wishes for continued success in the new year. ■

MSHA: Reports places blame on Massey Energy

(Continued from page 10)

the mine.

Associated with the issuance of this accident investigation report, MSHA issued 12 citations and orders to PCC/Massey for violations of the Mine Act and its implementing regulations that contributed to the April 5, 2010 explosion. MSHA also

issued 357 violations of the Mine Act and regulations to PCC/Massey for conditions and practices discovered at UBB that did not directly contribute to the explosion.

MSHA designated nine of these contributory violations as "flagrant." Flagrant violations, the most serious violations MSHA can issue, are

eligible for the highest penalty possible under the Mine Act.

The entire report is available on the single-source UBB webpage at www.msha.gov, which also includes the fatal accident report, interview transcripts, PCC record books, citations and orders issued and more information. ■

SME continues to grow

Great team effort yields favorable outcomes for the Society



by John N. Murphy
2011 SME president

Nearly 12 months ago I wrote my first President's Page column, sharing my vision and aspirations for SME during my term as SME President. As I now write my last column, there are several clear facts relative to the role that SME plays in the minerals and underground construction and tunneling industries, and the means to realize those outcomes:

- SME continues to grow in membership, domestically and internationally, as a result of quality member services. SME membership increased 6.5 percent in 2011.
- Many members and staff devote their skills and countless hours to the realization of the SME purpose "To be THE resource and advocate for the mining community." As members, we should all be thankful for an effective and dedicated team.
- It has been a pleasure and an honor to work with the SME Board of Directors, the strategic committees, the numerous other standing and ad hoc committees, the divisions and the SME staff in the continued progress that we are making relative to our purpose. There are hundreds of SME members who regularly contribute to SME's sustained growth and progress.
- As you know, SME has an updated strategic plan (initiated by 2010 President, Nikhil Trevedi), and it is an effective roadmap to keep us focused on the path of continuous improvement to serve the membership. (The strategic plan is posted on the SME website.)

With that introduction, let me briefly review with you some of the recent progress as well as the issues and strategies as we move forward.

A common issue for SME and the mining industry is the age of the membership and the workforce and how this will create a significant change in the demographics of potential members and industry employees in the next 10 years. The majority of SME members are over 50 years of age. The demographics for the industry workforce (professional and technical) are very similar. A

recent study commissioned by SME and partners for the National Academy of Science shows that by 2029, the mining industry will have to replace at least 61 percent of the workforce (professionals and skilled technical personnel). The study report is on the SME website. <http://www.smenet.org/store/mining-books.cfm/Emerging-Workforce-Trends-in-the-US-Mining-Industry/GPAC-EWT>. Hence, the opportunities for professionals in the 18- to 35-year age group are very positive and SME must attract and serve professionals in that demographic range to ensure continued growth.

From a broad industry perspective, I believe that you would agree with me that the principal issues include:

1. Continued environmental, and in some cases unrealistic, pressures related to the extraction and use of minerals (fuel and non-fuel).
2. Access to public lands for mineral exploration.
3. Health and safety.
4. Critical and strategic mineral availability/vulnerability.
5. A lack of understanding of the essential role of minerals to a viable economy, national security and quality of life

The principal focus areas for SME in the past year are summarized below:

- SME membership continued to grow: we realized 7.1 percent growth for 2011. As of Dec. 31, 2011, there are now 14,086 members, of which more than 4,000 work outside the continental U.S. SME is truly becoming an international society.
- Consistent with the expected shift in demographics introduced above, it is important that SME attract and engage younger professionals, and to ensure that the SME products and services are relevant to younger members.
- The SME Young Professionals group is dynamic and is facilitating the movement of younger members into SME governance, and the electronic products are responsive to the needs and interests of younger members.
- Relative to products and services, we

(Continued on page 16)



President's Page: growth is taking place in all areas

(Continued from page 6)

have continued to enhance recently introduced E-Services and have launched new services as defined by member feedback; those products and services now include:

- OneMine.org — the content and use continues to grow, with more than 97,000 publications and 1.3 million pages;
- E-books — all new SME books are also available in electronic format (nearly 60 books);
- eLearning — now online and the number of courses continues to grow;
- SME Community — now online and the use by SME members, sections and committees continues to grow;
- Social Networking — SME continues to maintain an active presence in this space.

In 2010, SME President Trevedi defined the need to recognize the role that SME sections play in our society. I have sought to increase the liaison and dialogue with the section leadership. Dave Kanagy, SME Executive Director, and I have either visited or held conference calls with the majority of the section leadership teams. While we are still researching the best means to address some of the most common needs and suggestions, it is clear that where feasible, SME headquarters should seek to facilitate programming at the section meetings and to assist with some items in the e-commerce area. More details will be forthcoming soon.

I was also impressed by the effective and ambitious government, education and mining (GEM) programs in some sections, and the lack of GEM-related activities in other sections. As we seek to help address the issue of a lack of understanding of the essential role

of minerals to a viable economy, national security and quality of life — we need to explore the feasibility of more GEM-related activities.

Speaking of the GEM program, I asked an ad hoc committee to investigate opportunities to optimize the services delivered by the GEM Committee and the Mineral Information Institute (Mii). The committee has recommended the integration of the two programs and the implementation aspects are being addressed. The committee has recommended that the SME Board approve the name of the consolidated enterprise be the Minerals Education Coalition.

I also asked another ad hoc committee to investigate opportunities for SME to be a better resource to the professionals in the operations sector of the industry; that committee is expected to have recommendations at the annual meeting in Seattle, WA, Feb. 19-22.

We have worked to increase the liaison and collaboration with other organizations that represent the mining professionals domestically and internationally. Most of the SME Board and several past presidents participated in the Extermin Mining Technology Exhibition and Perumin Conference in Peru. This venue also provided an opportunity to review and enhance our agreement with the Institute of Mining Engineers of Peru (IIMP), and meet with the leadership of the SME Section in Peru.

Dialogue has been enhanced with all of the English-speaking mining societies (Canada, Australia, South Africa and the United Kingdom) that will enhance opportunities for future collaborations. SME and CIM (Canada) organized the first annual symposium on health, safety and reliability. The next symposium will be in Minneapolis on Nov. 13-15, 2012. This is just one of the initiatives under the renewed commitment by SME to provide a forum and focus for all professionals whose interests include mining health and safety.

While health and safety must always be a key focus area, learning from past experiences is crucial at times when there are dramatic changes in the workforce, as these changes increase the risk for potential accidents, primarily due to lack of experience. With the expected high turnover in personnel in the industry, all involved need to be extra diligent to ensure the safety (and health) of the new influx of new employees.

We have continued to grow the Government Affairs and Public Policy Committee (GPAC); there is a dynamic program underway. SME has created GPAC within SME to help leverage the expertise of its membership to create a system for providing timely, accurate, fact-based, nonpartisan technical information in response to urgent inquiries from SME stakeholders on topics concerning mining, minerals and extractive industries; readers can learn more at www.smenet.org/gpac/.

And, of course, it is essential to ensure the continued fiscal stability of SME. The results were, that for the seventh consecutive year SME produced an operating surplus of \$239,074. This includes revenues of \$8,645,952 and expenses of \$8,406,878. And this is the same year in which SME purchased its new headquarters building.

In summary, it has been a pleasure and a privilege to be part of the SME Team that has moved SME along the path defined by the strategic plan. It is important that SME remains responsive to a changing technology base, a dynamic regulatory environment, and the coming change in demographics of members and the professionals in the industry.

As I turn the leadership over to the 2012 SME President, Drew Meyer, I am certain that the SME team will give him the great support that I have received. Thanks and best wishes for the team's continued success. ■



SME President
Nikhil C. Trivedi
VOL. 62 NO. 3 – VOL. 63 NO. 2

March 2010: VOL. 62 NO. 3

Nikhil C. Trivedi: An interview with the 2010 SME President

April 2010: VOL. 62 NO. 4

There are many qualified voices in SME

May 2010: VOL. 62 NO. 5

Tale of three cities

June 2010: VOL. 62 NO. 6

Where have all of the professors gone?

July 2010: VOL. 62 NO. 7

Membership has its privileges ...

August 2010: VOL. 62 NO. 8

(No Article)

September 2010: VOL. 62 NO. 9

SME is on the move, new headquarters building will give the society room to expand

October 2010: VOL. 62 NO. 10

A family story, SME's parent organization takes a look at its family and future

November 2010: VOL. 62 NO. 11

Safety in mining; SME's role in advancing the industry's standing and role

December 2010: VOL. 62 NO. 12

An October to remember; Chilean rescue and Gotthard Tunnel gave us something to cheer

January 2011: VOL. 63 NO. 1

Reminiscences of an SME president; Will Wilkinson looks back over the past three years

February 2011: VOL. 63 NO. 2

Final thoughts; SME continues to move forward

VOL 62 NO. 3

MARCH 2010

Mining

ENGINEERING

OFFICIAL PUBLICATION OF SME

www.MiningEngineeringMagazine.com



Nikhil C. Trivedi
2010 SME President

Special Editorial Sections: **2010 SME Bookstore Catalog,**
Tunneling & Underground Construction

Nikhil C. Trivedi: an interview with the 2010 SME President

The mining industry, like most other industries, has had a difficult couple of years. What are your thoughts on the industry's direction in the next few years?

I am bullish on our industry. There is no question in my mind that the quality of life we enjoy today is largely a result of our past successes in the minerals and mining sector. I am equally certain that the sustainability of that quality of life and the aspirations of the rest of the world to attain that same level of lifestyle will depend hugely on our future successes and will be the driver for our industry to continue to excel and prosper.

Surely, there are going to be challenges along the way. These challenges are not only from the public, regulators and various governing bodies, but also from our industry's own self regulating efforts. However, we have demonstrated throughout the past several decades that we have the capability to meet these challenges head on and come out ahead.

How about long-term?

Those of us who have been intimately involved with this industry certainly realize the tyranny of the cyclic nature of commodity prices. It is, therefore, essential for our industry leaders to maintain a long-term perspective in their decision making. I believe we are soon going to enter a sustained phase of increasing demands for many of the commodities we find, mine and refine. Just take a look at the security and energy needs of our own country. Demand and prices are increasing for some industrial mineral commodities, such as rare earths, lithium salts, graphite, antimony, borates and sulfur. The same will hopefully be the case with coal and other fuel sources. There have also been slight increases in demand and prices for such metals as iron ore, copper, nickel and molybdenum and of course, precious metals. And that does not even begin to address the demands for all of those commodities from the rapidly developing economies of Brazil, India and other countries in Asia and Africa.

Do you believe the mining industry is positioned to take advantage of improvements in the global economy?

There are many favorable trends helping our industry at this time. Our industry leaders were compelled to take drastic measures to control their costs and improve their efficiencies in the early years of this past decade. As a result, when the U.S. economy and financial sectors faced the rough waters in 2008 and 2009, our industry was already lean, our areas of deficiencies had already been identified, underperforming assets were already idled and plans were already waiting to be implemented when the markets demanded. As a result, as we see the economy turn around, the mining sector is ahead of the curve and is poised to lead the economy out of the cur-



rent crisis. It is a role this largely unappreciated sector of the economy has played over and over for centuries.

The mining industry is certainly not opportunity limited. Large-scale exploration activities may have moved from North America to South America or to Africa or to Australia. However, it takes a qualified exploration geologist, a mining engineer and a metallurgist to take a mere mineralization and convert it into an operating orebody. And that know-how may reside anywhere, since communication technologies have made the far corners of the world readily accessible. Wherever the resource base is, that is where the opportunities are. Opportunities for capital investment, opportunities for production, refining, treating and opportunities for using those resources to improve the quality of life on a global basis are all out there for us to seize.

Our industry has a critical role to play in securing our nation's energy future and in reducing our reliance on externally sourced minerals, metals and fuel. Similarly, professional societies like SME have a critical role to play in educating and training future leaders of our in-

dustry and enabling them to create jobs for others and to contribute to our economic engine.

Anyone involved with mining knows that its public image has most always been negative. Do you see that changing at all?

In the past, our industry had been – unfairly, in my opinion – loaded up with a monkey on our backs. That was “Mining industries have been poor stewards of the environment.” Lately, I see the tide turning. I do see a growing number of stakeholders recognizing the proactive steps our industry has taken in carrying out our activities in the most environmentally responsible manner possible. They are also recognizing that we have invested massive amounts of money and deployed numerous innovative technologies to remedy what might have occurred in the past. It is gratifying that our industry is beginning to be viewed as critical to the well being of the world’s economy.

But that is not enough. We still have a long way to go before we are viewed as neutral to the environment (at the very least). It is, in fact, a matter of great satisfaction to note that mineral products and technologies developed by the minerals industry are forming the basis for environmental protection technologies such as catalytic converters, flue gas desulfurization and CO₂ sequestration. So, that day is just around the corner when our mineral products and technologies will lead the way in protecting our environment.

Much has been made in recent years about the lack of qualified professionals entering the mining industry. But, with the expanding need for minerals globally, do you believe there will be a turnaround in mining school enrollments?

Our 2009 SME president, Will Wilkinson, pointed out that the age distribution of our industry personnel is skewed toward the higher end. As our membership ages and retirement approaches, there will be a critical need for younger people to fill the gaps. That is, in fact, going to be on top of the already existing shortfall in numbers of mining-related professionals.

Let us revisit the domino effect that we witnessed during the past decade following the pronouncement by some business magazines of “the death of domestic mining.” That led some shortsighted administrators to cut funding for academic institutions, thereby shuttering the doors of several mining schools. That, in turn, triggered high school counselors to steer prospective students to disciplines other than earth sciences. And that impacted the remaining few mining and minerals related academic programs. There, you have your proverbial domino.

That explains the current shortfall. Beyond that horizon, though, I see a comeback. I hear news that in 2008 and 2009, mining and mineral related degree holders were among those bagging the highest starting salaries. Not only that, the highest percentages of graduates in the earth sciences had secured employment before their graduation. News like that travels fast. Innovative and effective recruiting activities by our major mineral companies and our academic institutions will be a major influence on future student enrollment. Excellent foundational work carried out by the Mineral Information Institute (Mii) and GEM will further augment the posi-

tive perception among high school juniors and seniors toward the mining profession. I am, therefore, certain that the decade beginning now will be the decade that will produce a new wave of higher student enrollment in earth sciences. By the end of this decade, I believe we will again have a large base of young technical professionals to lead our industry into the future.

SME has made some significant improvements in the products and services it offers its members in recent years. Outline your goals as 2010 SME president.

Before I comment on my goals as SME president, let us take stock of where SME is today. The SME of today is a forward-looking, member-oriented, well-respected professional society that has clearly differentiated itself from other professional societies in its class by taking a lead in all facets of its members’ career needs. Today’s SME has seen five years of uninterrupted membership growth, five years of introducing new membership benefits such as publications, topical meetings, short courses, e books, OneMine.org, of course, and five years of positive operating income.

Today’s SME has two new divisions added to its original five. Today’s SME has two new student chapters outside of the United States (in Canada). Today’s SME publishes one additional periodical, *Tunneling & Underground Construction*, in addition to the original, *Mining Engineering*, and the quarterly *Minerals & Metallurgical Processing* journal. Today’s SME is at the forefront of disseminating reliable, technical information to its members via electronic media and sophisticated communication technology.

In short, today’s SME has everything in place to achieve its mission of being the premier professional society serving the mining industry worldwide. As SME president, I will build upon that strength and make SME a compelling stop for all mineral industry professionals as they journey through the industry regardless of their job function and regardless of their location.

I am not only humbled but also honored to serve my fellow professionals and the mining industry as president of SME. The SME that we inherit today is a product of the vision and hard work of many of our past leaders. I have never thought that my presidency would be markedly different from that of any of my predecessors. I know that I have this honor for only one year and I also know from my predecessors that the year goes by very fast.

And your goals?

My overarching goal is to make SME membership more relevant and compelling for members and others, alike. To accomplish that, I plan to focus on the following:

OneMine.org. This is one of the most valuable member benefits we have been able to provide in recent years. It is unique, it is different and it has already proven to be a compelling argument to recruit new members domestically as well as internationally. I intend to enhance the offerings from that vehicle by working diligently to recruit new groups to ally with SME and the other participating societies, and to add new specialized content to that databank. I believe that there is still a great deal

of value to be derived from OneMine.org by SME, by its allies and by our members.

Health and safety. Many of our members are engaged in this area of work within our industry. Yet, as you look at the SME organization, there is no “go to” place for any outsider looking for information on these two very critical areas. We have scattered presentations and sporadic publications. But a concerted effort on these topics is lacking. Health and safety subject matter is nowhere to be readily found on our website.

I have, therefore, established an ad hoc committee under the leadership of Jessica Kogel, made up of representatives designated by the division chairs. Their task is to recommend to the SME board the best way for SME to organize its activities, programming, publications, training, short courses, etc. in this area of critical importance to our industry. The goal is to make SME a compelling stop for all health, safety, industrial hygiene and regulatory persons seeking to enter into a discussion on these topics or share new developments or merely network.

Mii and GEM. SME has a powerful tool to further its agenda of educating the public at large and the student population at levels K through 12. When Mii became an affiliate of the SME Foundation, the dedicated cadre of GEM volunteers got ready access to a treasure trove of material that Mii has developed throughout the years. One of my goals is to make sure that this combination

adds greater value to the stakeholder and provides local sections and members effective tools to take the message of our industry to their neighborhoods. The goal is to make SME a compelling stop for teachers and students who are seeking information on minerals and mining.

Public outreach. The SME board recently approved the creation of a new standing committee within the SME umbrella to deal with the broad area of government relations. The board believes that SME has a role to play in this area as its members are highly competent technical professionals who can clearly articulate facts, backed up by technical explanations, and present them in an unbiased way. So, during the coming year, my goal is to get this committee established and its charter implemented.

I believe that professional societies such as SME have a newer role to play — to gather all of the myriad of information out there in the electronic and print media, sift it through various technical screens, apply the litmus test of reality versus hype, biased versus unbiased, and then turn around and disseminate the vetted information to a large stakeholder base far exceeding the SME membership. Visualize the old model as an inverted pyramid where the tip of the pyramid is the SME membership. Now, visualize an hour glass. The information coming out of the top chamber is spread out to a broad base. I am confident that this new committee will allow us to take giant steps in that direction and make SME

Defying the norm led to a brilliant career in the minerals industry for Trivedi

I was brought up in a metropolitan area as far away from a mine as you could get. Growing up near Bombay (India), the only “mine” I saw was a road building stone quarry. And the only impression I had of a mine or a miner was what “Hollywood” wanted me to see — a pathetic, sick old man, head to toe in coal dust, breaking a lump of coal and filling the little pans to be hauled out of the quarry and down the hill by an equally sick child who should have been in school.

Not at all a flattering scene for the Indian coal mines, but that is exactly what the film director needed to win the audience’s sympathy for the poor, exploited miner and the teenaged human conveyor. Moreover, the director succeeded in making the audience hate the exploiter, the mine owner, who would be shown driving away in his 1947 Buick convertible, leaving a cloud of black dust behind him. I remember coughing away in a comfortable air-conditioned theater thousands of miles away from the mine just looking at those clouds of black dust and smoke. Certainly, in my mind, the mine owner was the villain and the poor laborer was the victim. What a stereotype.

Then, in college, I decided to study geology. “What is the matter with him?” my family said. “Why does he not want to be a medical doctor like other kids in the neighborhood?” they asked. Well, I studied geology at

Bombay University and after graduating (B.Sc.) at 18, I dropped another bombshell, “I want to go to America and study metallurgy.”

My family could not take any more humiliation from me and sent me off to a place called Reno, NV. I learned much later in life that my family did not have any issue with my choosing geology or metallurgy. Their problem was with my not choosing to become a medical doctor. I do not need to tell you that all of the kids from my neighborhood who went on to become, well-trained, top-notch medical doctors are currently serving at your neighborhood hospitals.

Coming to Mackay School of Mines and pursuing my masters degree in metallurgy and mineral economics was the endorsement I was seeking of my decision to make the minerals industry my career choice. I joined SME as a student member at the age of 19 in 1968. My mentor, Professor Ross Smith, insisted that I join SME and I believe he even paid my dues for the first year.

While at Mackay School of Mines, I took advantage of my age (under 21) and audited lectures at University of Utah by taking the United Airlines flight at the staggering cost of \$19 round trip (student rate) between Reno and Salt Lake City. That flight, a milk run from San Francisco to Reno to Elko to Ely and on to Salt Lake City, took me to places I never knew existed.

the compelling stop for regulators, educators, industry professionals and the public for reliable, unbiased, scientific and technical information.

SME Tech. The SME board has approved the expenditure of a significant amount of funds to implement the SME Tech initiative developed by the Products and Services Strategic Committee chaired by Bill Hancock. We will enter into a dialog with experts in the field to develop new course content to offer to our members and others. In addition, in order not to reinvent the wheel, we will develop alliances with others who are already offering similar web-based courses. When properly developed and fully put in place, this initiative has the potential to make SME a compelling stop for all industry personnel, no matter where they are located, to continue to educate themselves and to remain abreast of novel techniques so that they can excel in their jobs.

As a long-time member of SME, what advice would you give to members who want to become involved with the society as volunteers?

I am bullish on our industry and I am bullish on SME. My confidence in SME continuing to be a compelling professional society for all mineral industry personnel stems from my first-hand experience with the society's members. I have yet to come across a more talented, more dedicated and more competent group than SME members. As I survey the scene today, I have some advice and a request to my fellow members. Come forward, volunteer, take

ownership of any SME initiative you find relevant and contribute to its success. I also have a message for those members who are already holding positions on one or more committees and councils and divisions. Thank you. Thank you for giving back to your profession in the form of your money, your time and your energy. It is truly a very rewarding experience.

We are a group of volunteers and we volunteer our time and energy for this society. However, the term, "volunteer," is not a license to be sloppy in what we do for SME. I do not like it at all when "volunteers" pay no heed to the "quality" of their service to SME. So, to all of those members who serve on committees, I say, please serve with integrity and sincerity; return calls from SME staff and other SME members promptly, attend all committee meetings and diligently follow up on action items. It is possible that circumstances change and one can no longer devote the time to SME committee work. That is not a crime. However, in this age of teamwork, letting your team down is getting close to criminal, in my opinion. Even mid-term, if your circumstance changes and you are unable to deliver to your team, speak up and yield your slot to another member.

One of SME's most enviable strengths is its outstanding administrative and support staff. Under Dave Kanagy's excellent leadership, SME's staff exudes enthusiasm, competence and a positive attitude. Most of us who belong to multiple professional societies are in a good position to compare and, having been in that position, I can truthfully say the SME staff is in a league of its own. ■

The lectures I attended at Utah were in chemical kinetics and I was drawn to that purely by the fame of Professor Henry Eyring who was an authority in that subject. I replenished my funds by working summers at Battle Mountain, NV and Miami, AZ at companies that have since been bought by others and whose names are now irrelevant.

After Mackay, at Professor Smith's encouragement, I joined the Mineral Resources Research Center at the University of Minnesota to study surface chemistry and flotation fundamentals under the direction of Professor Iwao Iwasaki. At Minnesota, I got exposed to the value of interdisciplinary studies and finally graduated from there with a doctorate in chemical engineering with two minors, analytical chemistry and microbiology. My family was at last able to brag that their son also was a "Doctor." Doctor I became, but alas, not of the variety they wanted.

Why was analytical chemistry my minor? Because there was a giant of a professor at Minnesota in those days. He was Professor Kolthoff, the father of polarography. I was not going to miss a chance to learn from a giant and so I took enough courses from him to make that subject my minor. Why microbiology? My thesis research was in bacterial leaching of copper-nickel sulfide ores.

After the Twin Cities, at 25 years of age, and against the advice of my advisors, (defying the norm seems to be pattern in my life), I chose a career in the industrial minerals arena, a decision I have never regretted. It is indeed unfortunate that the very fascinating sub-

ject matter, the application of industrial minerals, is not taught at any university. I have spent the past 35 years in the industrial minerals area working for only one company. Pfizer, the pharmaceutical giant, had a minerals division back then and I joined its research department. In 2003, I was retired from Pfizer Minerals' successor, Minerals Technologies Inc. My last position there was chief technology officer.

During my 30 years at Pfizer and Minerals Technologies, I continued to remain active in SME, first in the Minerals Processing Division and then in the Industrial Minerals Division. Along the way, I became a founding member of Calcium Carbonate Association of Europe (CCA-Europe). And, for a decade, I served on the board of the Industrial Minerals Association of Europe (IMA-Europe). Sometime during those last two involvements, a chief executive officer of a European industrial minerals company gave me the moniker: "Mr. Industrial Minerals." I like the sound of it, but I assure all SME members that during this year, I am not "Mr. Industrial Minerals." I am an SME member.

In 2003, I started my consultancy company, IDEKIN International, of which I am senior partner. We are a small (six persons) group and we work with companies who want to establish strategic alliances. We also help them manage those alliances. And we assist our, mostly overseas, clients in the area of licensing and technology transfer. In short, we have a lot of fun.

I owe my wife, Nishita, a school teacher, and my three children a deep sense of gratitude for allowing me to devote time and energy to SME throughout the years. ■

by Nikhil C. Trivedi, 2010 SME president

There are many qualified voices in SME

Jim Arnold, 2007 SME president, regularly wrote thought-provoking and meaningful articles on his President's Page during his tenure. Prior to Jim pumping new life into that column, it was sporadically used by incumbent SME presidents.

George Luxbacher, 2008 SME president, and Will Wilkinson, 2009 SME president, continued what Jim started and now it is my privilege to use this column to communicate with our stakeholders.

I believe that SME has no shortage of members who are well quali-

fied to take advantage of this vehicle to send a timely message to our members. I have, therefore, chosen to take a slight deviation from the norm and have decided to periodically invite guest writers for the President's Page.

This month's column is written by Professor P. Somasundaran, a distinguished member of SME. "Som" is a "teacher, lecturer, consultant, prod, motivator, university activist, department chair, devil's advocate, penultimate questioner and much more." I hope you will enjoy reading Som's message on sustainability.



Nikhil C. Trivedi

Love your grandchildren: live clean and green

by P. Somasundaran,
invited guest author

Since we are all just tenants on this planet, we cannot afford to continue to mess it up, lest the landlord becomes angrier and punishes us with extreme events. Alas, there is no other planet for us to move to, at least not yet. Our undeniable need for materials, both organic and inorganic, that dates back to the time of our hunter – gatherer forbearers, has undergone explosive growth in recent decades. The challenge facing us, hence, is to produce these materials, particularly minerals — a major source of metallic and nonmetallic materials — without doing further damage to this planet. In other words, practice sustainable mining. While a few in the mining industry have made laudable efforts in this regard, most still have, if at all, grappled with the concept of sustainability.

Sustainability is defined by the United Nations Division for Sustainable Development as "meeting the needs of the present without compromising the ability of future generations to meet their own needs." There are, however, many other definitions, reminiscent of the parable of six blind men describing an elephant, each believing the whole elephant to be just the part he touched. Irrespective of what our individual sustainability elephant is, ultimately it may

serve us all better to follow the spirit of the old Sanskrit saying, "Nishkama Karma," roughly translated as selfless action. So, I define sustainability as "meeting the needs of the future generations even if we have to forego some of our own perceived needs."

Today, every sector of our society, and indeed our whole planet, is closely interlinked and, hence, has a profound effect on each other. As such, for sustainability to flourish, it needs to include also the sister concepts of societal and economic impacts in addition to environmental factors.

A simple example of the fallout can occur from considering only part of the whole equation is the case of the "bad" plastic bag versus the "good green or biodegradable" paper bag. The once clear choice between the two becomes hazy when we consider that paper bags take 35 percent more energy to produce even when the recycling level is 30 percent, needs 500 percent more landfill space and generates 1,700 percent more waste water (*C&E News*, ACS, August 2008). This is by no means an endorsement of plastic bags, just a reminder of the impact we can make on a complex system even when we answer a simple question like "paper or plastic?"

On the positive side, some in the mining industry and academia alike are making noteworthy efforts towards attaining sustainability. Much more, however, remains to be done.

The International Mineral Processing Congress Sustainability Development Panel notes that the recovery of mass related to total ore varies from less than 1 percent (tantalite by Bernic) to 28 percent (chromites by Ferbasa), the rest being discarded. While the losses in mining itself are dependent on the methods used (openpit versus underground), in milling we generate contaminated waters, particulates sludges and CO_x and NO_x. Moreover, in downstream fabrication and production steps, losses are often up to or more than 50 percent. Huge amounts of energy and water are consumed in going from mining to milling to fabrication, and in mine closure stages. Engineers clearly have major opportunities to contribute to a sustainable environment by devising schemes for reducing the consumption of energy and water in mining, comminution, separation and pumping, for increasing extraction and recycling efficiency and, equally importantly, for the treatment of effluents containing arsenides, cyanides, acid mine drainage, etc.

While attempting to make progress, two critical points, however, must be kept in mind: (1) mining occurs in eco-rich remote zones that often have social, cultural and religious significance, (2) compared to manufacturing, which causes physical changes, processing involves chemi-

Continued on page 14

PRESIDENT'S PAGE

Continued from page 6

cal change that are inherently more polluting. It is clear that engineers in the mining industry have to be especially diligent when trying to attain sustainability.

For the successful sustainable development of mines, a holistic paradigm that integrates energy, water and materials efficiently, from exploration to post closure, must become our frame of reference. Here are 10 solemn pledges for miners and millers to adopt so that we may have a healthy planet for our grandchildren:

1. Have passion for using our planet's resources for the welfare of both present and future generations of humans and animals, alike.
2. Extract materials from the earth without doing further damage to the planet.
3. Work toward total resources recovery and zero discharge.
4. Give high priority to risk management, diagnose, anticipate and prevent disasters.
5. Make ethics and integrity top concerns along with safety, no-corruption and legal compliance.
6. Consider the welfare of local and indigenous populations in all discussions affecting their way of life.
7. Develop good lines of communication for sound partnerships.
8. Inspire confidence in all stakeholders from employees to sponsors to local people and government.
9. Conserve and guard the environment, air, water and earth.
10. Persevere in unison, government, academia, industry and policy makers to heal the planet.

Sources: Vale Inco Sustainability Reports, *International Mineral Processing Sustainability Development Guide*, (R.C. Villas-Boas), *Mining Engineering*, D. R. Nagaraj, D. W. Fuesrstenau, and S. Marcuson. ■

GOLD

South Africa slips to fourth in world gold production

Once the world leader in gold production, South Africa has since slipped to fourth in the world, according to figures produced by South Africa's Chamber of Mines. South Africa had been the world's largest gold producer for most of the 20th century and early 21st until it lost that position to China. Now, the latest figures also put it behind Australia and the U.S. in global gold output.

In 2009, South Africa produced 204.9 t (225.8 st) of gold, a 5.8-percent decline on the 2008 production number. The 5.8 percent year-on-year decline in production in 2009 was, however, not as large a fall as in 2008 when the drop was 14.5 percent, mostly as a result of the country's electricity crisis when power shortages early in the year forced most mines to cut production.

Nevertheless, the Chamber states, the country's gold mining industry remains critically important to its economy. In 2009, the industry earned about R48.7 billion (around US\$6.6 billion) in foreign exchange, making it the country's second largest exporter

behind platinum group metals (at R\$58 billion - around US\$7.8 billion). The gold sector employed about 159,000 workers and paid about R\$17 billion in salaries and wages. In the fourth quarter of 2009, South Africa's gold production only fell by 1.8 percent to 51.68 t (56.9 st) when compared with the third quarter. On a year-on-year basis, gold production was down by 5.4 percent in the fourth quarter of 2009.

While the fall in South Africa's gold output appears to be slowing, there are particular difficulties facing the country's gold miners — mainly due to the great depths at which many mines operate and declining grades in the older mining operations. This is also having an impact on mine safety and, although the industry has made great strides in improving this, safety-related closures following mine accidents continue to have an impact. From a mining point of view, the depths at which many of the mines operate make them difficult to work in total safety due to the unpredictability of extreme rock pressure related seismic events. ■

Kinross makes acquisition bid for White Gold project

The recent interest in gold mining in Yukon, Canada got another spark when Kinross Gold announced an acquisition bid for micro-cap exploration company Underworld Resources, which values Underworld at approximately US\$135 million.

Kinross has offered 0.141 of a Kinross common share, plus \$0.01 in cash, for Underworld Resources. Based on the March 10 closing price of C\$18.54 per Kinross common share on the Toronto Stock Exchange, the implied offer price was approximately C\$2.62 per common share of Underworld Resources.

Underworld Resources is an

early-stage exploration company. It announced the discovery of its White Gold property in 2008 but the resource estimate on the White Gold project was released in January 2010. The White Gold project is located in the Tintina gold belt, approximately 95 km (59 miles) south of Dawson City, Yukon Territory, Canada. In January 2010, Underworld announced its maiden resource estimate at the White Gold project, which showed indicated and inferred gold resources approximating 46.5 t (1.5 million oz).

The Yukon has been a hotbed of exploration activity for the past two years (ME, Jan. 2010, page 26). ■

by Nikhil C. Trivedi, 2010 SME president

Tale of three cities

March was an exciting month for me in more ways than one. Yes, it began with a very exciting, yet humbling event; my taking over as SME's 2010 president. By the time it ended, I found myself having attended three exciting events in three very exciting cities.

Phoenix: The SME Annual Meeting in Phoenix, AZ was a roaring success. Some of the 2010 meeting figures reached numbers not seen in quite some time. These included attendance, the number of technical sessions, the number of exhibitors, the number of attendees at the SME Foundation dinner and dance, the number of items auctioned at various silent (and not so silent) auctions, the amount of funds raised for the Foundation and the number of corporate sponsors for social events. It was mind-boggling and gratifying to see so many SME members, and nonmembers, coming forward to present papers, listen to presentations, network, get leads on career prospects, secure jobs or just meet old friends. It was indeed an event to experience.

At the SME Annual Meeting in Phoenix, the attendance was 4,937 compared with 4,512 in Denver, CO in 2009. This was the largest attendance during the last 10 years. And there were 470 exhibitors and 630 booths sold in Phoenix, the most since 1999.

The SME Foundation dinner and dance was attended by 213 people, compared with 154 in Denver in 2009. The Foundation's major fund raising activity, the silent auction, raised a record amount. AnnMarie Estrada is still counting, but she expects that the proceeds were in excess of \$30,000. As the 2009 chair of the SME Foundation silent auction, I want to thank all of those people who contributed items, books, old stock certificates, models, mineral specimens, mining memorabilia, field trips to Alaska and Nevada,



Nikhil C. Trivedi

and many other items. Thank you. Please keep that spirit of generosity alive as John Murphy will soon be asking for your items for the Foundation's silent auction at the 2011 meeting.

The SME banquet was attended by 565 people, compared with 536 in 2009. SME's celebration of the 100th anniversary of mining research (100 years of founding of the U.S. Bureau of Mines) was a great success. So was the kickoff of the yearlong celebration of the 75th anniversary of the establishment of the Industrial Minerals Division, now known as the Industrial Minerals and Aggregates Division.

The improved state of our industry, and the fact that the 2011 annual meeting in Denver will be held jointly with the Colorado Mining Association's annual meeting, gives me high hopes that we will see another record-breaker next year. Mark it on your 2011 calendars (Feb. 27-March 2).

Toronto: Immediately following the SME Annual Meeting was the Prospectors and Developers Association of Canada (PDAC) meeting. This was my first time attending this massive gathering. Multiply the SME meeting by three and you have the scale of this meeting. For early March in Toronto, Ontario, the weather was unbelievably good. Sunny days, warm temperatures and

clear skies were with us for the duration of the meeting.

SME's participation at this meeting was visible in many ways. First and foremost, the SME bookstore, strategically located in the registration lobby, was a busy place. This was the first time SME set up its bookstore at the PDAC conference. It was a grand success. Some SME staff members went directly from Phoenix to Toronto to make sure that the bookstore from Phoenix was reassembled, restocked and ready for the first day of the PDAC conference.

SME also had a booth promoting its other product offerings and membership benefits. SME members, especially exploration geologists, developers, financiers and resource specialists, were also present in large numbers. And to cap it off, SME was a co-host of an evening wine and cheese mixer that was a heavily attended fun evening after a long day of walking all around the convention center.

At one point, I counted seven SME past presidents, all in one room, at the historic Royal York Hotel in Toronto. Where are the photographers when you need them?

Toronto is a charming city. The PDAC banners were placed all over the downtown area and the importance of mining to the Canadian economy was evident. More important was the evidence that mining as an essential element of Canada's economic success was well recognized by the laymen and industry professionals, alike. That sense of positive public recognition of the industry is a feeling I have not experienced in the United States in decades. From the time I entered the country and the immigration official asked me the purpose of my visit, to the time the taxi driver dropped me off at the same airport for my return, all I had to mention was that the purpose of my visit was to attend the

Continued on page 18

PRESIDENT'S PAGE

Continued from page 6

PDAC convention. None of them asked, "which convention?" Certainly, Toronto has rightly achieved the status of mining finance capital of the world. Now I understand why someone I met recently in Geneva said, for the American mining industry professional, the message is not "go West, young man." Instead, the message might be, "go North, young man."

Miami: Although my Swiss friend's advice was to "go North," on March 21, I had to go south. At the luxurious Fairmont Resort and Spa at Turnberry Isle, north of Miami, FL, I attended the 20th Industrial Minerals International Conference and Exhibition. This biannual event is the premier event for prospectors, developers, producers, sellers, transporters and buyers of industrial minerals. Commonly referred to as the IM

Congress, these conferences are organized by *Industrial Minerals* magazine.

Having spent my entire professional career in the world of industrial minerals, I have attended several of the 20 meetings during the past decades. In contrast to the PDAC and SME meetings, this is a narrowly focused meeting. Technical sessions of very high caliber, exhibit stalls, presentations and discussions all are focused and intimate. After all of these years, I felt like I knew most of the 400 or so participants. It was fun to meet many old friends and colleagues, competitors and co-suppliers in one place in a superbly soothing environment. It was a greater joy to see numerous young faces from all over the globe.

In some ways, the products of SME and *Industrial Minerals* magazine may be seen as competing. Our Industrial Minerals and

Aggregates Division also puts on technical sessions with topics identical to those at the IM Congresses. SME also publishes articles and books targeted to the needs of the industrial minerals professional just as *Industrial Minerals* magazine does. However, we have enjoyed a strong friendship and collaborative association with each other. At this 20th IM Congress, I was invited to be the welcoming speaker. I was honored by that invitation and made a welcoming presentation as the 2010 SME president. This was a timely opportunity for me, especially as SME's Industrial Minerals Division is currently celebrating its 75th anniversary. As in Toronto, SME members were in attendance in large numbers at this event.

The IM Congresses continue to attract chief executive officers, presidents and managing directors of publicly traded and privately owned companies involved in the nonmetallic sector from all corners of the world. That is a clear evidence of the amazing level of credibility enjoyed by the magazine. It is not an easy task to sustain that credibility over several decades with turnover of staff and turnover in the ranks of the targeted audience. Personally and professionally I am impressed with the uniquely honored niche this magazine has carved out for itself in the world of the nonfuel, nonmetallic industry.

As has been the tradition among the regular attendees of this conference, the last hour was spent speculating which exotic locale the next IM Congress will be held.

The common undercurrent at all three meetings in all three great cities was the upbeat mood in the mining industry. I believe that we are on the leading edge of a massive upturn and a greatly prosperous era for our industry. As in the past, I continue to be proud of my association with SME members, some of the finest, most talented mining professionals in the world. ■



TAGGART GLOBAL

World Leader in Coal Preparation and Material Handling

Design.

Build.

Operate.

Lead.

Leading the World in Material Handling and Coal Preparation design, construction, commissioning and operations.

Taggart Global designs, builds and operates state-of-the-art coal preparation plants and material handling systems for clients worldwide in the coal production, power generation, steel making and material handling sectors. We offer flexible contract services to meet the unique needs of your project, and our construction, electrical and international procurement divisions bring specialized expertise to deliver a project that's on time, within budget and beyond your expectations.

Whether you're adding a new facility or system, modifying an existing plant or seeking to outsource operations, take advantage of Taggart's innovative engineering and proven solutions to improve performance, increase efficiencies and accelerate return on investment.



TAGGART GLOBAL

US Headquarters
4000 Town Center Blvd., Suite 200,
Canonsburg, PA, USA 15317
Tel: +1 724 754 9800 • Fax: +1 724 754 9801
www.taggartglobal.com

North America | South America | Africa | Asia | Australia

by Nikhil C. Trivedi, 2010 SME president

Where have all of the professors gone?

SME's Education Sustainability Taskforce is made up of several outstanding SME members who are focused on higher education in mining disciplines. We face a number of key strategic education-related issues. One of them is a little known, but potentially detrimental shortage of new faculty. Therefore, this month I invited Dr. Mary Poulton and Dr. Rick Sweigard to be my guest columnists and asked them to educate us on the extent of the shortage and remedial steps they recommend.

At the 2011 annual meeting, the Education Sustainability Taskforce will be organizing special poster sessions and other events to encourage graduate students to consider a career in academia.

Stay tuned...

**Sincerely
Nikhil Trivedi**

Mining engineering programs in U.S. universities are facing a shortage of new faculty, graduate students and research support that could jeopardize our ability to supply enough engineers to industry in the coming years.

We have 13 accredited programs in the U.S. that offer degrees in mining or mineral engineering. Faculty numbers are approximately 87 with a total undergraduate enrollment of slightly more than 1,000 in the 2008-2009 academic year. For contrast, the civil engineering department at University of Texas Austin has 69 teaching and research faculty



Nikhil C. Trivedi

and 1,150 students (source: www.ce.utexas.edu).

McCarter (2007) analyzed the faculty demographics and predicted approximately 35 retirements out of a pool of 45 senior faculty in U.S. mining programs by 2012. Doctoral degree production in mining was historically 10-15 per year over the past 10 years, with a recent increase to nearly 20 per year in 2006. Yet, of this pool, the estimated number of doctoral candidates who are self-reported as likely to become faculty ranges from 1-6. In 2007, there were 10 open faculty positions, and, in the 2009-2010 academic year, there are an estimated 15 openings.

In recent years, we attributed stress on mining programs to low enrollments following a protracted commodity cycle downturn. Industry and alumni were vocal in their support of preserving remaining programs and provided philanthropic support for faculty positions, operations and undergraduate student scholarships. Students responded to the market forces and enrollments increased. Universities protected their remaining mining programs in response to the external support. Once again, the number of B.S. degrees awarded is on the rise.

The more fundamental stress on our mining programs is the lack of research support that leads to a lack of faculty. External research funding supports graduate students

who become future faculty as well as entrepreneurs, consultants and business leaders. Junior faculty need research support to progress through the tenure process. Research funding attracts more and better undergraduate students drawn to interesting technical challenges. It also motivates them to pursue advanced degrees and to consider academic careers. Since the closure of the U.S. Bureau of Mines, public funding of mining research has been minimal, and junior faculty have had trouble accessing sufficient funds to launch their careers. The need for research dollars for mining faculty is on the order of \$25 million/year to enable new faculty to obtain tenure and to support the ongoing research programs of tenured faculty. The funds available from the U.S. National Institute for Occupational Safety and Health (NIOSH) Mining and the Office of Surface Mining typically amount to \$3 to \$4 million/year. In contrast, federal agencies allocated more than \$400 million last year to climate change research. Graduate students do not see attractive career opportunities in academia because of the lack of research support. The result is that we have university administrators supportive of maintaining or expanding their mining programs but we cannot fill vacancies with the new talent that we require, even with international searches.

There is room in the university teaching model for nontenure track teaching faculty supported on private funds. Professor of practice positions can help balance the workload in departments but do not alleviate the need for research-active faculty. Given that most public universities in the U.S. receive the majority of their funding from research, tuition and philanthropy rather than state dollars, universities do not offer tenure track positions on state dollars to faculty who do not bring in

Richard Sweigard, member SME, Ph.D., is associate dean of engineering at the University of Kentucky and a professor of mining engineering. He is the former department head of mining engineering at Kentucky.

Mary Poulton, Ph.D., member SME, is distinguished professor of mining and geological engineering, director of the Lowell Institute for Mineral Resources and department head at the University of Arizona.

Continued on page 15

PRESIDENT'S PAGE

Continued from page 6

external research dollars. For those who argue that mining engineering is not rocket science and universities should just teach industry practice, we would argue that mining today is harder than rocket science with the current and future environmental, social, safety, economic and engineering challenges.

The solution to the workforce shortage in mining engineering must include a renewed push to restore public funding for mineral resources research and a renewed approach to private support. The Australian model for university research as a public-private partnership with government and industry support has proved successful for

more than 20 years. In addition, there is a need to increase more traditional investigator-led research such as through the National Science Foundation or NIOSH.

Steps that should be taken by all parties vested in the future of the mineral resources industry include:

1. Support restoration of federal and state funding for mineral resources research. Senate Bill 1462, the American Clean Energy Leadership Act of 2009, contains language to support research and student fellowships for a range of mineral and energy resources programs. The legislation needs champions.

2. Increase the extramural funding available for mining in NIOSH, DOE, OSM and USGS.
3. Individual alumni and industry partners can support professor of practice positions as well as basic department operations, and graduate student support.
4. Industry can increase their support of university research, especially with the connection to workforce needs. ■

Reference: McCarter, M., 2007, "Mining Faculty in the United States: Current Status and Sustainability," *Mining Engineering*, Sept. 2007, pp. 28-33.

BRAZIL

Norsk Hydro to buy Vale's aluminum operations

Norwegian aluminum producer Norsk Hydro ASA has signed a deal to buy the majority of Brazilian mining company Vale S.A.'s aluminum operations. *The Associated Press* reported that the deal is worth a \$4.9 billion.

Oslo-based Norsk Hydro said it will pay \$1.1 billion in cash for the operations and give Vale shares in Norsk Hydro representing 22 percent of the company.

Norsk Hydro's president and chief executive officer Svein Richard Brandtzaeg said the deal was the biggest transaction in Hydro's history and that with the company has secured raw materials for more than 100 years of aluminum production.

Vale is the world's largest producer of iron ore and has more than 100,000 employees around the world.

The deal will give Norsk Hydro control of 60 percent of the world's No. 3 bauxite mine, Paragominas in Brazil. It also has the right to take over the remaining 40 percent stake in two installments, in 2013 and 2015, for \$200 million each.

Norsk Hydro will also take control of 91 percent of alumina refinery Alunorte, 51 percent of the

Albras aluminum plant and 81 percent of the CAP alumina refinery project.

As part of the deal, around 3,600 Vale employees will be transferred to Norsk Hydro, which already employs around 19,000 people in 40 countries.

The company said it will finance the acquisition by launching a fully underwritten rights issue of 10 billion Norwegian kroner (\$1.7 billion). The rights issue and the deal are supported by the Norwegian state, which currently owns 43.8 percent of Norsk Hydro shares.

After the deal, the Norwegian state's share in Norsk Hydro will drop to 34.5 per-

cent. Vale will get a seat on Norsk Hydro's board of directors. ■



Rugged STRAINERS & FILTERS

Make sure your strainers and filters work as hard as your heavy equipment. Flow Ezy has been manufacturing filtration products for 60+ years. One call can solve your heavy equipment filtration needs.



FLOW EZY FILTERS, INC.
P.O. Box 1749, Ann Arbor, MI 48106
Tel 800-237-1165 or 734-665-8777
Fax 800-252-1730 or 734-665-4332
flowezy@flowezyfilters.com
www.flowezyfilters.com

by Nikhil C. Trivedi, 2010 SME president

Membership has its privileges ...

The actor Karl Malden earned great name and voice recognition from his long-running television series called "Streets of San Francisco" with young Michael Douglas as his co star. That fame earned Malden a highly visible role as a pitchman for American Express. It was in that context that I first heard the phrase, "membership has its privileges." Of course, it was referring to membership in the American Express credit card club. Since then, however, we all have heard that phrase thrown around in many contexts and situations, some serious and some not so serious.

I want to use that phrase close to the home that we call SME. No, I am not going to list all of the wonderful things the SME does for its members. Nor am I going to boast about how so many SME members have gained so much from their membership (I must point out that if I did prepare such a list, it would indeed be an impressive, and well-justified exercise in bragging). But I have been around long enough to know that doing that would be a guaranteed way of losing you, the reader. That is not my goal.

So, I am going to list those privileges that are seldom exploited by SME members. For example, did you know that most SME governance meetings are open to all SME members? Yes, the SME Board of Directors' meeting is open. Divisional executive committee meetings are open. Standing committee meetings are open. Ad-hoc committee meetings are open. The only exceptions to this rule are the SME nominating committee meetings and the "closed" portion of the board of directors' meetings.

Many times, I have asked members why they do not exercise this key privilege and many times I have heard ignorance as the excuse. I urge you to make SME relevant to your needs and, to accomplish that, start by participating in any committee that appeals to you. Even if you are not a committee member or you do not have time to take assignments and followup action items home, you can certainly share your thoughts and



Nikhil C. Trivedi

ideas. I assure you that the professionals who chair these committees know how to minimize "whining," a major turn off to most of us, and maximize constructive thought process. I can also assure you that you will end up volunteering to take some work home. Volunteerism is contagious. Besides, it is your privilege.

Another privilege that is seldom exercised by many SME members is the publication of technical articles. Did you know that articles published in *Mining Engineering* magazine or *Minerals & Metallurgical Processing* or *Tunneling & Underground Construction* quarterly do not have to be presented at SME annual meetings? Many members are under the false impression that only after a presentation at an SME technical meeting, can an article be considered for publication. I hope I have set the record straight. I am especially calling upon our younger members to write about the new technologies and techniques that can be entered into public domain for all SME members to know, practice and improve. It is your privilege.

One common, and sensible, privilege that is infrequently exercised rests with members who are supervisors, department heads, presidents and chief executive officers. Did you know that one of the most effective ways of fulfilling your duty of providing training and continuing education to your subordinates is to enable them to attend short courses and technical sessions at SME meetings?

When asked why he does not use his authority and prerogative as

a senior manager at a well-known minerals company to encourage his subordinates to attend SME annual meetings, one SME member disappointed me by answering, "I do not want to make it easy for my guys to leave me after I have invested so much in them!" That ignorance, I am certain, is limited to only that one member, because I know that SME members at large are astute and forward thinking.

By leveraging the vast technological content that comes together at an SME annual meeting in the form of training programs, short courses, student competitions, presentations and hallway interactions, an opportunistic manager can gain a great return on his investment in his people. It is your privilege.

During the course of the year, in our jobs, we often realize the need for services of a PE or a qualified, certified, recognized expert. How often do we look for such individuals yet somehow do not take advantage of the directory of SME Registered Members? Use the technical expertise of fellow members as consultants, collaborators, partners or whichever business relationship you prefer under your circumstance. Remember, it is your privilege to tap a vast resource called "fellow SME members."

SME has an impressive array of awards that are given out annually to recognize accomplishments and contributions of professionals in our field. Having served as chair of several of these award committees, I know how important (and difficult) it is to have a list of nominees from which to select one or two finalists for awards. Did you know that it is your privilege to nominate individuals for these awards? You may nominate a colleague, a teacher or any one else who meets the qualifications for awards that are administered by SME and the various divisions. A public recognition by one's fellow professionals is an amazing motivator to do more. It is your privilege to nominate a worthy individual for such a recognition.

Continued on page 8

I have an observation on our local sections, too. During the past several months, I have had the pleasure of visiting five local sections. I am amazed at the number and quality of activities and the dedication of SME local section officers. However, in many cases, the local sections have remained internally focused. Some of the local sections do not know about, nor do they take advantage of, the many new initiatives SME has taken recently that can benefit the local sections. SME local sections have access to Mii products, Krumb

Lecturers, special project grants and subsidies from SME and its leadership. Using all of the different tools in the SME tool box will increase the effectiveness of local section programming and activities. And it is your privilege.

At the annual meeting in Phoenix, AZ, Will Wilkinson, John Murphy, Dave Kanagy and I attended the new member orientation mixer. My message to the new members was summarized in few words, "the value you will realize from your new SME membership depends on you. Passive membership will disappoint you and active membership will enrich you

beyond your expectation."

Your SME membership, whether you are a new member or a not so new member, offers you privileges. Please know and remember to exercise all of the privileges you have.

As Malden used to say, "don't leave home without it." I would like to say, "don't leave home without exercising your SME membership privileges."

It would be out of character for me to end without stating again that I have never seen a more talented and dedicated group of minerals professionals than SME members. To serve as your 2010 president is a privilege. ■

LETTER TO THE EDITOR

Who will speak for minerals?

Editor:

Here in Montana, we have been waging another public lands war. Our junior senator, Jon Tester (D), has sponsored a bill put together by a coalition of preservationists, recreationists and a few timber companies. The issue is timber jobs via a sort of "guaranteed" harvest. The bottom line to the mineral industry is another 364,000 hm² (900,000 acres) withdrawn from mineral entry. Some of this acreage is very good mineral country.

I watched a webcast of the senator's introduction of his proposed bill to the Senate Energy and Natural Resources committee. I was stunned. In nearly an hour of testimony, minerals were never mentioned. Not once. The wilderness advocates were there. The timber industry was there. A few county commissioners from Montana and Idaho were there. Missing was anyone from the NMA, NWMA, MMA, SME, SEG, or AIPG. I know these organizations have public awareness programs in place, but, the bottom line is, from what I have seen, these programs are having little, if any, effect. So, who will speak for minerals?

There have been piles of letters written to the editors of Montana newspapers waxing eloquent on the pros and cons of Senator Tester's wilderness bill. I have written so many that our local newspaper now limits me to one per month. I have seen only four other letters that have discussed, or even mentioned, minerals. Four! I often write such astute observations as, "we can only develop mineral resources where they are, not where

others may want them to be," and "the average wilderness withdrawal is 40,000 hm² (100,000 acres), the average mineral development is not even a tenth of that." And, "if we import our commodity resources, we export our wealth," and, "mineral development has the highest potential for creating basic economic wealth, ranging from \$10,000 to over \$1,000,000 per acre."

Why are so few of us the only ones speaking up? Where is the rest of the mineral industry? We need not be ashamed of our profession. As one lady geologist wrote in *The Professional Geologist*, "we are not the bad guys."

Do a quick search of "wilderness" on www.govtrack.us. I got 96 citations. Ninety-six bills before congress that either propose more wilderness or at least mention it. Not all are new wilderness proposals, but a bunch are. Is anyone keeping track of public lands removed from mineral entry? I hope one of our industry organizations is. The effort needs to be thorough and one that includes not only wilderness but military reservations, national and state parks, wildlife refuges, areas of critical concern, recreation areas and, last but not least, those infamous national monuments. I hope we are not paying our dues only to subsidize more books, more students and more backslapping conventions. If so, I think it's time we surface, open the hatch and look around. We are losing mineral access to public lands at a prodigious rate. I know we pride ourselves on being a staid old conservative industry, but, truth is, timid aloofness does not win battles, let alone wars.

Today, we hear a lot about forest

health and energy development, but minerals are not even on most land planners' radar screens. When minerals are mentioned, it's usually not about the jobs or wealth created, but about the threats to fish and wildlife and water and recreation and on and on. There is no discussion of balance, needs, jobs, or revenues. No discussion of the minimal impact to the land for the greater common good it will do.

As has been mentioned with increasing frequency in SEG articles, we've just about sampled all the known mineral occurrences into oblivion. We need to start evaluating areas that have no ore-grade outcrops. But, these areas are going to be few and far between if we continue to allow lands to be withdrawn from mineral development. We need to preach to anyone who will listen, especially to our legislators at the state and federal levels.

We also need to take this fight to the people via letters to the editors of newspapers and magazines. We need to work in concert with the other commodity producers, the timber industry, the oil patch, the stockmen. We need to support them and they need to support us because we all are struggling against the same foes, the anti-development activists. It will take a consistent, concerted, unwavering effort to stop the momentum that has built up over the last three decades. We must all become involved. We are not the bad guys, but we must speak up. So again I ask "who will speak for minerals?" ■

EA (Andy) Johnson
Butte, Montana

SME is on the move,

new headquarters building will give the society room to expand



by Nikhil C. Trivedi,
2010 SME president

SME is moving. Yes, figuratively and literally. In fact, as everyone can imagine, both are interdependent.

I have the pleasure of informing the membership that SME is moving its headquarters from its current location in Littleton, CO to Englewood, CO. The new SME building is about 32 km (20 miles) east of the current one, which has served as SME's office for the past 31 years. Those familiar with the current building know that it is a very attractive all-brick building with an aesthetically pleasing exterior. However, those who work there day in and day out, along with members

who visit the SME offices, have known for a long time how cramped it is on the inside. SME's Facebook friends may have already seen the "for sale" sign in the front lawn of the Shaffer Parkway site.

The new building, which SME will be acquiring shortly, is located in a beautiful office park, is 12 years old and currently houses a local Denver television station. Most importantly, to Denver Broncos fans, it is within a stone's throw of the Bronco's headquarters and practice field near Centennial Airport in southeast Denver. It is conveniently accessible from Denver International Airport and from all Denver suburbs via major highways.

I would like to share with you the steps involved in making this decision. SME's leadership and staff have, over the years, discussed the severe space shortage at the

current location. The recent affiliation of Mii and the society's increased book sales made it necessary for SME to lease some badly needed storage space. The recent member benefit initiatives, such as OneMine.org and SME Tech, warranted hiring additional staff and our planned initiatives for SME's future growth pretty much demand staff additions in the near future. For all of those initiatives, the current space was not adequate and SME was in great need of additional office space.

With that as background, Will Wilkinson, 2009 SME president, established an ad hoc committee to develop a list of options for SME to consider. The ad hoc committee was established in January 2010 and was made up of five members — Marc LeVier (board member), Doug Peters, Jim Komadina, Dave Kanagy and Mike Hedges.

During the following months, this ad hoc committee explored several options with the only criterion being "the best interest of SME." The committee looked at expanding the current building, buying land and constructing a new building, buying an existing building, leasing space and deferring the decision to a later date. I had not mentioned to the ad hoc committee that, in my opinion, that last alternative was a nonstarter. I would have been very disappointed if the ad hoc committee had returned to the board with the recommendation to do nothing. To its credit, I found out afterward the committee dismissed that option early on.

The ad hoc committee worked closely with SME's Finance Strategic Committee currently chaired by Bob Shaffer, board member. It put together financial models and projections for several different combinations of options and eventually concluded that SME's best option was to buy an existing facility that could be upgraded or modified to suit SME's needs with minimal expenditures of time and money. Ensuring minimum impact on the staff's daily commute to SME was also a key criterion. That was a key factor as the ad hoc committee expanded its charter to initiate a search for proper office space.

The ad hoc committee concluded that the best choice for SME was to move to Englewood in the Dove Valley office park at 12999 E. Adam Aircraft Circle. At this stage, we were just

SME will move its headquarters into a larger building in Englewood, CO shortly after the 2011 SME Annual Meeting in Denver, CO.



Continued on page 14



President's page; SME headquarters is expected to move after annual meeting

Continued from page 6

beginning the process. The SME board has the ultimate authority to act on such a major initiative. So we had a task at hand, convince the board.

The board was keenly interested. Each board member had questions. Each had concerns and rightly so. And each member was aware of the implications to SME's financial strength. But the board's approval of the project was unanimous.

Was I surprised? No. The ad hoc committee did a thorough job, the Finance Strategic Committee provided its timely, sage advice on financing options. And the board was kept fully informed throughout the process. Moreover, the board recognized that this action is in the best interest of SME and it provides the means to accomplish some big audacious goals we have for our society. The board was made aware that its decision on this initiative was unprecedented. No previous SME board had made any

decision with the magnitude of dollars that was involved in this decision. My thanks to the board members for showing leadership and vision. I know that they have made a good decision.

So what is next? There are several things to do before SME can print its new stationary. "Closing" will take place in early November. Architects will put the finishing touches on the remodeling where warranted. Interior construction contractors will work during the late fall and winter months and the big move is scheduled for March 2011 after the SME Annual Meeting.

To each member of SME, this is what I would like to say. SME leadership has made a very bold decision that shows its confidence in the sustainability and good financial health of SME and our industry. The new SME logo introduced two years ago, this new building, the bold initiatives, such as OneMine.org and SME Tech, are all tools to take SME to a greater height, to give SME a broader influence over the mining community and to provide SME members an unparalleled opportunity to derive professional excellence. These tools are for you to use, improve and update.

I am privileged that this literal "SME on the move" is happening on my shift. But I want to give credit where it is due. SME members, industry leaders, past SME presidents and SME staff have all driven SME to the threshold on which it is standing today. We are poised for unprecedented, exciting times ahead. We have the tools in place and, most importantly, we have the most outstanding group of skilled and talented mining industry professionals who call SME "home." Thank you for your support. ■

SME has outgrown the current headquarters office in Littleton, CO.



Simandou iron ore project to be developed; Rio Tinto teams with Chalco for mine in Guinea

THE SIMANDOU IRON ORE project in Guinea will be established through a joint venture (JV) agreement between Rio Tinto and Chalco.

The companies announced the binding agreement that follows the signing of a memorandum of understanding between Rio Tinto and Chalco's parent Chinalco that was announced in March 2010. The agreement covers all aspects of how the JV and the project itself will operate and be governed, including planning, construction and management of the mine and associated rail and port infrastructure.

Under the terms of the agreement, Rio Tinto's 95 percent interest in the Simandou project will be held in the new JV. Chalco will acquire a 47-percent interest in the new JV by providing US\$1.35 billion on an earn-

in basis through sole funding of ongoing development work over the next two to three years. Once Chalco has paid its \$1.35 billion, the effective interests of Rio Tinto and Chalco in the Simandou project will be 50.35 percent and 44.65 percent, respectively. The remaining five percent will be owned by the International Finance Corporation (IFC), the financing arm of the World Bank.

Simandou is a world-class iron ore mining project located in southeastern Guinea. The project has completed initial feasibility studies and development work is progressing. Rio Tinto is partnered with the IFC. Chalco also contributes dedicated capability in the delivery of major projects and access to the infrastructure expertise and experience of other organizations in China. ■

A family story, SME's parent organization takes a look at its family and future



by **Nikhil C. Trivedi**,
2010 SME president

During the past several months, I have visited many of SME's local sections in different parts of the country. Some of the local sections continue to proudly proclaim themselves as sections of the American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME) and rightly so. AIME is SME's parent organization and we honor our heritage. In August, SME Executive Director Dave Kanagy and I attended the AIME Board of Trustee's annual meeting. SME is ably served at the AIME level by Mike Karmis and Barb Filas. At this event, Karmis's term ended and George Luxbacher was inducted as the next SME representative to the AIME board and he will be AIME president in 2013.

When we talk about AIME, it is logical that we also want to know what is happening with the Women's Auxiliary of AIME (WAAIME). Well, the WAAIME group, SME's youngest Division, is doing very well. This year, the WAAIME Division is led by Winnell Burt, Susan Harwood and Veronica Yovane-Brahm. This year alone, the WAAIME group has awarded \$200,000 in scholarships to deserving students in several countries including the U.S. Many decades ago, I was fortunate to receive a WAAIME scholarship. The WAAIME Division is always on top of my mind when I feel generous and I hope you will feel the same way.

And since so many SME members are curious about AIME and its current mission, I asked Barb Filas (2005 SME president) to tell the AIME story. So, here it is.....

— Nikhil Trivedi

The parents were married in Wilkes-Barre, PA. It was an historical event, with a wedding party of 22 and a total of 71 people attending. Their honeymoon was a trip to the most beautiful fields in the Wyoming Valley of Pennsylvania.

The marriage was built on a very specific passion, which was cultivated and grew through a continuing hunger to learn and share. The parents lived quite comfortably and, over time, they thrived and prospered. They shared many things, traveled to many places and hosted many gala events. They were members of the country club, where other parents also came together to learn and share their combined wisdom.

The parents had children. As babies, the children were totally dependent on the parents. As the children grew older, the parents took them along on their travels, to their galas and to the country club. They taught their children to play with the other club member's children. They raised them to think for themselves and to stand on their own. They taught them to be independent, and also to recognize the value of their friends at the club.

The children grew up and wanted to venture out on their own. Each had matured and defined themselves as a unique person, with specific interests and passions that, while still bearing a family resemblance, were not the same as the other siblings. The parents encouraged their autonomy and independence, but still embraced

each child with loving arms as each of their respective families matured and grew.

The parents are older now. They live on a modest income from the returns on their investments. One of those investments generates significant dividends that cannot be bequeathed to the children if the parents die. They continue to support their children and enjoy their membership in the country club. The children were never allowed to join the club — it quit taking new members years ago.

As the parents have aged, the children sometimes say that their parents try to do too much. The children feel like they can do most things better themselves. They are younger, more nimble and have families of their own who can get things done more easily and efficiently than the parents. The parents need to step back and let the children do the work and to run their own lives.

The children respect their parents and their traditions, but they have their own lives to live. They want the parents to live on, but the relationship is so different now than it was when they were babies. They understand the importance of the network at the country club, and they recognize that they do not need to be members themselves because they have full access to the club and all of its benefits as long as the parents keep their membership.

It really is a special family. The parents are

(Continued on page 17)

President's page; AIME's new mission is to support its member societies

(Continued from page 6)

healthy, financially strong and supportive of their children. The children each have healthy families of their own and are doing quite well. They all enjoy a strong respect for the history, traditions and values that the parents have built.

Well, if you have read this far, my strategy worked. I knew no one would read the article with a title like "Trustees rethink the strategic plan at the AIME Annual Meeting." So now, go back and re-read the story and replace "parents" with AIME; "children" with SME, The Minerals, Metals, and Materials Society (TMS), the Society of Petroleum Engineers (SPE) and the Association for Iron and Steel Technology (AIST), the four member societies of AIME. And replace "country club" with the United Engineering Foundation Inc. (UEF), of which AIME is one of five founding member societies. One of the "investments" that goes away if the parents die is the Offshore Technology Conference (OTC). The modified story, in its own twisted way, gives some organizational history and describes the outcome of the recent AIME strategic planning process.

I cannot take credit for coming up with the analogy. Incoming AIME President DeAnn Craig (SPE) used it to characterize where AIME has come from and where it should go in the future at its annual meeting at the Garden of the Gods Club in Colorado Springs, CO on Aug. 6-7, 2010. I took some pretty ridiculous privilege in presenting her parity in my own words, but I think it serves to illustrate some of the changes that AIME needs to make (as the parents get older) to remain relevant, even as its member societies (the children) have grown independent and autonomous. It was clearly time to reassess the role that AIME plays and refocus on adding value to the four member societies. At the annual meeting, the

Given that AIME will continue to exist, the real task is to determine what AIME should do and how it should be staffed going forward. We asked ourselves what it would take to make AIME a valuable and relevant partner to its member societies.

AIME trustees and member society executive directors debated the merits of the different roles that AIME could play. They even went as far as discussing whether AIME should be eliminated altogether. In the end, they unanimously agreed that AIME should remain intact, based on two compelling reasons. First, to maintain the founding member seat at the UEF table (the country club membership that is no longer open to new members). Second, to preserve the investment that cannot be bequeathed to the children. In addition to these, the AIME portfolio currently sits at a little more than \$9 million, so if AIME were dissolved, dividing up the proceeds would likely be divisive among the member societies (the children would fight over the parents' retirement nest egg).

Given that AIME will continue to exist, the real task is to determine what AIME should do and how it should be staffed going forward. We asked ourselves what it would take to make AIME a valuable and relevant partner to its member societies. We agreed that the role and vision of AIME needed to be refocused based on the following priorities:

- Distributing more funds to the member societies to support mutually beneficial initiatives.
- Functioning as a conduit to channel initiatives to member societies where the staff and volunteers reside.
- Honoring the AIME legacy and fostering goodwill, communication and trust among member societies.

This all boiled down to a new AIME mission — support its member societies.

We will fulfill this mission by:

- Exercising fiscal responsibility.
- Distributing funds.
- Facilitating interaction with the larger scientific and engineering community.
- Enhancing collaboration among the member societies.
- Honoring the legacy and traditions of AIME.

The idea is to have AIME function more like a foundation going forward, limiting the activities and initiatives that it undertakes as a society to the maximum practical extent and pushing down the day-to-day work to the member societies as much as possible. So, with that directive, President Craig appointed a new committee to work on reallocating programs and responsibilities to the member societies, reassessing AIME staff and overhead requirements, and some serious budget trimming. The ultimate goal is to generate revenue that can be distributed to the member societies while, at the same time, preserving the financial security of AIME. There is a lot of work to do, changes to be made and belt tightening to be done. Hopefully, we will see the fruits of these labors in the years to come. The efforts are well aligned with the new mission and will get AIME closer to its new vision: To honor our legacy by becoming a relevant and valued partner to our member societies.

So the children are all grown up and successful now. They respect their parents and value their heritage. The parents continue to lend their support, share their country club membership and help their children to live their own lives. Their legacy will live on.

— Barb Filas

Safety in mining;

SME's role in advancing the industry's standing and role



by Nikhil C. Trivedi,
2010 SME president

Over the past several months, there have been incidents in mining operations on a worldwide basis that have drawn public attention to the issue of mine safety. The mining community has always taken the issue of health and safety to the heart. Despite that, in the public eye, our industry's performance is not adequate. When I began my term as SME president, I established an ad hoc committee to advise the SME board on how SME can become a "go to" place for information related to health and safety in the mining community. The definition of health and safety for us is broad. It includes disaster prevention and control, ground control and strata monitoring, risk management, safe blasting practices, mine automation, mine ventilation, slope stability, respirable dust control, industrial hygiene,

pneumoconiosis and toxicology, to name just a few of the topics. Moreover, for our UCA Division, safety takes on an added significance, since some of the projects they undertake are often directly under densely populated metropolitan areas.

I am pleased to inform you that at its mid-year meeting in September, the SME board unanimously approved the creation of an SME Standing Committee on Health and Safety. This new standing committee will hold its inaugural session at the SME Annual Meeting in Denver.

In anticipation of that board action, and continuing my practice of inviting knowledgeable people to pen a President's Page column, I invited Gary Goldberg of Rio Tinto Minerals to provide us his views on what role can a professional society such as SME play to advance the mining community's safety standing. As a mining industry leader, Goldberg has very clearly articulated for us that SME indeed has a major role to play.

— Nikhil Trivedi

In my 30 years in the mining industry, I have seen a tremendous amount of investment in, and progress toward, creating a safer and more productive operating environment. We have made great strides in applying technology to make our mines, equipment and plants safer, as well as in applying behavioral sciences to create safer mindsets among our employees.

But that is what it looks like from the inside.

From an outside perspective, people tend not to think about mining at all until something goes wrong, usually in the form of a tragic accident. Then the questions arise – is mining an outdated industry that accepts casualties as a cost of doing business? What controls are missing to make these people take safety seriously?

Even inside the industry, we tend to mind our own businesses and pull together only after we are reminded of the dreadful cost an accident represents to our teams, families and communities – as well as to the industry's license to operate.

Rio Tinto believes that the demand for metals and minerals will double in the next 15 to 20 years. That means we have to get even better at safety, and at pulling together to share best practices and close the gap between our reputation and our record for safety.

I believe that SME and other professional associations have an important role to play in leading this charge.

It can be argued that in the wake of a mining accident, new legislation and regulation often has less to do with promoting a safer workplace than it has to do with promoting the perception that something is being done about safety.

SME has a strong record of providing resources for the global mining industry. It is also in an equally strong position to provide resources to legislators, regulators and other opinion leaders. With 13,000 members in 100 countries, SME can and should serve as a credible source of information about the safest mines to visit, next generation technology that reduces or eliminates risk, and experts who are best positioned to inform and help draft legislation that truly advances miner health and safety.

Rather than becoming a clearinghouse for complaints about increasingly stringent regulations, SME can turn the flow of communication outward, leveraging its broad contact base to share knowledge and best practices within the industry.

At Rio Tinto, we have systems in place to

(Continued on page 18)



SME will play a critical role in the industry's safety future

(Continued from page 6)

capture and replicate success in instilling the attitudes, practices and values that create a safer workplace. We collect and analyze data, but even more importantly, we put people together to learn from each other.

One way we measure our performance is through what we call lagging indicators or injury rates. But we have found that leading indicators – work we do to identify risk, learn from our near misses and promote a healthier workforce – are even more important. We train all of our employees to observe each other on the job, acknowledge safer behaviors and discuss ways to improve where we observe 'less safe' behaviors.

With its broad reach, SME already facilitates networking across company

boundaries, but I can also see a role for the organization to play in putting people together – less at conferences and more at operations – to learn from each other.

SME also has the access and reach to establish key performance indicators that lead to better safety performance, and to publish standards that are broadly recognized as best practice, much as *Consumer Reports* publishes expert product reviews and ratings.

Finally, SME invites suppliers to contribute to *Mining Engineering*. The organization also stands in a unique position to establish industry-wide partnerships with suppliers to develop safer, more productive products and services – from equipment to training programs.

Starting with the industrial revolution of the 1700s, the mining industry has always risen to the challenge of providing the building blocks for developing nations. Today, we face unprecedented demand from emerging economies – as well as unprecedented expectations and higher standards than ever before.

We are all in this together, and SME and other professional societies play a critical role in creating a collaborative approach and developing proactive standards that will see us through to a bright, safe and successful future. ■

— Gary Goldberg,
President and CEO,
Rio Tinto Minerals
Chairman,

National Mining Association

Take time to enjoy life, and pass along your knowledge

(Continued from page 8)

paper reported him dead: "Rumors of my death are greatly exaggerated." You went out on a high note and that pitch will be retained, at least until you blow it. So you are not radioactive with a short half life. Do not rush into the next job. You have plenty of time. My friends mandated that I take 30 days off. Around day 28, I no longer wanted to take over the world. By day 100, I wasn't reading the newspaper. By Day 180, I was more worried about my fishing statistics than metal prices. Your body chemistry and emotional state are changing and so will your interests. Go with the flow and enjoy it.

Rule No. 4. Even if you are currently not a top executive, or feel the overwhelming need to find work, I would still recommend taking some time off. The transition from heavy to no workload will mess with your head. Take time to establish a new equilibrium. One of my mentors took the better part of the year off watching the world pass by while honestly assessing what he really wanted out of life. Active people never leave the business. But during

this transition phase, you have the opportunity to sharply change direction and align yourself with that perfect job. I think everyone in the mining industry has been laid off at least once (if you have not you are not a real industry participant), so you know that the sun will rise tomorrow. If you received a severance package, use it to buy time rather than a Porsche. Have that deep intrapersonal talk about where your passions are. Then use the time to find an employer that can truly fulfill this need. Life without passion is an impassionate life.

Rule No. 5. When our parents retired, they got a gold watch and a rocking chair. Today's 50s and 60s are the last generation's 30s and 40s. We live longer, are more active and everyone I know certainly refuses to act their age. Grow up, but don't grow old. I worked many years to become financially independent. When I was a kid, I never told my parents, "Mom and Dad – I want to spend my life working hard to barely break even, worry every day about my mortgage and taxes, have to travel on weekends and holidays and miss family birthdays and anniversaries

because I want to work for Captain Bligh." I have spent a career trying to finance myself to the point where I could regain those summers I knew as a 10-year-old, barefoot with a fishing pole, throwing dirt clods at my sisters and catching frogs. Assuming that you got a good price for your shares in the company or received a solid severance package, now is the time to recapture your youth and go back to enjoying those things that make life so much fun.

Rule No. 6. Do not forget that you have gained wisdom. A lifetime of working hard has given you unique expertise that is still very valuable and needed and makes you very special. You have a duty not to squander this gift. So give back to your community. Mentor whenever you can. If you have excess cash, donate generously to your favorite mining school so that they can provide scholarships and grants to those worthy students who want to be your replacement in this business. Giving back is enormously gratifying and benefits so many people — it can be your true legacy.

Rule No. 7. Remember to tap the keg slowly. ■

An October to remember; Chilean rescue and Gotthard Tunnel gave us something to cheer



by **Nikhil C. Trivedi**,
2010 SME president

October was an extremely eventful month for our profession. It was a month of triumph, punctuated with cries of “eureka!” from the high desert of Chile and the mountains of Switzerland.

It was a month of emotional highs and lows. Of anxiety, despair, prayers, jubilation and celebration. It was a month in which the entire world got involved in our profession. It was a month when there was a unified, worldwide sigh of relief. For those several days, our colleagues in Chile and Switzerland were the heroes that young adults looked up to. It was a brief moment when the mining and underground construction industries

shone brightly, although the real heroes were literally in the dark and far away from daylight and sunshine.

I am referring, of course, to the miracle rescue of 33 miners in Chile that proved to be a testimonial to the mining profession’s technological prowess as well as to the ever-present guiding light of Saint Barbara, the patron saint of mining. Mining engineers from around the world responded to the crisis and went to Chile to provide their assistance and expertise. When the call came to the community of mining professionals, not one, not two, but three distinct drilling technologies were deployed, and all three were successful in demonstrating to the world that we practice the best technology, and that we can put it to use on short notice and under the most adverse circumstances. It was this commitment and technology that we reached the emotion-filled moments when, one by one, all 33 miners came out from the collapsed shaft after more than two months of being buried alive.

I am also referring to the “eureka” moment that took place beneath the Swiss Alps. At roughly the same time that the three drills were racing to rescue the miners in the Chilean Atacama Desert, an awesome tunnel boring machine (TBM) was coincidentally drilling away horizontally under the Swiss Alps on the 57-km (35-mile) Gotthard Tunnel project, the longest tunnel in the world.

Both events were full of anticipation and expectation and both were successful in achieving their goals. The giant TBM brought a distant dream conceived decades ago to reality. Our

colleagues in the UCA Division of SME can perhaps attest to the exhilaration one feels when a TBM cuts through the last bit of wall. But I can only imagine the sight and sounds under the Alps on that day, and I bet that they were no different, or no less exuberant than those when the two railroad crews met up in the desert at Promontory Point, UT a couple of centuries ago. Just as that railroad opened up trade and commerce and habitation between Saint Louis, MO and San Francisco, CA, the new tunnel will do wonders for travelers and traders between Zurich and Milan, and other destinations in central Europe and Italy.

Mining professionals and underground construction professionals do not get their fair share of recognition. However, we got a huge dose of euphoria during that short, eventful week in mid-October. And now, it is up to us to celebrate that technological accomplishment on both continents and to resolve to do even better next time around. We certainly hope that no miner ever gets trapped underground the way those 33 did. But, if history does repeat itself, we must resolve to be united as a community of professionals to carry out an equally elegant and flawless rescue, anywhere in the world – only faster. We also hope that the Gotthard Tunnel succeeds in realizing the dream of the original entrepreneurs and that it becomes a shining example of the myriads of technologies that go into underground construction. It should become a beacon for similar public works initiatives in other parts of the globe. Lastly, we must continue to remind ourselves, and those young adults who are still impressed with those events of mid-October, that ours is a profession worth joining. We owe it to ourselves to keep celebrating our successes.

It is my custom to end these columns with expressing my gratitude to you all for allowing me to lead the SME. SME members are the most skilled and talented mining and underground construction professionals I have ever come across, and I am proud to serve as your president.

So, let us all celebrate the holiday season ... and our successes.

Note: At the SME Annual Meeting, on Monday, Feb. 28, 2011, during the keynote session, we will be honoring several of the people and companies that were intimately involved with the San José Mine rescue operation. I invite you all to be there and to celebrate their success. ■

Reminiscences of an SME president; Will Wilkinson looks back over the past three years



by Nikhil C. Trivedi,
2010 SME president

For the first issue of *Mining Engineering* in 2011, I turned to Will Wilkinson, a man for whom no introduction is necessary for SME members.

Although SME's financial year does not coincide with the calendar year, I felt it was a good idea to take stock of where we stand today and where we were four years ago. As

most members are aware, the SME presidential rotation is a multi-year commitment starting as president-elect designate to president and then past president. What follows is a time-lapse snapshot of the changes at SME and in the mining community that took place during Wilkinson's journey up that ladder during the past three years, including his term as president in 2009. I know you will enjoy this travelogue. Happy New Year.

I would like to thank President Trivedi for the invitation to write this column. The President's Page was one of the hardest things I did during my year as SME president and I did not think I would write another one. But Trivedi

asked me to summarize changes within the mining industry and within SME over the three years between my first day on the board as president-elect (February 2008) and my last day on the board as past president (February 2011). Nikhil's invitation has given me a chance to sit down and reflect over the past three years — something I have not done because time passes way too quickly.

I work for the world's second largest copper producer so much of the perspective I present will be how copper and the markets performed during this period (Fig. 1) compared to SME's performance during the same period (Fig. 2). So please do not think I am ignoring the other commodities.

Most of you probably know that being president of SME is not a one-year affair. It begins by serving a year as president-elect and getting up to speed on what the current president is doing and continuing to formalize what he wants to do as president — in a sense, it's an apprenticeship. The year as president is when the real work starts and the president has the opportunity, with the support of the board and the SME staff, to implement the initiatives he has chosen to pursue. The year as past president is a year in which to decompress, somewhat, but also to be available to advise the new president, as appropriate, and to serve on the board as a standby alternate.

After a year of anticipating the position as president-elect designate, I became president-elect at the February 2008 Annual Meeting in Salt Lake City, UT. It is traditional for the president, president-elect, president-elect designate and SME executive director, Dave Kanagy, to visit with the divisions and as many committees as time allows. I remember vividly going along and listing to President George Luxbacher talk about the state of the society and his plans for the coming year. I also had a chance to speak briefly about what I anticipated for the following year. At this stage, things looked very good for SME.

Early in 2008, the mining industry was in excellent shape, enjoying record commodity prices — copper prices climbed from about \$3/lb to a little more than \$4/lb (Fig. 1). New mines were being touted and many expansion projects were under way. The stock market declined a bit, to just under 12,000 points, but showed a bit of a rebound to a little more than 13,000 points from March through May.

In June 2008, the markets declined significantly and then, in October, there was a

Figure 1

Markets and copper prices 2005 - 2010. Courtesy of Freeport-McMoRan.



(Continued on page 32)

SME fared well in toughest of times

(Continued from page 6)

precipitous collapse in both the markets and commodity prices. At the midyear board meeting in Las Vegas, NV in September 2008, SME virtually had the hotel to itself because AIG had just cancelled one of its big meetings following its collapse, and the SME leadership had serious concerns about what the impact would be on the society.

Toward the end of 2008, a number of copper mines curtailed production and expansion projects were put on hold or cancelled due to the falling copper prices. Several mines actually ceased production. All of this resulted in major job losses throughout the mining industry and its supporting industries. This also had some negative impact on attendance at the 2008 annual meeting in Salt Lake City, UT, as companies cut back on meeting attendees. We all remember what happened to the overall job situation in the U.S. and worldwide, a calamity from which we have yet to recover.

So this was the scenario in my year as president-elect (2008) and was what I faced as I became president in February 2009. Despite all of the above, attendance at the 2009 annual meeting was very good and President Luxbacher was able to report in his State of the Society presentation that: membership continued to grow, we had our fifth increase in operational surplus and SME was able to provide additional member benefits such as OneMine.org (Fig. 2). I thought Luxbacher had done a remarkable job during very difficult economic circumstances and I was wishing that I had just been president.

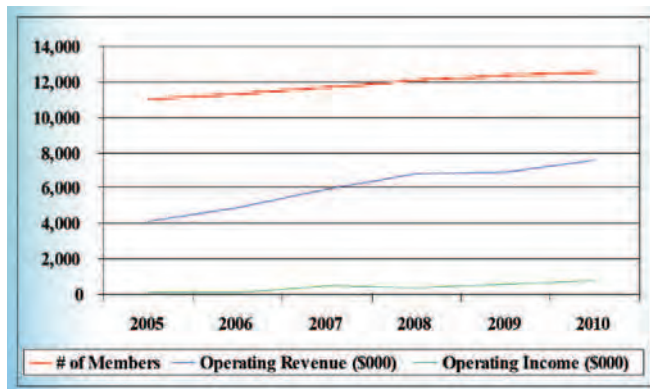
As February 2009 approached and I became president at the end of the 2009 annual meeting in Denver, the markets were essentially at their bottom, with the Dow at just under 6,550 points and copper prices at about \$1.50/lb. There had been further cuts in mining operations and things were as bleak as I can remember in my career in the industry. I remember thinking that fate had dealt me a terrible blow and that I had the potential to preside over one of the worst years SME has faced. Now it was my turn and I still had serious doubts about how good of a year SME would have.

However, conditions slowly improved during 2009, both markets and commodity prices, but the jobless rate stayed at near record levels. Remarkably, SME again finished the fiscal year (September 2009) with a surplus in revenue and operating income and continued membership growth.

As my term as president ended at the 2010 annual meeting in Phoenix, AZ and I reviewed the results of the year for my State of the Society presentation, I remember being astounded at how well SME continued to perform (Fig. 2). There was a record attendance at the Phoenix meeting and the program finished with more than 300 sessions. What started out as a potentially disastrous year for SME actually became a record year. It was a challenging time to be president but the SME staff performed superbly and the industry,

Figure 2

SME performance 2005 - 2010.



although still struggling, strongly supported SME. The SME Board of Directors monitored conditions closely and, with the operational surpluses we had, SME was able to approve several new member benefit initiatives. I was extremely happy that the five-year-long trend in increasing surpluses and membership growth did not end during my term.

As I turned things over to our current president, Nikhil Trivedi, the markets and commodities continued their gradual increase, despite some marked volatility in March and April of 2010. Under Trivedi's leadership, we again finished the fiscal year (September 2010) with positive numbers across the board and prospects for the 2011 annual meeting are excellent.

Overall, it has been an amazing period of three years in my succession as president-elect, president and past president. We saw the country plunged into a major recession with precipitous drops in commodity prices. And we saw significant mine closures and disruptions and exceptionally high unemployment. There has been a shaky recovery, but the jobless rate remains very high, which is holding back a major recovery. Throughout this, SME has performed extremely well and finished the 2010 fiscal year with a six-year run and a 117-percent increase in operating revenue, continued membership growth and many new products offered as member benefits. SME has had great leadership from Kanagy, the SME staff, a series of good presidents — supported by their boards with a vision to move the society into the future — along with tremendous support from its membership and industry.

As we move into 2011, we continue to provide new products that are supported by new staff. We will be moving into a new and larger headquarters building, reflecting our growth. The outlook for continued economic growth and infrastructure development worldwide bodes well for commodities and mining (at least as I write this in November), and I anticipate that SME is on track to become the premier mining society in the world.

I have said it before, but it has been a great honor and privilege to have had the opportunity to serve SME and its membership as president and to have had a small impact on that growth. As I go off of the board, I look forward to continuing to be an active member and supporting SME however I can. ■

— Will Wilkinson, 2009 SME President

Final thoughts; SME continues to move forward



by **Nikhil C. Trivedi**,
2010 SME president

This is the last time I am writing to you as SME president. My term will end at the 2011 annual meeting in Denver, CO where we will welcome John Murphy as the next SME president. Just as several of my predecessors told me, the year did go by very fast. Whether it was a warning or a consolation, I know that they were right.

My term had just begun when the popular movie, *Avatar*, seemed to take a shot at the mining industry. In the fictional land of the Pandora, a mining company plots to drive off the Na'vi civilization in order to mine its land for a valuable mineral called unobtainium. Pure fiction

that is so much removed from reality. If only the producers had met a member of SME, they would have realized how archaic their storyline was and how far from modern day practice it is. At the least, they would have found out that for true exploration geologists, members of SME, everything is "obtainium."

Alas, fiction is what makes Hollywood... well... Hollywood.

As my term progressed, I got many opportunities to interact with SME members at the local section level. I have always believed that SME is enriched by those who carry its flag at local sections and provide valuable educational and networking opportunities to SME members within their geographical reach. After visiting several of these local sections, my belief is now further reinforced. I have, therefore, taken two specific initiatives that will honor our local section activities. First, is the creation of a monthly column in *Mining Engineering* magazine called "local section heroes" that highlights the work of a member at a local section. Second, a new category of Presidential Citations has been initiated specifically for honoring significant contribution by a member at a local section.

Countless number of volunteer hours are spent by SME members at the national level as well. These are SME members who generously donate their time for programming, publications, committee assignments and other activities that enhance member benefits. I repeat what I have said many times that the benefit we derive from our membership in SME is directly proportional

to the effort we put in to SME. I am thankful to our members and their employers for giving so generously to SME. I also want to assure you that SME is committed to making your volunteer work experience a pleasant, fruitful and rewarding experience.

When I began my term, I mentioned that my vision for SME was to first become "relevant" to all of its members and then become "compelling" to all of its stakeholders. We have taken significant steps in that direction. For example, there was not a "go to" place for a mining health and safety professional within SME for technical information, publication, networking and idea exchange. Now, we have a standing committee on health and safety that promises to provide that important, and very "relevant," topic its due place on SME's menu of member benefits. Second example; we want to utilize the collective knowledge and wisdom of 13,000 SME members to provide factual, unbiased technical information to members and public at large on relevant topics of current interest. Our newly organized Government and Public Affairs Committee will be responsible for that activity. Again, in due course, the white papers created by SME members under the guidance of this committee will make SME a compelling first stop for our stakeholders.

We have developed a strategic plan for the next five years for SME. It is meant to guide us and help us follow a strategic direction that will make SME a better recognized professional society on a global scale. It will help us articulate the importance of our profession to high school and college students, and it will make SME a first and only stop for any mining and tunneling community member seeking information on any topic covered under the broad umbrella of "mining and underground construction." More importantly, I believe that SME will pop up on the radar screens of mining company leaders and CEO's as a credible society of mining and underground construction professionals dedicated to the betterment of our community and worthy of their strong support.

One of the elements of the strategic plan is for SME to reach out to other like societies and build strategic alliances. I am happy to report that we will soon be welcoming a new Division to SME. The International Marine Minerals Society

(Continued on page 21)

New committees were born in 2010

(Continued from page 6)

Minerals Society (IMMS) may be joining SME as our newest division. If this comes about, the new IMMS division of SME will enhance the programming and publication activities of SME and will expose SME members to an entirely new area of sophisticated technology practiced by those developing undersea exploration methodology. Along the same line of outreach, I am happy to report that SME has signed a memorandum of understanding with the Canadian Institute of Mining, Metallurgy and Petroleum (CIM). SME and CIM will jointly organize an annual conference on safety, reliability, health and other relevant topics over the next several years, alternating between the two countries. The first such joint conference will be in Calgary, Alberta, Canada in the fall of 2011 hosted by CIM. SME will host a similar topical, regional meeting in fall of 2012. I am truly excited about this new member benefit and alliance with our Canadian counterparts. Also, SME has executed a new potential agreement with the Association of Mining Engineers, Metallurgists and Geologists of Mexico, A.C., to foster greater cooperation between the two organizations. Moreover, personally most satisfying to me is the addition of four new SME student chapters; three of them outside of the United States.

"I have had the privilege of working with a highly driven, dedicated and committed board of directors. Each board member has contributed their time, energy and wisdom to help me do my job better. For that, I am grateful to them."

time. Commodity prices are at high levels. Our suppliers are enjoying great business climate as well. Both of these actually reflect nicely for SME's financial health. We are once again having a banner year as our financial performance continues to show an uptick in all relevant indices. During this past year, we also benefitted from the generosity of Stewart Wallace, who directed in his will that almost a million dollars from his estate should be donated to SME for use without any restriction. SME members have a special appreciation for Wallace for his exemplary generosity. I hope that others will follow Wallace's lead and include SME on their list of possible beneficiaries.

Very soon SME will be moving to a bigger, better headquarters building — just a few miles from the current one. I believe that we have made a very bold, yet prudent move and only time will tell how we leverage this investment to attain our strategic goals. I have full confidence that we will look back at this as probably the most significant step toward making SME a more efficient society with high morale among its staff and total

commitment to enhancing its member benefits.

I have had the privilege of working with a highly driven, dedicated and committed board of directors. Each board member has contributed their time, energy and wisdom to help me do my job better. For that, I am grateful to them. SME's headquarters staff is in a league of its own. Often we take so many things for granted and we do not realize the amount of hard work and diligence that goes in to making every meeting so successful and every publication so timely and relevant. Under Dave Kanagy's leadership, our staff has excelled in every facet of their work. To Dave and to all SME staff, my heartfelt thanks for making my year as SME president so productive, rewarding andso much fun.

Throughout the year, I have enjoyed having this dialog with you. Every month, I have expressed to you how thankful I am that you chose me to serve as your president for 2010. As I pen my last President's Page, I once again thank you for the opportunity.

There have been just 54 people who have had the honor of serving as SME President. That I am among those 54 is truly a privilege and I will forever cherish my SME President's pin. ■



**DISCOVER NEW TALENT.
DIG THE RESULTS.**

ROBERT K SCHULTZ
PRESIDENT

505.275.1234

MRC 
MANAGEMENT RESOURCE CONSULTING

www.MiningSearch.com



SME President
William H. Wilkinson
VOL. 61 NO. 3 – VOL. 62 NO. 2

March 2009: VOL. 61 NO. 3

William H. Wilkinson: an interview with the 2009 SME President

April 2009: VOL. 61 NO. 4

The future of SME is bright

May 2009: VOL. 61 NO. 5

Who can you encourage?

June 2009: VOL. 61 NO. 6

SME should be involved in the future of energy

July 2009: VOL. 61 NO. 7

What is SME doing for young members? More than you might think

August 2009: VOL. 61 NO. 8

(No Article)

September 2009: VOL. 61 NO. 9

If there is no American mining expertise which foreign country will we allow to run our mines?

October 2009: VOL. 61 NO. 10

(No Article)

November 2009: VOL. 61 NO. 11

SME is in good shape, despite recession

December 2009: VOL. 61 NO. 12

SME has a place in public policy matters

January 2010: VOL. 62 NO. 1

SME changing to catch up with hip crowd

February 2010: VOL. 62 NO. 2

2009 was a good year

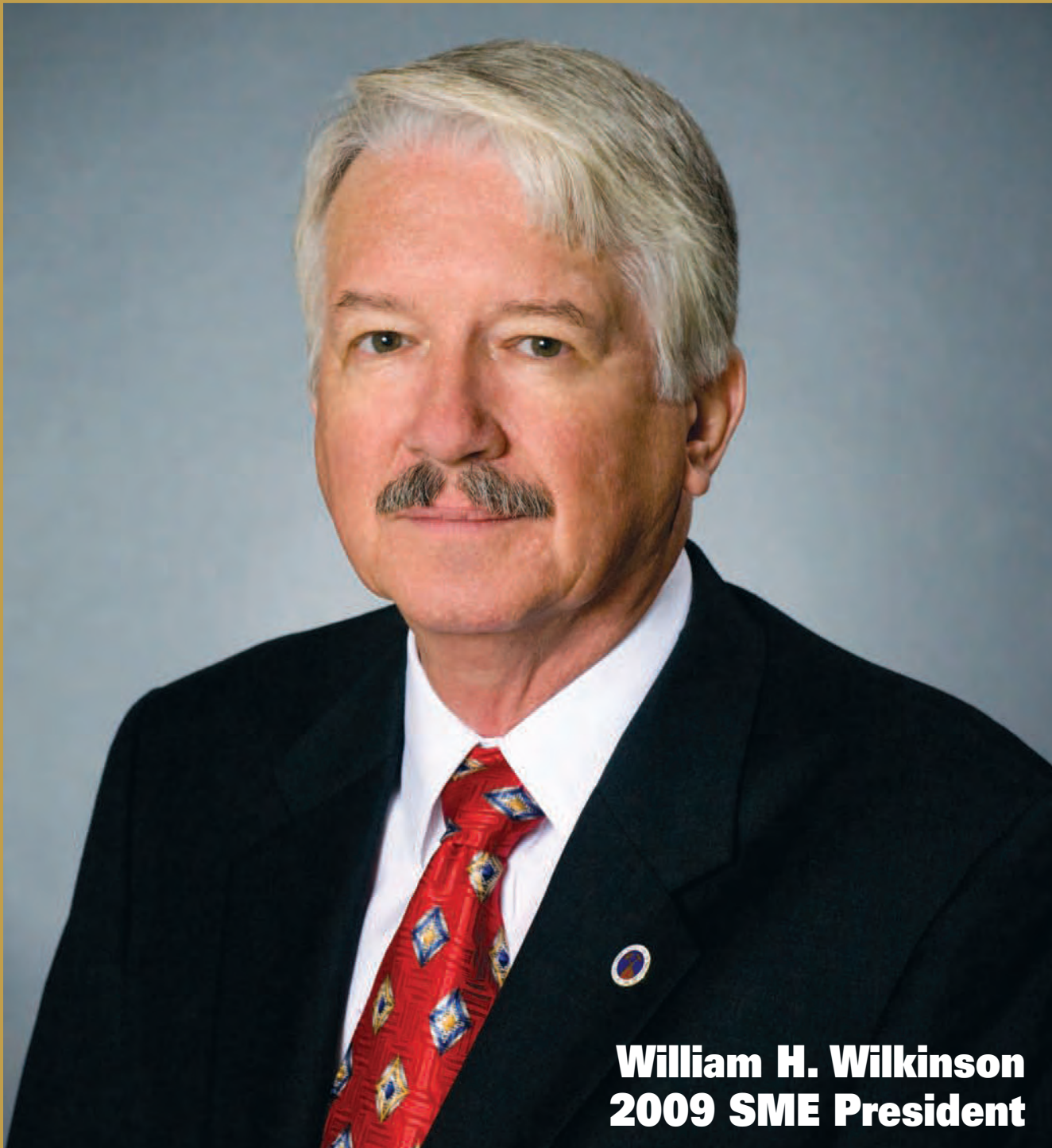
VOL. 61 NO. 3

MARCH 2009

Mining

ENGINEERING

A PUBLICATION OF SME
www.MiningEngineeringMagazine.com



William H. Wilkinson
2009 SME President

Special Editorial Sections: ***Tunneling & Underground Construction,***
2009 SME Bookstore Catalog

William H. Wilkinson: an interview with the 2009 SME President

What is your assessment of the current state of the minerals industry?

It is no understatement that domestic mining is facing a severe crisis at this time. The sharp decline in commodity prices and demand is putting a great strain on domestic and worldwide mining, causing major declines in profits and market capital of mining companies. This, in turn, has led to major production cuts, layoffs, shutdowns of operating properties, and the deferral of new and expansion projects. These changes in the minerals industry have played a major role in the health of the economy.

Operationally, the industry continues to develop new technologies that are making our work more efficient, more cost effective and more environmentally acceptable and safe. During downturns like this, companies generally pay closer attention to operational efficiencies and process optimization. Historically, new technologies and processes tend to be developed during down markets, and I believe we will see the same thing as companies strive to preserve liquidity and maintain or improve their margins. On the positive side, the drop in commodity prices has resulted in a reduction in operational costs, as the costs for fuel supplies and construction materials have decreased.

So, where do you see the industry going, in the near- and long-term?

There is still a need and demand for commodities that drive our way of life. This is especially true in developing countries where people are looking for a better way of life. I don't think that the modernization and upgrading of lifestyles, especially in China and India, will cease. China's economy is slowing down (from 13 percent to 9 percent in 2008). But I believe it will resume because of the massive infrastructure investment program in place, China's massive financial reserves and the Chinese governments awareness of the risks of social upheaval. Add to this President Obama's goals of major infrastructure improvements in the United States, and the demand for commodities should increase. I don't think it will be as immediate as many Americans anticipate, but there should be some improvement toward the end of 2009.

Longer term, the world is still going to demand commodities and the mining industry is the source of those. Most of us have seen and lived through several cycles (four, in my case) and we know that things will turn around. The question is when, and I am not prescient enough to know when that will be.



How long do you think the current trend will last — as long as the last one?

This current downturn was so precipitous and especially marked since it came off of record high commodity prices. The character of this trend is so different from past cycles that it is difficult for anyone to predict how long it will last. You can find people who will tell you they know what is happening, but this trend is unique and I don't think anyone really knows. It is not just a decrease in prices, due to a slowdown of demand or an increase in metal stocks, as in past cycles. It is more deeply rooted in our financial system. Money is not available for loans so building cannot proceed and commodities are not needed. It appears that the U.S. stock market has reached a floor (at least at the time of this interview), so an increase in consumer confidence could turn things around. However, the increasing deficits, both at federal and state levels, suggest it will take awhile.

Comment on a few of the major challenges confronting the mining industry.

The major challenge facing mining companies right now is how to address their financial situations and drive the things that will allow them to continue to operate and not lose money. Unfortunately, this involves the curtailment of production and the postponement of new projects and expansions at existing ones. This, of course, results in employee layoffs, which will mean a lack of jobs for mining-related professionals.

With the new administration, there will be a major push for mining law reform. The mining industry will need to be fully engaged and make sure the American people understand how important mining is to our economy. And the industry must make sure people are aware of the technology it employs that protects the environment as we mine now and is also being employed to clean up the impacts of past mining activities. We need to increase our efforts to educate the public on the importance of producing a product, not just goods and services.

What are some of your thoughts on the mining industry's shortage of professionals, domestically and globally? Also, how does the industry attract students to minerals programs?

We are all aware that we have been experiencing a shortage of mining-related professionals. This is partly due to a lack of interest in the mining industry, so fewer professionals have been trained. The explosive growth in demand due to high commodity prices was another factor contributing to the shortage. The resulting new projects and expansions created more positions than there were professionals to fill them. We have seen a renewed interest in mining-related studies in universities, with significant increases in enrollment. Now with the bust, we are going to see many of those new students being trained and just graduating with no positions awaiting them.

The age distribution of our industry is skewed toward the higher end. As our membership ages and retirement approaches (although current market conditions may push that out a few years), there will be a critical need for younger people to fill the gaps.

I think one of the greatest challenges going forward will be to sustain the renewed interest in mining and somehow conserve/preserve jobs that are held by young professionals. I believe that SME — through its many services such as OneMine.org; sharing of knowledge at the annual meeting, local section meetings and regional meetings; and the networking opportunities it creates — is instrumental in creating a community of professionals. To do this, though, we will have to maintain the services that our younger members use the most. We will also have to work with employers and continue to reinforce the necessity of young professionals and benefits of SME membership. New scholarship opportunities are forthcoming and SME needs to aggressively advertise these to keep new students in school.

A Democratic-held White House and Congress. What impact will that have on the domestic mining industry?

This will be an interesting couple of years. I believe had commodity prices remained high, the new congress and administration would have mounted a major campaign for mining law and environmental reform that would be detrimental to the industry. I am not by any means suggesting that will go away. I believe there will still be a strong push for reform and restrictions. In fact, Secretary of the Interior Salazar has stated such.

However, that is somewhat counter to the new administration's goal of new infrastructure development. The materials for building new bridges, roads, communication networks and alternative energy will still need to be provided by the mining industry. It probably means that we will have to mine more to accomplish those goals. There

Wilkinson's career has gone from mineral collection in the fourth grade to 25 countries on five continents

William H. Wilkinson is Vice President, Africa, for Freeport-McMoRan Exploration Corp. in Phoenix, AZ. He is responsible for project direction, reconnaissance and acquisitions throughout the continent. He has nearly 35 years of experience in mineral exploration and has worked in base and precious metal exploration worldwide.

Wilkinson's early career was in copper exploration when he worked as a summer student for Anaconda in the southwestern United States. He then worked for Duval Corp. in Tucson, AZ while in university and after graduating. In 1985, he switched to gold exploration and joined Westmont Mining in Tucson and Reno, NV.

Wilkinson's career with Phelps Dodge began in 1991 in Spokane, WA. He has done precious and base metal exploration for that company since then, serving as district geologist, assistant to the president of Phelps Dodge Exploration and vice-president of exploration. In this capacity, his exploration work has taken him to 25 countries on five continents.

Wilkinson received his B.S. and M.S. degrees in

geology from the New Mexico Institute of Mining and Technology, with a three-year break for service in the U.S. Army. He received his Ph.D. degree in geosciences in 1981 from the University of Arizona. He is a member of the Society of Economic Geologists, Mining Foundation of the Southwest, Mining and Metallurgical Society of America, Arizona Geological Society and Nevada Geological Society. He is a Certified Professional Geologist of the American Institute of Professional Geologists and a charter Registered Member of SME.

Wilkinson joined SME in 1979 and has served in numerous capacities. He is past chair of the Mining & Exploration Division, program chairman for the 2002 Annual Meeting in Phoenix, AZ, SME board member and SME Foundation board member. He is a member of the Registered Member Ethics Committee and also a Distinguished Member of SME.

Wilkinson has been an avid mineral collector since the fourth grade, which provided the impetus to study geology leading to a great career in the mining industry (a story for a later column). ■

will be a new tension between creating infrastructure and jobs and environmental groups looking to restrict mining. I think this will be a good opportunity for both groups to work together toward accomplishing those goals as well as toward a better understanding of what the mining industry and its technology can provide in a positive way to the economy and security of America.

If a reasonable solution can be found to mining law reform, the results of the above could be a dramatic increase in exploration in the United States. The discoveries at Resolution, Pebble and Cortez Hills have shown that major new deposits exist in the western U.S. and have generated renewed interest. With favorable resolution of the mining law issue and the increasing risk in foreign countries, we could see an increase in exploration efforts in the United States.

The move to double our alternative energy production during the next several years is an admirable goal. However, the infrastructure for alternative energy (wind turbines and towers, solar plants and transmission lines) requires newly mined material. All of this new construction will, in itself, affect the environment and require new permits. In order for these new "jobs" to have a short-term effect on the economy, this construction will need to be done sooner rather than later. This should be an opportunity for miners, environmentalists and preservationists to work together for the good of the national economy and the nation's people. I hope we can do that.

We need to support the increased use of alternative energy, but there is ample data available to indicate that we cannot get there as fast as some would like. Fossil and nuclear fuels will continue to provide the majority of our energy needs for the foreseeable future. SME is uniquely qualified to provide the information our policy makers require to make the proper decisions to balance energy sources while increasing the use of alternative energy.

How badly has exploration been hurt by this recent downturn and are there any positives?

Like the mining industry, exploration programs are under intense pressure due to the collapse in the economy. After riding a six-year increase to an estimated record expenditure of \$14.4 billion in 2008, according to Metals Economics Group (MEG), exploration expenditures are predicted to drop dramatically. Much of the expenditure estimated by MEG was spent before the crash; exploration expenditures dropped dramatically in the fourth quarter of 2008. Junior explorers are having extreme difficulty raising money and major explorers are making huge cuts in their budgets. Many projects at the scoping and prefeasibility study stage are being put on hold. Downstream, this is having a severe impact on the suppliers as well. Drilling and analytical companies are seeing major drops in business and contractors are faced with not enough work to keep their staffs busy. This has resulted in significant layoffs of professional people and is having a severe impact on students who are graduating or just about to graduate.

On the positive side, many exploration and advanced projects that were tightly held in the past are now becoming available. Many junior companies are faced with losing their properties because of lack of financing. Money is in tight supply, even for the major companies. So only the best of the available properties will have a chance of attracting new partners.

The period of extremely high commodity prices caused many governments to adopt a more populist approach to foreign development in their countries. Many have chosen to modify laws and agreements to increase either tax revenues or state ownerships, or both. I believe that all parties involved in mining operations should participate in additional revenues during the high parts of the cycle. However, the net effect of this populist approach has been to delay, significantly in many cases, new projects. That pushes the tax revenue based on production that would have been generated and new jobs further out in time. In some cases, this has pushed projects that might have been in production a year or so ago to the point where prices have made companies delay or terminate them altogether. The net effect is that these governments are receiving less revenue than they might have and employment and social programs have suffered. They are also creating uncertainty in the minds of foreign investors and driving that investment to parts of the world that are more stable.

You have been an SME member for 30 years, and a very active one at that. What do you hope to accomplish as president during the upcoming year?

I am really honored to serve as president of SME. It is the premier mining and exploration society in the world and it owes this position to its great leaders of the past. I would like to think that my presidency will be one of marked changes. The reality is that I am only one person. There are more than 12,000 members out there and I look forward to working with each of you to see what kind of ideas you have that can make SME better. I think the society is in good shape and I don't plan any major changes in direction. We have worked hard to keep our operating income in the black, which is critical to our ongoing programs (we cannot do much about the effect of the economy on our investments). I do, however, have several things I want to focus on.

- OneMine.org — I want to continue to build OneMine.org as the premier source of mining-related technical information so that it becomes the main source for students and professionals, alike. Among other things, this will involve identifying new sources of data that can be included in the library and I will place a high priority on that.
- Mii — I want to work with Mii as it continues to integrate into the SME Foundation. I want to ensure that SME provides the necessary support that will allow Mii to continue to distribute to our schools the great tools and information it has available. I want to make sure we work with Mii's financial supporters to ensure funding continues despite the downturn. I want to make sure GEM and Mii work together to create a much stronger program so that those in public education will automatically think of SME when they need information on mining and mineral resources. GEM is not going away and Mii will continue to focus on teachers and students.
- Work with the strategic committees to continuously improve SME's programs and opportunities — I held a strategy session with all of the strategic committee chairs immediately following the annual meeting in Denver, CO last month. There will be future communications on the results.

- Continuing current services in the economic downturn — We understand that commodity prices have dropped dramatically and this is affecting companies' decisions regarding operations and financial support. We hope we have positioned SME's finances to be able to weather these downturns better than in the past. We anticipate continuing SME's services and programs at current levels.
- Continuing to attract and keep young professionals during this economic downturn — I want to make sure SME continues to increase its use of electronic media and new scholarships for the continued growth of SME.
- Local sections — I will work for a renewed commitment to supporting local sections in the ways we can best support them.

Talk about some of SME's strengths and weaknesses.

The new governance structure has cut bureaucracy and allowed for a much more efficient decision-making process. This has allowed SME to grow in ways not envisioned before. Specifically, during the last two years WAIMME, UCA and Mii have become divisions or significant parts of SME. These additions have helped increase membership and provided significant new services and opportunities to the SME membership.

The professional staff in Denver, under the direction of Dave Kanagy, is a major strength for SME. They continue to work exceptionally hard and efficiently to manage the programs approved by the board of directors.

One of the weaknesses I perceive is that the new governance structure has perhaps given the impression to many that local sections and their members are no longer important. Some will argue that the new structure has weakened the local sections and removed any voice they had in national governance by eliminating their representation on the board. However, the new structure does not specifically recognize any particular segment of SME, so local section representatives can be as active as they want to be. The weakness has been getting this message to the local sections. I will encourage local section members to become involved and work to see that they feel like they belong, get comfortable participating in SME committees and move into the new governance.

What is SME's role in addressing industry challenges and problems?

SME's members represent the best trained, most technically competent and most internationally connected people in the mining industry. We should use these talents to provide input to our leaders (national, state and local) so that our contributions are recognized and that we can produce as much of our commodity needs as possible in the United States. By doing so, we will preserve jobs (a critical imperative at this time), stop sending money to countries that do not like us and improve the nation's security.

SME plays a major role in providing the most up to date information on the importance of minerals in our society, new developments in mining technology and new environmental treatments for mined areas. Our focus has been, and should continue to be, on the transfer of information and technology to our members.

With the addition of WAIMME and Mii, we now have the opportunity to provide this information to a wider spectrum of society.

We need to increase our ability to disseminate this information through the Internet. More and more people, not just technical people, get their information from the Internet. If we are not a part of that "system," then we will lose out. Many have credited President Obama's election to his and his campaigns' use of the Internet to disseminate information and mobilize voters. SME should do the same to make mining-related information available. This is the way the younger people we want to recruit and retain are used to communicating. We as a society do not want to be abandoned by our young people like the Republican Party.

We have a good start on this through OneMine.org and eNews. We are also working on increasing the number of eBooks available through SME and we should find ways to leverage WAIMME and Mii online. In January, we opened an SME Facebook page to help broaden the social network within SME. This is already attracting numerous young people.

The American Geological Institute recently published "Critical Needs for the Twenty First Century: The Role of the Geosciences" and the National Research Council published "Minerals, Critical Minerals and the U.S. Economy." Both publications highlight the need for resources. These publications highlight the importance (criticality) of mineral resources. The Science Foundation of Arizona recently announced a four-year, \$17.4-million initiative at the University of Arizona that focuses on sustainability and mineral resources. This is the result of a joint proposal by the departments of Geosciences, Mining and Geological Engineering, and the College of Public Health. I believe that SME and its members should (and in many cases are) play a significant role in these efforts (and there are probably others I am not aware of) and we should explore how to do that.

Any other areas that you believe are important to SME members?

I view SME membership and participation as a way of giving back to the industry that has provided me with incredible opportunities to do the things I like to do and earn a living. My 30 years of association with the society has benefited me professionally and personally. I count many of you as friends and look forward to adding to those numbers in my year as president. One of the highlights of being an SME member is that it brings together professionals from all aspects of the mining industry — not just the geologists. This is a great benefit as we can all learn from each other.

Times are tough now and will likely be for the immediate future. But this is still a great time to volunteer your knowledge, time and support to help SME maintain its premier status in the world and to ensure that the skills and knowledge we develop in our work are passed on so that our industry can continue to meet the challenges we will face. I encourage each member to participate in local sections, where available, and to continue to support the annual meetings. Our society is only as good as each of us makes it. So I look forward to working with all of you and encourage each of you to get more involved in SME activities wherever possible. ■

by William H. Wilkinson, 2009 SME president

The future of SME is bright

First let me say that I am looking forward to serving as the 2009 president of SME. For my first president's column, I am pleased to report that the 2009 SME Annual Meeting in Denver, CO was a success. I think we were all holding our breaths about this meeting given the overall state of the economy and that of the mining industry in particular. We had a total registration of 4,215 and our exhibit hall was at capacity with 603 booths. The registration was almost 9 percent better than 2008 in Salt Lake City and only about two percent less than Denver in 2007. I would like to thank all of our members and exhibitors for their continued support. I know that this required more effort on the parts of some this year since they did not enjoy the company support that they have had in the past.

Based on the mood at SME and several other conventions I have attended, I would say that there is still a lot of optimism in our industry. There are certainly many areas of concern, such as unemployment and reduced productions levels, but the gold price is staying high and there is a lot of enthusiasm from the gold companies, both majors and juniors. There are also many opportunities out there for projects and properties.

There are many exciting things going on within SME and it is hard to know where to start. OneMine.org is off to a strong start with more than 50,000 documents in the library. We continue to work to increase this.

The Minerals Information Institute (Mii) successfully merged with SME under the SME Foundation. This is a tremendous benefit to SME in that it brings in nationally recognized teaching materials for K-12 education.

SME will provide fund raising to ensure Mii has the necessary funds to continue to develop new materials.



William H. Wilkinson

At the Thursday board of directors' meeting, the board approved a program to provide eBooks. By May, we will have 37 new e-titles and all new publications will be available as eBooks. This will create new opportunities for disseminating information on a much broader basis. It will help eliminate high shipping costs and make it much easier for our foreign members to purchase our publications.

There are two groups that I would like to highlight this month that are very active and are critical to the strength of the Society. We are targeting these two groups to build the pipeline of new members and new knowledge. Our student members are a very active group within SME. We had 1,024 student members going into the annual meeting and about 414 of those attended. When I attended the Student Chapter Officer's meeting, the room was full and everyone was participating. They indicated strong use of OneMine.org, and SME has started a Facebook page for social interaction. Activities held for students were very popular (even among nonstudents) and well attended. I am sure we got new members at the meeting and I know we signed up at least three new student members at the PDAC in Toronto. There is a lot of energy within this group and it is great to

see the growth. This is something I want to make sure we continue to focus on.

The Young Leaders is another group of our membership that is very active. When I attended the Young Leaders' Committee meeting, I was impressed with the energy in that room. This is a group that is really looking for things to do in the Society. They are very enthusiastic about our industry and our Society and are looking for ways to participate. One of the things that concerns them is how does a young professional sell participation in the annual meeting to his or her boss. In addition to technical training, they are looking for ways to promote programming tracks for young professionals. One of these is through management training to help them become better professionals, and a session is being planned for the 2010 meeting in Phoenix, AZ. They have also targeted web training and student fora at the annual meeting to facilitate studying for the PE exam. Because of their desires to be more involved, we have charged this group to work on a plan to help retain student members.

A highlight of the meeting that focuses on students and our younger members was the announcement at the Operator's Forum by Scott McIntosh that he was donating to the foundation, \$1 million to the McIntosh Engineering Scholarship Fund. The first check for \$333,333 was presented at the Forum. These funds will be used for education, recruitment and retention of students and young professionals to careers and jobs in the field of underground mining. Thank you very much, Scott, and I hope your generous donation will encourage other members to do the same.

It is up to us as long-time members to work with both of these groups of young members to help them meet their needs and remain SME members. They are the future of SME. ■

by William H. Wilkinson, 2009 SME president

Who can you encourage?

In my presidential interview (ME, March 2009, pp. 18) I made reference to the industry that has provided me with the tremendous opportunities that I have had during my career.

How did I get to this point and what were the crucial factors and events related to SME that led to my being president? I would like to briefly reflect on what got me into geology and then elaborate on my journey through SME.

My first introduction to geology was through my mother when I was in the fourth grade. She was my teacher and we had to come up with a science project. She liked "rocks" and persuaded me to do a project on rocks. Now, living in Mississippi did not exactly provide me with opportunities to visit rock outcrops. But gravel pits and streambeds provided me with my first exposure to the myriad of types, colors and shapes of rocks. I became a rock collector at that point and added many specimens of agate and petrified wood to my collection. However, I quickly found I was more attracted to mineral specimens and joined a rock club and attended mineral shows — yes they had those in Mississippi — and I was hooked.

The only natural occupation that would give me access to more "rocks" was geology. Since petroleum geology did not allow much hands-on experience with rocks, I decided that



William H. Wilkinson

hard rock geology was my interest. I looked at several universities in the West and settled on New Mexico Tech.

The rest is history, as they say, and I wound up in Tucson, AZ with an exploration job at Duval Corporation. It was there that I attended my first SME meeting at the Arizona Conference. My boss at the time, Robert Metz, convinced me to join SME and provided encouragement to attend other meetings.

After Duval was divested by Penzoil, I moved on to Westmont Mining where my boss, Clancy Wendt, was very active in SME. I remember going to annual meetings with him and walking around the exhibit floor. In addition to picking up all of the "goodies" that were available, Clancy introduced me to everyone he knew. That is probably how I first got to

know many of you. Clancy convinced (coerced) me into chairing a geology session. This led to serving on and advancing through the unit committee structure of the Mining and Exploration Division. One position led to another within the division and then on to the board. But without Clancy's encouragement and guidance, I probably never would have gone beyond attending annual meetings.

When I went to work for Phelps Dodge, one of the questions I had was would the company support my activities with SME? Fortunately, my boss, Don Ranta, emphatically encouraged me to continue working in SME and supported those efforts. Don continued to provide encouragement even after he left Phelps Dodge and became a role model when he became SME president.

Freeport-McMoRan, specifically Tim Snider and Rich Leveille, have continued to provide support as the demands have increased leading up to my year as President.

You will notice that most of the companies I worked for no longer exist. But these key people who started and led me on my SME journey are, thankfully, still around. Most of us move around within the industry, but our friends and mentors are always there to help us. Obviously, there are many other people in SME and industry who have had a strong influence on me, but those mentioned above have provided a special impetus at the right times.

The point of this column is less about my history and more about the effect specific people (mentors) had and continue to have on my career in SME. I hope we can all say that we are encouraging young members on their journey through SME. The influence is important at all levels from simply encouraging membership, encouraging participation in local sections and attendance at annual meetings, to encouraging and supporting active participation in various divisions and committees.

Wouldn't it be cool to some day look back and be able to say "I played a part in the new SME president's career?" ■

SME calls for nominations

The Society for Mining, Metallurgy & Exploration needs member support in creating the future leadership for the Society. SME is asking for your assistance in nominating or recommending members (including yourself) to serve the Society in one of the following roles:

- 2012 SME President.
- 2011-2014 SME Board Member-at-Large (two will be selected).
- Members for all SME strategic committees.

The 2012 SME President must be

a current member of the Society and should meet these additional qualifications:

1) The candidate holds or has previously held one or more senior positions with either a single firm or institution, or with multiple employers (including self-employment).

2) In addition to service to the Society, the candidate has a degree in science, engineering or other degree applicable to the mineral industry.

3) The candidate has a distinguished career of service to the profession or a record of accomplishment, demonstrating leadership or

Continued on page 17

SME NOMINATIONS

Continued from page 6

technical expertise.

4) The candidate understands the issues and challenges facing the Society and the minerals industry in general.

5) The candidate has superior written and oral communication skills.

6) The candidate has previously served for at least one year as a member of the Board of Directors or on a committee reporting to the board. Note that the intent is to interpret "committee reporting to the board" as broadly as possible to identify the best possible pool of candidates.

7) The candidate has demonstrated a willingness to serve, including a willingness to bear the financial burdens of travel to meetings and other costs typically borne by officers and directors.

8) The candidate demonstrates a willingness and desire to serve the Society as a whole and not to act as a representative of a narrower constituency within the membership of the Society.

Board Members-at-Large must be current members of the Society. There are no established qualifications in the bylaws. However, the qualifications for president (other than item six) may be considered for guidance.

Strategic committee members must also be current members of the Society. SME is looking for members who have a desire to become more involved in the leadership of the Society and have an interest in topics covered by one of the strategic committees. The following responsibilities have been identified for each strategic committee:

Marketing and Outreach: This committee is responsible for the long-range planning of member recruitment, international growth, review and recommendation of member benefits, outreach programs with related societies and monitoring, reviewing, and coordinating communication between the SME leadership and the membership.

Organizational/Governance Structure: This committee is responsible for the oversight and long-range

planning of SME's internal organizational infrastructure and includes international (global), regions and local section areas of the Society. The committee will be provided flexibility for managing SME's infrastructure to meet the ongoing functional needs of the organization. It will also serve as an intermediary between the local SME groups or committees and the SME Board of Directors.

Products and Services: This committee will be responsible for the quality and integrity of SME products and services and for the long-range development of new programs and activities within the Society. It will evaluate current products and services to determine if they have value or have become obsolete or ineffective. This committee will review new opportunities and engage SME's Functional Working Groups in developing new and timely offerings.

Finance: The Finance Committee shall be responsible for the general supervision of the financial operations of SME.

Annual tasks include the review of the SME annual budget to be submitted to the SME Board of Directors; oversee and maintain an investment program for the Society's surplus and endowment funds; recommend and review the work of the SME investment manager and ensure that the investment manager meets the investment guidelines as established by the SME Board; and supervise the retirement and 401(k) program for SME staff.

Education and Professional Development: This committee shall

set strategic goals for the education subcommittees, receive and act when appropriate upon recommendations of the education subcommittees and outside educational groups aligned with SME, plan and implement educational policy as approved by the SME Board and promote educational reach activities through GEM long-range planning. The committee will provide assistance as required to the Professional Engineers Exam Committee, GEM, Mii and the Registered Member program.

Please forward any recommendations, a photograph and a brief biography of each candidate no later than June 15, 2009 to Mary O'Shea, SME executive assistant, (oshea@smenet.org). She will compile a list for final review by the Nominating Committee.

Thank you for your membership in the Society and your continued commitment to the mining community. We look forward to receiving your recommendations. ■

Haul Truck Suspensions



Lower Operating Cost
Increased Productivity
Reduced Maintenance



Replacement Struts for:
Caterpillar
Komatsu
Terex/Unit Rig
Wabco
Le Tourneau
Euclid
Liebherr



MINER
ELASTOMER
PRODUCTS CORPORATION

Tecspak®
www.minerelastomer.com
1200 East State Street
Geneva, IL 60134
p: 630-232-3000
f: 630-232-3172

by William H. Wilkinson, 2009 SME president

SME should be involved in the future of energy

Like many of you, I have been watching the developments in the Obama administration regarding proposed climate change legislation that is emerging and the president's nominations to fill cabinet and other senior government posts (weighted by environmental activists). Whatever you may believe about the outcome of the scientific debate regarding climate change and man's contribution, the Obama administration's actions indicate it has reached the conclusion that the debate on climate change and human affect has been decided. It is moving forward with legislation that is designed to change these effects, regardless of cause.

Energy is one of the main areas of focus. New mandates are being proposed for increases in alternative energy sources, often, it seems, without regard for the realities of how soon we can implement renewable energy to replace fossil and nuclear energy sources, or if we have the resources to do so. The mantra is fossil fuels can be replaced by renewable energy.

This is going to be a busy year for climate change legislation. The stage is set for a legislative show down. On one side are those who will push renewable energy, whether the necessary technology is available or not, and those who are working to develop the technology to enhance renewable energy. On the other side are those working on technology to make use of our abundant fossil fuel resources, including nuclear power generation, in a more environmentally friendly way.

SME Executive Director David Kanagy and I attended two meetings in Washington, D.C. last month. One was the 2009 Engineering Public Policy Symposium focused on "Putting Engineering and Science Back into Energy Policy." This meeting highlighted the need for more engineering and science students to address technology development to help achieve our future energy needs. Representatives from the U.S. House and Senate working on energy bills gave presentations and listened to input from various



William H. Wilkinson

engineering groups. One statement made by one of the advisors to the House of Representatives was "you don't want us (politicians) writing policy about technical issues." He added that there are many different groups pushing various agendas regarding renewable energy and much of the newly proposed legislation is being developed ahead of major scientific and engineering group's release of proposed guidelines.

The U.S. government needs to make sure it is not making policy changes based on technology that is not ready or available. Those proposing policy need to know what is possible and what timeframes can be realistically expected. This requires input from science and technology and the professional engineering and science societies that can:

- Provide facts to politicians.
- Provide outreach for public education.
- Think on the larger scale.
- Be objective.

The second meeting was the Convocation of Professional Engineering Societies and the National Academy of Engineering. It held a review session on its upcoming energy initiative looking at the energy use during the next two to three decades. The focus is on those pathways that have the ability to fully mature during the time frame considered, with emphasis on energy efficiency, alternative energy, renewable energy sources, fossil fuels,

nuclear, and transmission and distribution. The report is under review and should be published shortly. This report can be followed on the NAE Web site at www.nae.edu or at the National Academies Web site on America's Climate Choices at www.americasclimatechoices.org.

In addition to these groups, a group of SME members led by George Richardson, with support from SME, has established the U.S. Energy Coalition. The goal is to assist the federal government in the analysis, evaluation and formation of a long term, greener, shock resistant, U.S. energy policy and to determine what sources of current energy should be used in forming an economic bridge to alternative, renewable, cleaner fuels. U.S. energy policy should favor the U.S., or stable nonvolatile sourcing countries, apply the depth of expertise of professional societies and universities and analyze and develop insights that we can package as a group. The energy coalition is working with the Offshore Technology Conference sponsoring societies and will provide recommendations to the SME board before the midyear board meeting.

I know there are many other groups working on energy issues, but I do not have room to cover them all.

Recommendations made by professional groups can be effective. The American Geological Institute published "Critical Needs for the Twenty First Century: The Role of Geosciences" in 2008. Many of the recommendations in this publication were included as policies in H.R. 1145, the National Water Research and Development Initiative Act, which was passed on April 30, 2009.

SME's goal should be to provide a similar publication with recommendations on energy policies. It is, therefore, imperative that groups like those mentioned above get their proposals out as soon as possible in order to provide valuable scientific and engineering information to law makers. Otherwise, laws will be

Continued on page 12



INTEGRATED MONITORING SOLUTIONS

Surface or Underground

Monitor and control ground behavior with information from our satellite- and ground-based systems:

- InSAR
- GPS
- Tiltmeters
- Vibrating-wire
- Automated data acquisition
- Data access via your secure website

Subsidence • Pit Wall Stability
Hydraulic Fracturing • Block
Caving • Ground Water

IS IT MOVING?

**APPLIED
GEOMECHANICS**

415.364.3200 USA
WWW.GEOMECHANICS.COM
A CARBO COMPANY

INDUSTRY NEWSWATCH

LEGISLATION

Obama administration sides with Bush on polar bear rule

U.S. Interior Secretary Ken Salazar announced that the Obama administration will let stand a Bush-era regulation that limits protection of the polar bear from global warming. Salazar said that a law protecting endangered species should not be used to take on the much broader issue of climate change, the *Associated Press* reported.

Salazar said that he will not rescind the Bush rule, although Congress gave him authority to do so. The polar bear was declared threatened under the Endangered Species Act a little more than a year ago.

Salazar said rescinding the Bush rule “would provide no more protection for the polar bear and result in uncertainty and confusion about the management of the species.”

The polar bear was declared a threatened species because global warming is causing a decline in Arctic sea ice. But the Bush administration rules limit that protection, saying no action outside the Arctic region could be considered a threat to the bear under the law.

Environmentalists have strongly opposed the rule as have many

members of Congress. They argued the limits violate the Endangered Species Act because the release of greenhouse gases from power plants, factories and cars indirectly threaten the bear’s survival.

“The Endangered Species Act is not the appropriate tool for us to deal with what is a global issue, and that is the issue of global warming,” said Salazar.

In March, federal lawmakers authorized Salazar to scrap the Bush regulation without going through a long regulatory process.

When the Bush administration declared the bear a threatened species, the declaration came with a “special rule” that said no action outside the polar bear’s Arctic habitat — such as carbon dioxide emissions from power plants thousands of miles away — could be viewed as detrimental to the bear’s survival.

Congress is trying to craft broad legislation that would limit greenhouse gases and, separately, the U.S. Environmental Protection Agency has begun a lengthy regulatory process that could lead to heat-trapping emissions being controlled under the federal Clean Air Act. ■

PRESIDENT’S PAGE

Continued from page 6

passed based on flawed expectations.

Many of SME’s members are directly involved in the energy debate by working in the coal or nuclear industries or through energy research at universities or government agencies. All of us, whether we work directly in the energy fields or not, will be directly affected by energy policies passed by Congress. What is required is a reasoned approach to reaching the alternative energy goals that have been outlined by President Obama, and this should include using the energy resources we have in the United States.

We all need to stay involved and help these groups develop guidelines, reach out to our legislators so that they have the best and most up-to-date information available. Some additional Web sites that you might want to use to track developments are:

Fourth Assessment Report, “Climate Change 2007, Synthesis Report,” Intergovernmental Panel on Climate Change, www.ipcc.ch/ipccreports/ar4-syr.htm; United Nations Climate Change Conference www.en.cop15.dk and United States Climate Action Partnership, “A Blueprint for Legislative Action,” www.us-cap.org. ■

by William H. Wilkinson, 2009 SME president

What is SME doing for young members? More than you might think

In my presidential interview and again in my May column (**ME**, March 2009, pp. 18-21; May 2009, page 6), I highlighted the importance of SME's student and young professional members. There have been many discussions in the SME Foundation and in the Education and Professional Development and the Products and Services strategic committees about what SME can do to attract student members and then retain them as members as they move on as young professionals, or "gap members," in the industry. We have also looked at what services other societies provide for their younger members. Through these discussions, I have learned that SME has a significant process in place to attract student members and then to help them in their transition to young professionals. However, from these discussions, I also get the sense that this process is not widely known among the membership, perhaps even the younger membership. This may be a factor in the retention of the gap members.

First, student membership is growing (1,003 so far in 2009, which is up nearly 10 percent from 2008) as well as student attendance at the SME Annual Meeting (414 in 2009). SME has 19 student chapters, 15 in the United States and four internationally.

What benefits are available to SME student members?

- They receive student membership at a rate of \$30 a year. Students get all the rights of membership but they cannot vote.
- They also receive discounted registration fees at all SME meetings and short courses, including the SME Annual Meeting. Equally important, though, students receive significant discounts on SME books.
- SME, through its divisions and committees, has provided



William H. Wilkinson

more than \$200,000 this year in student scholarships. The majority of this funding comes from the WAAIME Division, but all divisions have a scholarship program.

- Fellowships are available through the Seeley W. Mudd Memorial Fund for Ph.D. candidates.
- The Student Design Competition program provides students the opportunity to work together to solve a common problem. It helps them to learn how to work as a team and how to present the results of their work in a competitive atmosphere.
- Many local sections support student members by providing free section membership and free dinners at their monthly meetings. This provides the students the opportunity to network with SME members and share in the transfer of knowledge from speakers.
- The Mentors Program allows students to interact with members at the annual meeting. In this way, the students can learn more about SME and about jobs in the industry. Many students continue to communicate with their mentors after the annual

meeting and even after they become employed. In some cases, mentors have hired their mentees.

- Student members have access to www.miningjobs.com, which can help them in their job search.

But what are we doing to retain the transition, or gap, members? Upon graduation, all students receive their first year of membership free. This is a full membership with all membership benefits.

After the first year of free membership, if the individual was a student member of SME, the member pays half of the full membership price until they reach their 30th birthday (\$68). This helps to relieve some of the financial considerations of remaining an SME member.

But there are also many other benefits beyond the financial benefits. The Young Leaders Committee was created to provide young professional members with the opportunity for professional and career development. The Young Leaders program gives the younger membership of SME the chance to:

- Network with key players in the industry.
- Gather technical information important to their professional growth.
- Remain involved with SME after graduation.
- Transition into more active leadership roles within SME.
- Develop and lead professional development programs within SME.

The Young Leaders Committee is a very active group that is looking for ways to become even more active in SME. Some members now serve on the SME strategic committees. They are active in programming for the 2010 Annual Meeting and are working on sessions on

Continued on page 19

PGM'S

GM bankruptcy could hurt Stillwater Mining

Stillwater Mining Co. is among the many paying close attention to General Motors (GM) after the U.S. automaker filed for the fourth largest bankruptcy in history.

Stillwater Mining Co. operates a platinum group metals (PGM) mine in Nye, MT. This is the only known significant source of platinum group metals in the United States and one of the significant resources outside Russia and South Africa. Stillwater is the

primary supplier of platinum and palladium to General Motors, which uses the metals in automobiles' catalytic converters. With the bankruptcy filing by GM, Stillwater said it is monitoring the General Motors bankruptcy to see if Stillwater-GM contracts will be honored.

Stillwater Mining spokesman John Beaudry told the *Associated Press* that all the palladium and 70 percent of the platinum produced by the com-

pany's mine near Nye, in south-central Montana, is committed for filling contracts with GM and Ford.

With GM facing a sweeping reorganization, Beaudry said Stillwater could be hurt if its contract is modified as the automaker's case moved through U.S. bankruptcy court.

Stillwater, which has offices in Columbus east of Billings, last month reported a first-quarter loss of \$11.6 million on revenue of \$85.8 million. ■

PRESIDENT'S PAGE

Continued from page 5

professional development activities and programs that will be open to all SME members.

Young professionals often have a tougher time than their more experienced colleagues in getting employer support for participation in professional societies and attending annual meetings. I have asked

the Young Leaders Committee to develop a brochure or document that young members can use as an aid when approaching management with requests for meeting attendance or participation in society committees. The members of the Young Leaders Committee have successfully convinced their management to support their participa-

tion and they are in an excellent position to provide guidance.

Although I believe we have a strong program in place, there is certainly a need to continue to improve the benefits. The Education and Professional Development Strategic Committee is working with the Young Leaders Committee to find ways to continuously improve. ■

Unearth a New Career

Career Advancement Made Easy

The new *MiningJobs* website is the ideal place to be seen by employers who are specifically looking for mining professionals. Whether or not you are actively looking for new employment, it makes sense to post your resume on the new *MiningJobs* website, because you never know what opportunities may be out there looking for you. Also, checking the job listings is a great way to see what is hot and what is not in the job market, and whether your particular skills are among those most in demand.

Come check out the new
MiningJobs website:
www.smenet.org/miningjobs

SME

Society for
Mining, Metallurgy
& Exploration

Also see the Mining Engineering classifieds on page 75

by William H. Wilkinson, 2009 SME president

If there is no American mining expertise, which foreign country will we allow to run our mines?

I recently read several articles in publications by the Geological Society of America (GSA) and The Prospectors and Developers Association of Canada (PDAC) that highlighted some significant differences in how the American and Canadian governments view their minerals industry. These articles discuss the competitiveness of their respective mining and exploration industries, at home and abroad. In particular, they note differences in attitudes toward professional training and corporate social responsibility. Any guesses on which government provides significant support and resources to help these industries? If you guessed the U.S., then you would be wrong. Why is that?

Hitzman et. al. (2009) discuss, in detail, the marked decrease in the number of economic geology professors and the consequent loss of the ability to produce adequately trained mineral resource geologists in the U.S. and Canada. They review U.S. mineral sustainability and raise the question of how we can maintain it with fewer economic geologists. They also put this in perspective of competitiveness of the U.S. mineral industry worldwide. We have also been made well aware of similar shortages in training of engineers through the loss of engineering departments in some of our major universities and the lower rates of student applications. A viable and competitive U.S. mining industry requires the best trained professionals from both groups. The implication is that the U.S. cannot maintain its competitive edge with fewer home grown professionals.

On the flip side, the PDAC reports that the Canadian government has published a four-pronged corporate social responsibility (CSR) strategy for Canadian mining companies. The government contends this will help improve the competitive advantage of Canadian



William H. Wilkinson

companies working in the extractive sector, both at home and abroad. The PDAC is the largest exploration related society in Canada and it has strongly supported this strategy. In addition, a Canadian industry-government group is examining the public's perception of the mining industry to make recommendations on ways to address the public's concerns about the mining industry. The Canadian government is actively working with the Canadian mining industry to increase its competitive advantage all within the guidelines of operating in an environmentally and socially responsible manner.

Why can't the U.S. government get behind its extractive industries? Why won't it work with the mining industry to support responsible development of mineral resources in the U.S.? Despite the rhetoric of "energy independence" and "mineral sustainability," the U.S. government is instead working to limit the ability to produce mineral products in the U.S. The government continues to restrict access to potential resources, add multiple layers of environmental bureaucracy and, in general, tries to drive mineral production to other countries.

As reported by the Minerals Information Institute (Mii), each American born will use 3.3 million lbs of minerals, metals and fuels in

their lifetime. As a result, we are the largest consumer of mineral products in the world. The U.S. mineral industry's personnel are the best trained and most efficient producers in the world. As an industry, we have greatly increased our focus on operating in an environmentally sound manner. We also have a proven track record of working with local communities and national governments around the world to improve their standards of living.

I believe it is in the best interests of the world to have the companies that are most focused on efficient, environmentally responsible production managing mineral development. Such development contributes to the economic welfare of all citizens at home and abroad. This will help avoid the environmental, economic and cultural destruction that follows from companies that are only interested in securing a source of natural resources from developing nations. To me, this can be one of the best ways for the U.S. to make a difference in the world and to support the needs of developing nations while maintaining our resource security.

Hitzman et. al. "invite the minerals industry, government, and institutions with a stake in mineral resources to initiate a dialogue and develop a new strategy, perhaps mediated by the National Research Council..." Whether it is the National Research Council, the National Academies or another entity, I fully support SME's answering this invitation. There is a clear role that SME can play in developing a new strategy and I would suggest that our Research Council take this up and move forward with recommendations on becoming involved. ■

References

- Hitzman, M., Dilles, J., Barton, M., Boland, M., 2009, *GSA Today*, v. 19, no. 8, p16-28.
- Prospectors and Developers Association of Canada, 2009, *In Brief*, 12 p.

by William H. Wilkinson, 2009 SME president

SME is in good shape, despite recession

September was a busy month for SME staff, officers and governing committees, with the highlights being the mid-year board meeting in Nashville, TN. In addition to the mid-year board meeting, I had the privilege of attending Perumin in Arequipa, Peru, as well as the Founders Societies Presidents and Executive Directors (FSPED) meeting in Kansas City, MO. My conclusion from these events is that the mining industry, as a whole, is doing well and that our Society is in very good shape, despite the recession.

The Instituto de Ingenieros de Minas del Peru sponsored the 29th edition of Perumin. This convention is held every other year in Arequipa and is the largest mining convention in Peru. This five-day show was a combination of technical sessions, exhibits and social events. The exhibit space (Extemin) filled four large, covered and open pavilions and provided the opportunity for mining suppliers and consultants to display their technology and contact clients. The technical sessions covered operations, logistics, business and mining company efforts. All were well attended.

SME had a booth where we displayed SME literature, books, and were able to talk to attendees about SME. We sold all of the 40 or so copies of SME books that we took, in addition to taking additional orders, and signed up 33 new members. This was a great opportunity to showcase SME, especially OneMine.org, and to discuss the benefits of SME membership.

OneMine.org continues to be a major selling point for new memberships. Mario Cedron, professor at the Pontificia Universidad Catolica Del Peru in Lima, is the faculty advisor of the university's student chapter. He requires all of his students to do a research project using OneMine.org, and we heard great things from the students concerning the benefits of this tool. Students from this active chapter spent a considerable amount of time at the booth asking about SME, the state of the mining industry outside of



William H. Wilkinson

Peru and about job possibilities, both at home and abroad. Cedron always brings a group of his students to the SME Annual Meeting and I look forward to seeing many of them in Phoenix, AZ in February.

The Lima Section of SME, chaired by Cedron, hosted its semi-annual dinner in conjunction with Perumin at the Arequipa Club — an elegant old club just off of the Plaza de Armas. It was a formal evening with excellent food and presentation of awards to section members. The dinner was well attended by about 200 people. This has become a traditional visit for the SME president. The local SME members and their spouses were very gracious hosts. They are strong supporters of SME and really appreciate the presence of SME staff and officers. Dancing began after dinner and rumor has it that the evening did not end until about 2:00 am, although I must confess neither staff nor I can verify that. I challenge the next SME president to attend to make sure he stays throughout the dancing.

The mid-year board meeting was held this year at the Gaylord Opryland Resort in Nashville, TN. For the officers, strategic committee members and division leadership, this mid-year meeting is like a mini-annual meeting and has become a very important function in the governance of SME. In addition to being the second of three board meetings in the annual cycle of officers and directors, this event provides an

opportunity for a face-to-face meeting to review the state of SME and to provide guidance of ongoing and new programs. Prior to the board meeting, the strategic committees and the divisions meet and are then in a position to report their status and any requests for new programs directly to the board.

There are also opportunities for socialization and I would like to thank Freeport-McMoRan for sponsoring dinner on Friday night and Newmont for sponsoring a reception on Saturday night. As always, our corporate sponsors are a critical part of the success of SME, not only through sponsoring events like these but also in providing support for the officers, committee and division leaders, who are all volunteers.

The results of the board meeting show that the Society is in excellent shape. Despite the crash in metals prices last year and the recession, we have a \$500,000 operating surplus, which provides us with the ability to work on new programs that provide benefits to SME members. Our membership continues to grow and our book sales have also grown. We are down a little bit in advertising in our magazines, but we anticipated that in our 2009 budget.

Thanks to the hard work of Bill Hancock and his committee, the board approved the launch of SME Tech Online. This is an exciting new venture and will add another significant member benefit to SME. We will be moving forward to finalize this program and look forward to the first offering in 2010.

OneMine.org continues to grow with the addition of two new organizations: The Coal Preparation Society and the EPD of TMS. Their publications should start appearing in the digital library by the end of the year. The growth of OneMine.org continues to reinforce the vision by SME of a digital mining library as a tremendous member benefit.

Jeff Kohler from NIOSH requested that SME become involved in the Mining Sector Council that

Continued on page 16

Six years later, Rio Tinto signs Oyu Tolgoi agreement

It was six years in the making, but on Oct. 6 the work apparently paid off for Rio Tinto and Ivanhoe Mines Ltd. as Rio Tinto announced that it had signed an investment agreement with the government of Mongolia for the development of the huge Oyu Tolgoi copper-gold complex in Mongolia's South Gobi region. Rio Tinto and Ivanhoe Mines, the development partners for the project, will now move forward with the government to address the conditions precedent and commence the development phase. Production is expected to commence in 2013, with a five-year ramp up to full expected production of 450 kt/a (496,000 stpy) of copper and 10.2 t/a (330,000 ozpy) of gold.

Bret Clayton, chief executive of Rio Tinto's Copper and Diamonds group, said in a statement that Oyu Tolgoi is consistent with Rio Tinto's strategy of investing in large, long life, low cost ore bodies. "We plan to be a partner here in Mongolia for decades to come."

Under the terms of the investment agreement and associated shareholders' agreement, the government of Mongolia will own 34 percent of Ivanhoe Mines Mongolia Inc. LLC, the license holder of the Oyu Tolgoi project. Key terms include a stable operational and tax environment, provisions dealing with the government's equity participation and financing arrangements.

Rio Tinto initially made a

US\$303-million investment in a 9.95-percent shareholding in Ivanhoe Mines in October 2006 under the terms of a placement agreement. It has the obligation to invest \$388 million for a further 9.95-percent holding at the conclusion of an unconditional investment agreement with the Mongolian government (Tranche 2). Rio Tinto and Ivanhoe have recently agreed to a short-term, month-by-month extension of the Oct. 27 deadline for completing Tranche 2.

Rio Tinto has the right to acquire up to 43.1 percent of Ivanhoe's shares under fixed price options, with a right to further increase that interest to 46.65 percent through on-market purchases. ■

PRESIDENT'S PAGE

Meetings confirm strength of SME

Continued from page 6

is under the National Occupational Research Agenda. This council involves industry, labor, academia, professional organizations and government to establish the national research priorities that will help focus funding. Kohler highlighted the benefits for SME as:

- It will underscore the reality that SME speaks for the mining industry.
- SME will provide information regarding policy.
- SME member's professional interests are being looked after.
- SME has a number of distinguished members contributing to mine health and safety.

George Luxbacher was charged with developing a list of potential SME members for this council.

The FSPED meeting was held at beautiful Linda Hall Library in Kansas City, MO. It is dedicated to the preservation of print copies of scientific and technical publications.

The Linda Hall Library was chosen as the repository of the combined libraries of the United Engineering Foundation when the building in New York was sold. SME executive director David Kanagy and I were able to inventory the SME publications that we no longer have copies of and begin the discussion of how to get these included in OneMine.org. During the reception given by the Library, we were given access to the rare books section where we had the unique opportunity to touch and turn pages of an original of Agricola's *De Re Metallica* (not the SME editions), among other remarkably preserved antique printed texts. The meeting highlighted that the member Societies are working on many independent activities but are not working together. It was suggested that an inventory of these activities be completed to see where there are overlaps and identify areas for cooperation where there are opportunities to scale up these activities for major public impact.

The 2010 Annual Meeting will be the venue for two significant

events in SME and the mining industry. The year 2010 marks the 100th anniversary of the formation of the U.S. Bureau of Mines as the premier mining research organization in the United States. SME is proud to mark this anniversary with a gala event and a special symposium titled 100 Years in Mining Research and Technology. Research and business leaders from major mining countries throughout the world will be presenting an overview of the historical timelines of mining research and technology in their countries and give us an outlook into future developments in the areas of mine safety and health and mine productivity.

2010 also marks the 75th anniversary of the Industrial Minerals Division of SME. Its celebration will last throughout the year but will have its beginning in Phoenix.

With these two anniversary celebrations adding to our already strong programming, it looks like 2010 will also be a good year for SME and I encourage all of you to begin making your plans to be in Phoenix Feb. 28 to March 3, 2010. ■

by William H. Wilkinson, 2009 SME president

SME has a place in public policy matters

During the past year, I have gotten in the habit of reading the president's columns of other professional societies to which I belong to see what issues they are facing and how they are approaching them. Last month's column from the American Association of Petroleum Geologists' (AAPG) publication, the *AAPG Explorer*, was especially interesting and appropriate. In it, AAPG President Lorenz noted that the AAPG-fostered science that helps its members do their jobs ultimately benefits their industry. This is similar to how the advances SME members make in their jobs benefit the mining industry. Lorenz talked about how AAPG gets out information on "geologic issues that affect their members, present the geoscience and give the member's perspective on those issues" through an active public outreach committee and through its division of professional affairs.

I strongly believe that is one of the functions of a professional, technical society like SME, as I stated in my June column.

As in the oil industry, SME is not the mouthpiece for the mining industry; that is what organizations like the National Mining Association (NMA) do. But, like AAPG, SME is a professional society that has a great depth of technical knowledge through its members, and I believe that knowledge and experience should be incorporated in policy decisions that affect our industry. When was the last time SME produced a document, white paper, etc., that provided information that is important to our members that can be placed in our policy makers' hands? It was probably when the Society provided input on the importance of mining research in the waning days of the U.S. Bureau of Mines.

SME has a lot of members who are passionate about and care about their profession and look to SME for support on policy affecting mining that maintains or provides job opportunities and career development.

These members understand the challenges that their profession faces on a day-to-day basis. This is espe-



William H. Wilkinson

cially important right now, when our industry is being assailed on all sides, despite the fact that it provides the basic raw materials for our way of life as well as providing quality, safe and high-paying jobs.

I believe our members want the Society to be more proactive in speaking on behalf of the profession by providing the real perspective of the professional and how it affects their jobs. We may be criticized as being biased by those outside of the industry. In reality, though, only those of us who have experience in the various professions in the mining industry can provide reliable information to policy makers.

SME has provided input in the past on an ad hoc basis, generally based on requests. But the need to provide information can also come through grassroots volunteers using their expertise or as topics defined by the Society leadership that are proposed to a committee to develop the information. The first of these three, direct requests, often comes from an organization that needs an expert to testify or provide specific information on various issues (rare-earth minerals, for example).

An example of grassroots volunteers is a group called the U.S. Energy Policy Coalition that is looking at energy policy issues (mentioned in my June column). The SME Board of Directors is working to coordinate its product within the Society as a whole. The board recognizes that we need to balance the ideas developed by different groups with the overall Society goals as well. But this indicates that the current Board recognizes that ideas and proposals from our members are

important and should be encouraged.

The Board has recognized the need to be proactive in providing information, and the Society is moving forward on the fronts mentioned above. But we need to accelerate the pace. SME is developing a defined process that can provide technically sound information for policy makers in an efficient manner.

The board, at the midyear meeting, voted to approve the establishment of a standing committee, currently named the Government Relations Committee. Its purpose is to provide relevant, nonpartisan, fact-based professional and technical information to government officials and others involved in public policy, regulatory and other issues that impact the practice of mining, geology and related industries. This committee will be finalized at the Annual Meeting board meeting and will report to the SME Board of Directors at its future board meetings.

These are all critical steps, and I appreciate the support of the board and the membership as a whole moving forward to help ensure we are able to practice our professions and maintain a strong mining industry base in the U.S.

I know it is hard to believe, but with the delivery of this December issue of *Mining Engineering*, there will only be a couple of weeks left in 2009. It has been an exciting year with many challenges. SME has had an outstanding year and the minerals markets are making a strong showing.

As the year is drawing to a close, I would like to take this opportunity to remind you to take a final look at your finances and see if there is something left for SMEF. This would be a good time make a donation to the Foundation. Or, if you already have made one, check again and see if you are in a tax position to make an additional donation. I encourage you to reread Barbara Arnold's column in the November issue of *Mining Engineering* (page 45). If you have children in school and are looking for an appropriate gift for a favorite teacher, Mii has great teaching aids that would make a perfect gift.

I hope you all have a merry Christmas, a happy holiday season, and a happy new year. ■

by William H. Wilkinson, 2009 SME president

SME changing to catch up with hip crowd

Well, Christmas and New Year's are gone and we have started a brand new year. I am not really sure where 2009 went, but I hope 2010 does not go as fast. The SME Annual Meeting in Phoenix, AZ will be here before we know it, so please make your plans to attend. I look forward to seeing you there.

In the mining industry, we use and are continuously developing cutting edge technology in operations, planning, exploration and health and safety. We are constantly reminded of it through articles in our journals, in our section meetings and in talks at our conventions. But are we truly technologically advanced? In his keynote address at the SME Arizona Conference in December in Tucson, Gary Goldberg, president and chief executive officer, Rio Tinto Minerals, conducted an experiment with the audience that suggests that we may not be as far along as we think we are. His first question to the audience was how many people have a Facebook page. There was a smattering of hands, but not very many. His second question was how many people twitter. Even fewer hands went up this time. I must admit, my hand did not go up either time. His point was that although we use cutting edge technology, our industry is not very "hip" and we are not attracting "hip" younger people.

So how are we to attract young people to our industry?

I have written before in this column about the steps our Society is taking to become an electronic society (*ME*, April 2009, pg. 6, November 2009, pg. 6) and how much of this is aimed at attracting young professionals and retaining them as members. But for me, Goldberg's experiment brought home the fact that many of us have not really adopted the electronic world. Sure, we have cell phones, use e-mail and register and order books online. But we have not really embraced the electronic media.

I complain about my children and how they are always texting



William H. Wilkinson

rather than calling. I cannot get them to respond to e-mails in a timely manner (e-mails seem to be old fashioned now) but they constantly communicate with each other and with their friends via Facebook.

So why don't I get a Facebook account to "talk" to them?

Fear? Not enough time? Not enough interest? Afraid of change?

Fear of change may be the biggest issue, yet change is the one thing we can all be sure of. A society needs to constantly look for ways to change to continue to provide the best services and benefits for its members. But still, we resist change. Take the new SME logo, for instance. Some of our members have decried the loss of the crossed pick and hammer (schlagel and eisen) and some think SME will forget its past and what its senior members have contributed. That is clearly not the intent.

SME has a long and proud history going back to AIME's foundation in 1871 by 22 mining engineers in Wilkes-Barre, PA. But that version of AIME no longer exists. AIME added metallurgical engineers in 1918 and changed its name to the American Institute of Mining and Metallurgical Engineers. It formed the Petroleum Division in 1922 and, in 1956, changed the name again to the American Institute of Mining, Metallurgical and Petroleum Engineers to accommodate the changes.

AIME further devolved into member societies in 1957 and the

Society of Mining Engineers of AIME was formed. SME became independently incorporated in 1984. In 1989, we changed the name to recognize exploration and mining geologists and became the Society for Mining, Metallurgy and Exploration (although many members still use the Society of Mining Engineers and some still use AIME). The changes were made to reflect the evolution of the Society, and it is because of this evolution and these changes that SME is the vibrant and successful professional organization that it is today.

Change will continue to occur and, overall, the new logo has been accepted by the majority of members, especially younger members — one of the main groups we are trying to attract. SME did not change the logo to offend any of our members or to suggest that the past accomplishments are not important. It did so with the reasoned thought that we, as a Society, need to remain current and relevant to the younger generations, the generations that Goldberg said are "hip." They are the future of SME, building upon what has been accomplished in the past.

Many of our younger members may not have ever used a hammer or pick. But all have used a computer and more than 1,500 people have become fans of SME's Facebook page. Many are involved in computer analysis, health and safety, environmental activities, etc. These are critical parts of our industry and we want these professionals to find a home in SME to continue to make it the premier professional society for the worldwide mining and minerals community. The SME letters in the new logo, with the curved arc through the bottom half, represents the earth's surface with SME members working above and below the surface and reflects all of the activities of our members.

In his address to the Mining Foundation of the Southwest Hall of

Continued on page 24

PRESIDENT'S PAGE

Continued from page 6

Fame Banquet in Tucson, Tom Albanese, chief executive of Rio Tinto, noted, among other things, that the Chinese are training thousands of students as scientists and engineers. Yet in the U.S., many of our really talented young people are not going into mining. We need to do a better job of mentoring students and supporting mining schools. But we also need to let these potential students know that not only does the mining industry provide challenging job opportunities while using cutting edge technology, but that we are "hip" as well. That is what your board of directors and SME staff are trying to accomplish through the many technological advances such as e-books and OneMine.org.

Well, I guess I'd better open my Facebook account, learn to twitter and move ahead with SME. ■

CostMine
Your Cost Data Resource Center

Need Help With Your Cost Estimates?

Mining Cost Service
Equipment Cost Calculator
Mining Compensation Reports
Coal Cost Guide

Tel: + 1 509 328 8023 Fax: + 1 509 328 2028
Email: info@costmine.com Web site: www.CostMine.com

CostMine Division - InfoMine Inc 2009 - www.InfoMine.com

COBALT

Idaho cobalt mine gets approval

Formation Metals announced that it had won initial approval from the U.S. Forest Service to proceed with plans for a cobalt mine in the Salmon-Challis National Forest, about 322 km (200 miles) northeast of Boise, ID.

Vancouver-based Formation Metals' chairman and chief executive officer Mari-Ann Green said the company aims to supply as many as 1.45 kt/a (1,600 stpy) annually of 99.9 percent-pure cobalt to companies like United Technologies Corp.'s Pratt and Whitney unit, Rolls Royce Group Plc and Portland, OR-based Precision Castparts Corp. Cobalt is used in hybrid car batteries and jet engines.

The Forest Service will allow Formation Metals to proceed with the first stage of the mining plan — logging the mine site and road construction. Mining could get under way in the central Idaho mountains in 2011 and could continue for 30 years, the company said.

Green expects to employ 150 people at the mine and another 77 people at the company's existing smelter 322 km (200 miles) to the northwest in Kellogg, where the cobalt will be refined.

Though the price of cobalt dropped from about \$52/lb in 2008 to \$18/lb earlier this year, optimism that the worst of the recession is over is again pushing prices higher. It traded at about \$23/lb, Green said.

Formation Metals has been ex-

ploring Idaho's Cobalt belt — the U.S. government bulldozed trenches during World War II to recover the chemical element for use in aircraft engines — for 14 years.

Prior to winning Forest Service approval, Formation Metals' efforts had been hampered by a financial crisis that followed the Sept. 11, 2001 terrorist attacks as well as complicated dealings with Xstrata Plc, a Swiss-based cobalt producer that indirectly owns a defunct mine next door that is on the federal Superfund pollution cleanup list.

In April, Xstrata lost a federal appeal aimed at halting Formation Metal's project. And three months ago, Formation won a separate state court order giving it access to cobalt mining claims across its Swiss rival's property.

So far, Formation has spent \$50 million, including \$17 million on permits.

To complete the mine by 2011, it is finalizing a stock-and-debt deal with investors to raise another \$140 million by the end of 2009, Green said.

Formation must put up reclamation bonds totaling \$29.6 million to address eventual impacts of its mine and has agreed to chip in another \$150,000 annually for the life of the mine for watershed improvement projects. In return, the Idaho Conservation League, an environmental group, agreed in 2008 not to challenge the mine in court. ■



SRK Consulting

Engineers and Geoscientists

RESOURCE GEOLOGY, DUE DILIGENCE,
ENVIRONMENTAL PERMITTING,
GROUNDWATER STUDIES, AND
DESIGN ENGINEERING

Global Experience Global Solutions

www.srk.com

by William H. Wilkinson, 2009 SME president

2009 was a good year

One year ago this month, I embarked on my term as president of SME with some trepidation and wondering how I would be able to manage the responsibilities. To my total amazement, the year has flown by and I am now wondering what life will be like as past president. At the Tucson Section Meeting in November, Dr. Roshan Bhappu presaged the end of my term by saying I would soon be a member of the "Who Club" that is reserved for past presidents of SME ... Will who?

This has been a whirlwind year and I really do not know where the time has gone. SME is truly a great society that covers a broad group of professions that make significant contributions to the mining industry worldwide and to the security and well-being of the United States and its citizens. Our international members are an important part of SME and we continue to add services that will encourage international member growth (such as eBooks).

It has been a true honor and pleasure to serve as your president. I have had the privilege of speaking to, or visiting, the Bagdad and Tucson sections in Arizona, the Pittsburg section in Pennsylvania, the Lima, Peru section at Extremis and the Prospectors and Developers Association of Canada in Toronto. I also had the pleasure of meeting the executive directors and presidents of the Founding Societies. At each of these, I had the opportunity to meet many talented and passionate members of SME as well as members of our sister societies. I have certainly gained a much better understanding of many of the different and complex issues that our members face in various parts of the world.

I also attended the SME Christmas party in Littleton and was able to observe first-hand the commitment of the SME employees and



William H. Wilkinson

We entered 2009 in the midst of one of the worst economic collapses in history accompanied by major cutbacks and layoffs in our domestic mines. It appeared that 2009 had the potential to be a financial disaster for SME. However, we finished the year with a positive operating surplus, membership growth and new members in OneMine.org.

how they work together to ensure the society runs smoothly, something I think few members appreciate. A tremendous amount of work is accomplished with a relatively small staff, many of whom wear more than one hat, and they deserve a special acknowledgement from the membership. I know there is no way I could have made it through 2009 without their unstinting dedication, reminders and help.

We entered 2009 in the midst of one of the worst economic collapses in history, accompanied by major cutbacks and layoffs in our domestic mines. It appeared that 2009 had the potential to be a financial disaster for SME. However, we finished the year with a positive operating sur-

plus, membership growth and new members in OneMine.org. Even our investments have rebounded. I wish I could take credit for this, but it is based on the many changes incorporated in our governance structure during the past few years, as well as on the leadership of our board of directors and the implementation of their directives by executive director, David Kanagy.

Although there were many accomplishments, as discussed above, a number of things were left undone or in their infancy. I am pleased that the board approved the Government Relations Committee to provide relevant and timely information on our industry for policy makers and the public. However, as the year comes to an end, this committee is just getting started and needs dedicated volunteers to make it reach its potential.

SME Tech Online was approved by the board and is working to get its first courses online. I believe this will have tremendous benefits for our members and become one of the cornerstones of our e-business.

Finally, as my last act as SME president, I look forward to presiding over what looks like an exceptional annual meeting in Phoenix, AZ. Part of me is anxious to pass the gavel on, but another part will certainly miss being so involved in the day-to-day activities of SME.

Nikhil Trevedi will carry many of the new initiatives forward as well as advancing new initiatives he will propose. I look forward to supporting his year as SME president and I urge each member to give him the same kind of support you have given me during this past year.

So with Nikhil taking the reins, I look forward to becoming a member of the prestigious Who Club and joining the other past presidents to support the continued growth of SME however I can. ■



SME President
George W. Luxbacher
VOL. 60 NO. 3 – VOL. 61 NO. 2

March 2008: VOL. 60 NO. 3

George W. Luxbacher: an interview with the 2008 SME President

April 2008: VOL. 60 NO. 4

(No Article)

May 2008: VOL. 60 NO. 5

(No Article)

June 2008: VOL. 60 NO. 6

(No Article)

July 2008: VOL. 60 NO. 7

Call for nominations

August 2008: VOL. 60 NO. 8

SME – What does it mean to you?

September 2008: VOL. 60 NO. 9

If we don't know what is broken, we can't fix it

October 2008: VOL. 60 NO. 10

Membership renewal time – where does membership lead

November 2008: VOL. 60 NO. 11

What happens in Vegas ...

December 2008: VOL. 60 NO. 12

Content and value to our members: The Minerals Information Institute joins SME

January 2009: VOL. 61 NO. 1

Swimming against the current – showing optimism in the face of uncertainty

February 2009: VOL. 61 NO. 2

On the road to zero – mine safety



MARCH 2008

Minning

ENGINEERING

A PUBLICATION OF SME



George W. Luxbacher
2008 SME President

George W. Luxbacher: an interview with the 2008 SME President

Talk some about your background. Mining, particularly coal, runs in the family.

I come from a mining family, one generation removed. Both of my grandfathers worked in the coal mines. My mother's father had worked as a coal miner in the South Hills area of Pittsburgh after coming to America from Croatia. My father's father (who died of black lung long before I was born) had been born in America and worked as a mine foreman and superintendent in mines just outside the Pittsburgh area. My father often talked about when, as a child, he accompanied his father underground on Sundays to check the mine pumps.

While I never expected to go into mining, I often read some of my grandfather's books on mining technology that my father had kept. I started college at Penn State and drifted into mining engineering as my third declared major. I was finally realizing the importance of a career choice. I've never regretted that decision.

One of my children, Mark, has followed me into mining engineering, much to my surprise and pride. Evidently, he had been listening to the many conversations I had with friends and colleagues in the industry and never considered any other career path. He has since married another mining engineer, Kray Davis Luxbacher, so we truly have a mining family and can talk mining when we get together. My other children are in more mundane lines of work and rapidly tire of the mining discussions.

I've worked for operating companies: Pittsburgh Coal Co. (then a division of Consolidation Coal Co., and a company I believe both of my grandfathers had worked for), Island Creek Coal Co., and a research organization: Occidental Research Corp. I am now with Glenn Springs Holdings Inc., dealing with legacy issues (primarily environmental) related to Occidental's previous mining operations (coal and minerals). As such, I have a broad view of the industry and the critical changes that are shaping our industry.

What is your personal assessment of the minerals business — domestic mining and operational perspectives?

While the general public may never notice mining occurring around them (which, in itself, is a credit to our industry), our domestic mining industry is still strong and is largely responsible for the quality of life we enjoy. The climate in which we operate, however, from a "public license" view, continues to be restrictive. This is primarily reflected in environmental and health and safety regulations.

Access to mineral reserves has been one of the keys to the development of the domestic mining industry. But, with the continuing criticism and call for unreason-



able reform of the Mining Act of 1872 (signed by President Ulysses S. Grant), the domestic mining industry may find itself in the same bind as the domestic petroleum industry — shut out from those reserves that are required for the security of this nation.

It is unfortunate that commodity prices are cyclic. Despite prices at today's level, many mining operations that were previously closed, yet had remaining resources, have been reclaimed and will never reopen.

The future of the minerals industry in the near and longer term. Think the current uptick is sustainable?

While there will be continuing price fluctuations, near and long term, I believe the outlook for demand has no other direction than favorable. Expanding and developing countries, of which China and India are the best examples, are entitled to the same standard of living and quality of life that we have in the United States. It is an inescapable fact that the minerals industry is largely responsible for our lifestyle (although we, as an industry, have done a poor job communicating that to

the public). That demand will occur.

Discuss some of the major challenges for the mining industry – engineering, environmental, regulatory, sustainability.

The mining industry's major challenge is one of public perception — the impact of that perception has a direct influence on engineering, environmental, regulatory, sustainability, etc. Let's take an example from the minerals industry segment I'm closest to, coal mining.

Based on data from the U.S. Mine Safety and Health Administration (MSHA), since I entered the industry in 1970, coal production has increased more than 80 percent while fatal injuries have decreased more than 90 percent. More than half of the coal mines in this country operate each year without a single lost time injury. Despite this, the headlines and the 24-hour news coverage from Quecreek (2002), Sago and Darby (2006) and Crandall Canyon (2007) would lead one to conclude that mining is inherently unsafe. This public perception pushes regulations, such as the Mine Improvement and New Emergency Response Act of 2006 (MINER Act), which amended the Mine Safety and Health Act of 1977. And those regulations push technology, often exceeding our true abilities as an industry.

When the U.S. Bureau of Mines closed on Sept. 30, 1996, the industry lost its best health and safety resource and a critical source of funding to university programs in this area. This occurred despite the fact that portions of the Bureau's mission were transferred to the National Institute for Occupational Safety and Health and the U.S. Geological Survey. Without a federal group focused solely on mining we now get regulations that exceed current technology.

Now, move from safety to environmental and you see something similar. In Kentucky and West Virginia, mountaintop mining has revitalized the coal industry. It provides economics of scale in large earthmoving operations. Yet public perception, driven by countless letters to the editor in the larger metropolitan newspapers in areas far removed from mining, would lead one to believe that the mountains and stream headwaters are being destroyed.

Surface coal mining is certainly disruptive (even "ugly") during active mining and contemporaneous reclamation takes time. Groups opposed to mountaintop mining often use helicopter flyovers to demonstrate how bad mining is.

There are tradeoffs to this form of mining: cash flow into the local economy, employment, low cost energy, creation of flat and/or more productive land, against some negatives: surface land use disruption, changes in topography and the loss of some perennial streams.

There is no doubt that the groups against mountaintop mining are sincere and determined — the continuing litigation, permit blocks, and disruptions are reported

FIGURE 1

Regional imbalance of geoscience graduates.



well outside the mining regions. As the mining industry begins to embrace sustainable development, I am hopeful that it could help change that public perception.

What are some of your thoughts concerning the coal, energy, metals or industrial minerals sectors where you have had experience?

Since I work for an energy company, Occidental Petroleum Corp., and have most of my experience in coal, that's where I'll focus my comments. In July 2007, the National Petroleum Council issued the draft report "Facing the hard truths about energy: a comprehensive view to 2030 of global oil and natural gas." The Council's conclusion was that coal, oil and natural gas will remain indispensable and that all sources of energy will be needed. This is reinforced in the report's recommended five core U.S. strategies:

- Moderate demand by increasing energy efficiency.
- Expand and diversify U.S. energy supply.
- Strengthen global and U.S. energy security.
- Reinforce capabilities to meet new challenges.
- Address carbon constraint.

That analysis showed the critical importance of coal to our energy mix for the foreseeable future. So it was disappointing to read that the U.S. Department of Energy in January canceled its support for the FutureGen coal gasification plant. That project would have been a milestone in the development and application of clean coal technologies, not only domestically but internationally as well. No one doubts the importance of clean coal technologies and carbon sequestration, given the increasing emphasis on CO₂. Hopefully, a way will be found to keep this project on track.

Your thoughts on the mining industry's shortage of professionals, domestically and globally. And how does the industry attract more students to minerals-related programs?

While I'm well aware of the industry's challenges related to the shortage of professionals, I found it interesting that the National Petroleum Council draft report identified that as an issue facing the entire energy industry. This is particularly true in the United States, where more than one-half of the workforce is eligible to retire within the next 10 years. The report also noted the significant regional imbalance of geoscience graduates. The accompanying figure from the National Petroleum Council's report illustrates this.

I recently wrote an op-ed piece for *GeoTimes*. In it, I talked about the issues associated with funding for university research in mining. Without exceptional faculty, we won't have students that will develop into the industry leaders of tomorrow.

I have been disappointed by the lack of commitment of some companies to SME, while those same companies are complaining that they cannot attract new engineers. It is not difficult to look at the SME directory and identify those companies that do not support or encourage professional society membership. I would be hard pressed to recommend any of those companies to a young professional entering the industry because it says a lot about opportunities for professional development. Contrast that to other companies that will pay for any of their employees to belong to SME and strongly encourage them to join. That is where I would want to be.

Explain governmental impacts on and relationship to the minerals industry and to minerals companies, many of them now operating worldwide.

Mining has become an international activity and is directed by international mining companies. Few of them are now based in the United States, and, effectively, the United States has become a less attractive country to do business in.

When I was an undergraduate student, the discussions about mining always centered around political risk. Today, though, other issues have come to the forefront — the public perception against mining, the restrictive environmental regulations, and health and safety regulations. No one in the mining industry will ever express

opposition to reasonable statutory requirements designed to protect workers, society and the environment.

While the United States still has a significant resource base, I feel that much of that will remain unexploited and mining will continue to migrate to other countries.

Let's turn to SME. When did you get involved with the society and who influenced you?

While an undergraduate, I was heavily involved with Penn State's student chapter of SME — a great social group. After I graduated, like many young engineers, I drifted away. When I returned to Penn State for my graduate program several years later, my Master's thesis advisors, Bob Stefanko and Raj Ramani, were emphatic that I get involved in SME. Both of them impressed on me the need to give back to our profession through service to our professional society. It is noteworthy that I'm following in their footsteps: Dr. Stefanko and Dr. Ramani both served as presidents of SME (1979 and 1995, respectively).

What are some of your goals as the 2008 SME president?

I'm a realist, in that a one-year term as SME president limits what can be done in terms of goals. I've been involved in the recent society governmental reorganization where the board size has been reduced and strongly believe that has been the best change in SME in decades. It has produced a more responsive, nimble organization that can rapidly respond to member and industry needs.

There is still more work to do to develop our expectations for this governance structure. My primary goal is to further define and refine the roles of the strategic committees and the board of directors to assure the positive dynamics continue to the benefit of the society (we need to avoid stagnating). This occurs through strategy implementation — the relationship between the strategic committees and the operational units of the society. I see that as my primary focus.

I'm also excited about the creation of the UCA technical committee and now UCA Division. The

Luxbacher brings a distinguished career to presidency

George W. Luxbacher is vice president of operations with Glenn Springs Holding, Inc. Glenn Springs Holdings is a subsidiary for Occidental Petroleum Corp.

Luxbacher assumed the role of vice president in April 2002. He is responsible for environmental remediation operations at former and active OxyChem sites. He also manages Arizona state Superfund litigation related to former copper mining operations. Luxbacher's duties also include the management of Services Group that provides demolition and assets recovery services for closed OxyChem plants. He also served as business manager for phosphorus and Ferrophos businesses.

Luxbacher earned his Bachelors, Masters and Doctorate degrees in mining engineering from the Pennsylvania State University.

He began his professional career with the Pitts-

burgh Coal Co. in 1971.

He returned to Pennsylvania State University in 1975 to work as a research engineer. He joined Occidental Research Corp. in 1980 as research engineer. He was responsible for mining research in Island Creek Coal Co.'s West Kentucky Division. He has held 13 titles since joining Occidental Research Corp. These include director of operations (1996-2002), managing partner, International Marine Terminals Partnership (1995-1996) and director of asset sales (1993-1996).

He is a Distinguished Member of SME, won SME-AIME Best Presentation award in 1977 and is Centennial Fellow — Penn State College of Earth and Mineral Sciences.

He has been published in more than 25 publications or presentations at technical society meetings and has three patents related to the recovery of elemental phosphorus sludge. ■

UCA of SME was the result of SME's purchase of the assets of the American Underground Construction Association. This new division has a different structure and method of operation than the other SME divisions, both of which are extremely effective. I would like to challenge the other SME divisions to reflect on what they similarly can do, outside of their traditional role.

What do you believe are SME's strengths, as well as its weaknesses?

I believe SME's greatest strength is its membership. We truly have a large number of members who are committed to the industry and the society. These members have demonstrated time and again that commitment through their service. Our other primary strength is the SME staff — a group of great professionals that can help our members maximize the contribution of the time they have available. *Mining Engineering* continues to be the premier technical journal in the industry and somehow manages to more than adequately address the diverse interests of our membership — truly a gargantuan feat. Membership, staff and magazine — a great combination.

While the membership is our greatest strength, one of SME's greatest weaknesses is its failure to constantly address the industry's current needs so those members have a forum in which to contribute. The recent change in the society's governance and the establishment of a Governance Strategic Committee, which is looking in depth at our structure, are trying to address this weakness as rapidly as possible. I have attended as many division, council and committee meetings as I could during the last several years. It is disappointing to see those parts of the society (fortunately, there are just a few) that have lost focus, direction or enthusiasm. We need to challenge our membership to do their part to reinvigorate the entire organization.

What do you believe SME's role should be in addressing industry challenges and problems?

Many years ago, our members and others in the industry could attend technical sessions put on by the American Mining Congress, the National Coal Association, state or local mining groups. With the consolidation of the industry, many of these venues no longer concentrate on transfer of technical knowledge. That is where SME's greatest value lies. At our annual meeting, sessions that deal with the immediate challenges and problems facing the industry are those that draw the greatest attendance and interest. Many of our traditional topics and sessions draw significantly less interest. Book sales, *Mining Engineering*, regional and topical meetings, the immediate posting of annual meeting technical papers on OneMine.org — this is where we are effective.

SME also needs to be responsive to other needs of our members. The Registered Member category started from internal interest by a few members, primarily within the M&E Division. These individuals identified a critical need and worked with the society to fill it.

Now that the divisions and special interest committees of the society have been freed from the responsibility of society management (through representation on the board of directors), I believe there is a unique opportunity for our membership to identify an internal structure that can further address industry issues. I trust

that our membership and the strategic committees will quickly identify those opportunities.

Comments to members – areas and activities you think are important

I believe that every activity SME undertakes is critical to some portion of our membership. I have been very active at the local section, divisional and committee levels of the society and have grown from my exposure to each.

During the past five years or so, the SME board of directors, has started to move a number of critical society activities under the auspices of the SME Foundation to ensure an adequate and continuing source of funding. These include the Government, Education and Mining (GEM) program, the Professional Engineering Registration Committee, the Mentoring Program and the Young Leaders Program.

The Foundation's fund raising efforts are developing, but I feel the Foundation deserves support from all of our members. Many years ago, when I was a SME regional vice president, the board of directors made significant cuts to the GEM program. My phone rang off the hook for days with calls from within and outside my region, all demanding that the cuts be rescinded. Unfortunately, at that time, the society was under severe financial pressures and options were limited. That is why I believe an adequately supported Foundation is critical to maintaining many programs that are responsible to the future of our industry.

You have been involved with SME's new OneMine.org service from its beginning. Where do you see OneMine.org in the list of SME benefits?

2007 SME President Jim Arnold asked me to chair the OneMine.org committee when SME staff proposed this project. So I have been privileged to be associated with OneMine.org since its inception and help guide its development.

I feel strongly that OneMine.org will develop to become the greatest single benefit of SME membership to each of our members (remember, I noted earlier the importance of transfer of knowledge as a critical goal of the Society) as we add more content, complementing *Mining Engineering*. As SME staff is used to hearing from me, "content is king" and we need the largest and most diverse content we can provide. In this industry, nothing is obsolete — the historical papers provide context for today's practices. As we went live with our beta site in January, the feedback from our members has confirmed the value of OneMine.org.

As we go forward with OneMine.org, the major mining societies from other countries have been invited to join. In fact, in addition to AIME, the South African Institute of Mining and Metallurgy (SAIMM) and the International Marine Minerals Society (IMMS) have already contributed content and a number of other societies have expressed sincere interest. As our industry continues its consolidation and international scope, many of our members are active in a number of countries and industry segments. I envision that OneMine.org may become a basis for increased cooperation between the major international societies to better serve our combined memberships. ■

by George W. Luxbacher, 2008 SME president

Call for nominations

You, the membership of SME, emphasized your faith in the Society's leadership several years ago when you approved the changes in the organizational structure of the Society to reduce the size and structure of the board of directors to streamline our organization. I see the renewed vitality that those changes have already brought to our organization (such as OneMine.org – one of the best member benefits since the introduction of *Mining Engineering* magazine more than 50 years ago) and I trust you will see them as well with many of the issues and initiatives the board currently has under consideration.

The SME board is no longer made of representatives of each of the divisions. Instead, each individual serving on the board acts as a member-at-large representing all the membership, not any specific interest group or division. Those members are supported by five critical strategic committees. We rely on all of these individuals to act in the best interests of SME in their deliberations and decisions.

One intent of the changes to our organizational structure was to identify and choose the most qualified individuals within the Society to serve on the board and strategic committees, as well as to develop a pool of well-qualified candidates for president. The common statement that "volunteers are the life blood" of an organization such as ours has never been truer – we need that contribution of one of your most valuable things: time. Unfortunately, the upsurge in our industry is imposing demands on everyone of us that makes it harder to participate. To maintain and grow our organization, we need to find those members who care passionately about SME and to do that we need your help. Please give your support in creating our future leadership for our Society by nominating and/or recommending members (including yourself) to serve the Society in one of the following roles:



George W. Luxbacher

- 2011 SME president.
- 2009 – 2012 SME board member-at-large (two are required).
- Members for all SME strategic committees.

All of these individuals must be current members of the Society. There are no established qualifications in the SME bylaws for board or strategic committee members, however the qualifications for president, which I cover later, may be considered for guidance.

For the strategic committees, we are looking for those members who have a desire to get more involved in the Society organizational structure and have an interest in a topic covered by one of the committees. To assist with your consideration of strategic committee members, the following charges have been identified for each committee:

Marketing and Outreach: This committee is responsible for the long-range planning of member recruitment, international growth, review and recommendation of member benefits, outreach programs with related societies and monitoring, reviewing and coordinating communication between the SME leadership and the general membership.

Organizational/Governance Structure: This committee is re-

sponsible for the oversight and long-range planning of SME's internal organization infrastructure and includes international (global), regional and local sections areas of the Society. The committee will be provided flexibility for managing SME's infrastructure to meet the ongoing functional needs of the organization. It will also serve as an intermediary between the local SME groups or committees and the SME board of directors.

Products and Services: This committee will be responsible for quality and integrity of SME products and services and for the long-range development of new programs and activities within the Society. It will evaluate current products and services to determine if they have value or have become obsolete or ineffective. This committee will review new opportunities and engage SME's functional working groups in developing new and timely offerings.

Finance: The Finance Committee shall be responsible for the general supervision of the financial operations of SME. Annual tasks include review of the SME annual budget to be submitted to the SME Board for approval; oversee and maintain an investment program for the Society's surplus and endowment funds; recommend and review the work of the SME investment manager and ensure that the investment manager meets the investment guidelines as established by the SME Board and supervise the retirement and 401(k) program for SME staff.

Education and Professional Development: This committee shall set strategic goals for the education subcommittees, receive and act upon appropriate recommendations of the education subcommittees and outside educational groups aligned with SME, plan and implement educational policy as approved by the SME board, and promote educational reach activities through GEM

long-range planning. The committee will be providing assistance to the Professional Engineers Exam Committee, GEM and the Registered Member program.

The SME bylaws do list qualifications for the president. I would like to think that everyone serving on the board or a strategic committee might be that individual you would like to see some day serving as president and so would suggest you give some consideration to these qualifications for all positions. 2011 SME president nominees should meet these qualifications.

(i) The candidate holds or has previously held one or more senior positions with either a single firm or institution, or with multiple employers (including self-employment).

(ii) In addition to service to the Society, the candidate has a degree

in science, engineering or other degree applicable to the mineral industry.

(iii) The candidate has a distinguished career of service to the profession or a record of accomplishment demonstrating leadership or technical expertise.

(iv) The candidate understands the issues and challenges facing the Society and the mineral industry generally.

(v) The candidate has superior communication skills, written and oral.

(vi) The candidate has previously served for at least one year as a member of the board of directors or of a committee reporting to the board. Note that it is our intent to interpret "committee reporting to the board" as broadly as possible to identify the best possible pool of candidates.

(vii) The candidate demonstrates a willingness and desire to serve the Society as a whole and not to act as a representative of a narrower constituency within the membership of the Society.

I would like to request that you forward any recommendations (with a brief biography if possible) for consideration to SME executive director, Dave Kanagy (kanagy@smenet.org) as soon as possible. He will compile a list for final review by the Society's Nominating Committee at its meeting in August. Should you have any questions, feel free to contact Dave or me.

Thank you for your membership in the Society and your continued commitment to the minerals industry and community. We look forward to receiving your recommendations and nominations. ■



Mineral Technologies

Your Complete Solution to Minerals Processing

innovative design - quality solutions

CALCITE

TALC

KAOLIN

MICAS



DIAMONDS

GLASS SANDS

FELDSPAR

SILICA

QUARTZ

GARNETS



WOLLASTONITE



ZIRCON, RUTILE, ILMENITES,
STAUROLITE, KYANITE



MAGNETICS – RARE EARTH DRUMS AND ROLLS



ELECTROSTATICS



GRAVITY SEPARATORS



SPIRALS

Head Office
Carrara, Qld, Australia
Ph: +61 7 5569 1300
Fax: +61 7 5525 3180
Email: sales@roche.com.au
www.mdminotec.com.au

North America
St Augustine, Florida
Ph: +1 904 827 1694
Fax: +1 904 827 1695
Email: mtmtusa@aol.com

South Africa
Alton, Richards Bay
Ph: +27 35 7973230
Fax: +27 35 7974629
Email: sales@mdminotec.co.za

India
Cochin, Western India
Ph: +91 484 238 9097
Fax: +91 484 238 9506
Email: md.cochin@bplnet.com

by George W. Luxbacher, 2008 SME president

SME — What does it mean to you?

I have been associated with SME since my student days (more years ago than I wish to count). Back then, SME meant a discount on textbooks, a monthly social event, field trips and speakers. Throughout the years, my relationship with SME matured to include activities and networking within several local sections as my job necessitated several relocations, attendance at the annual meetings as the technical exchange became more important to me, involvement with the Coal Division (now Coal & Energy) as I began to understand the importance of the Society to our industry professionals and then my association governance.

While SME is a volunteer organization and I still have to put time in to maintain my “day job,” I have always believed that I have gotten more back more from my relationship with SME than I have ever contributed. I have satisfied my personal need for continuing education (and my professional curiosity) by attending technical presentations well outside the scope of my work. I have made long-lasting friendships with mining professionals from other segments of the industry that I would never otherwise have met and, hopefully, I have contributed positively to the growth of the Society. From my perspective, it has been a great experience and the highlight of my professional career.

While my interest and involvement in the Society governance has grown, I have met many individuals who share my passion for the Society. As SME president, I have been invited to a number of local section meetings and symposia (a privilege I have probably enjoyed more than any other aspect of my term) and I have been extremely impressed with the vitality and



George W. Luxbacher

enthusiasm that exists both within our Society and our profession. Even with my regular participation at similar events in the past, the friendship, fellowship, technical content and information exchange at these events this year has exceeded my expectations. We may have disagreements as to where our Society is going or how we are going to get there. But I have not met anyone who does not agree with the importance of the Society.

One disadvantage of being so involved in SME and being surrounded by similar people is that you have a tendency to think everyone wants to be as involved as well. To many of our members, their exposure to our Society is limited to the technical information transfer through *Mining Engineering* magazine, books, an occasional section meeting and, hopefully, our newest offering, OneMine.org. But there is so much more to be gained through increased exposure and involvement. Last month, I penned a president's column (*ME*, July 2008, page 6) discussing the nominating process within the Society and asked for your assistance in identifying potential board and

strategic committee members. I was pleased at the response. I recently sent out a broadcast e-mail to our under 35-year-old members about the Young Leaders program. In the e-mail, I encouraged them to consider applying for the program that was developed by the Society in 2002. As I stated in that e-mail, the future of SME depends on the development of qualified, capable individuals who have the vision and dedication to lead the Society during the next century.

If you are interested, it doesn't take much to get involved — a discussion with or phone call to one of the local section officers, an e-mail to SME indicating your desire to help and areas of interest, even a phone call to our executive director, Dave Kanagy — once others know of your interest, opportunities abound in the Divisions, Special Interest Groups, GEM, professional registration and ABET. If you have avoided more direct involvement because you feel the Society's offering are deficient in some way, the best way to make changes is from the inside.

As I have met a number of our student chapter members at the annual meeting and events over the last several months, I often think back to my first exposure to SME and try to offer words of encouragement. The SME books, *Mining Engineering* and OneMine.org provide a great value and alone justify the membership dues. However, there is so much more to be gained by involvement at all levels of our organization. For all, students to seasoned professionals, please take that first step and help further develop our professional society. ■

by George W. Luxbacher, 2008 SME president

If we don't know what is broken, we can't fix it

With my recent, unexpected relocation to Dallas, TX, my family and I went through the moving pains that many in our industry consider a normal, or routine, part of life. Many of my colleagues used to consider it a badge of honor the number of times they had to relocate for their career (notice I did not say job).

I purchased a new Chevy truck late last year in Kentucky while I was attempting to finish my basement and needed to haul studs and drywall. No front license plate is required in Kentucky. So with the move, my truck had to go into a dealer in Texas to mount the front plate bracket. I had the bracket, but not the rivet tool required to mount it. My spouse took on this task and went to the closest dealer – a simple request: mount the front plate bracket on a truck less than one year old. Final charge (and getting to the point of this column): \$29. The dealer's explanation: if I had bought the car from them new, they would have done it for free, since it was legally required in Texas. Unfortunately I did not, so I had to pay the cost of service.

There are several dealers in reasonable proximity to my home. While the charge was relatively insignificant, it was unexpected. I just assumed any dealer would be happy to do the installation for free as an introduction to their dealership. Unfortunately, I will not consider this particular dealer again for service or a new car purchase. Given the state of the automotive business in the United States, it is amazing that a dealer would not do everything and anything to generate goodwill. I also have a (non-American) sports car and the nearest Dallas dealer for that brand has, through his actions, let me know that he wants my business.

Now the relevance to SME. We have recently been in discussions with several other U.S.-based organizations concerning potential mergers with SME (more to come on this topic, hopefully in the near future). The intent of these mergers would be to strengthen the services and programs available to our members. I have had the opportunity to hear (directly and indirectly) what others from these organizations consider the strengths and weaknesses of our organization. The majority of those comments comes from SME members. It would be an understatement to say the indirect comments, in particular, that have been related to



George W. Luxbacher

me have been shocking. Some of our members bear strong grudges against the organization. They feel we are inefficient in operations, dislike staff (or former staff) and so on. Wow, such animosity.

The difference between my opinion of the Chevy dealer and my surprise at some member's views of SME reflects the difference in the mission of the organizations – the Chevy dealer is out to make a profit while SME is a volunteer organization dedicated to the mining profession. Both of these organizations rely on customer/member satisfaction to prosper. While we have a great staff (possibly the best in our organization's history), their contribution in terms of time is dwarfed by the volunteer hours you all contribute. The staff primarily helps to maximize the value of our volunteer efforts by developing member programs and executing the direction of the board and committees. There are bound to be disagreements, whether with other volunteers or staff, but does that change what SME brings to our profession? I strongly believe there is only one answer: no.

This organization values feedback. That is the only way we can accommodate the needs of our members and understand the issues. SME is also very dynamic, probably more so today than ever. This is reflective of the smaller board of directors, the creation of strategic committees, cooperative working agreements with related organizations, our new divisions (UCA and WAAIME) and the nature of our industry. I personally take the time to listen to any and all feedback from our members. And, while I or the organization may not have been able to make every change asked for, your comments have definitely helped to define my agen-

da for the brief year I have the privilege to serve SME president.

An example of how SME recognizes that it is a member-driven organization is the structure of OneMine.org (hopefully no further explanation of that member benefit is required). We were in a quandary when we started OneMine.org. We initially saw it as a vehicle that could, in our global profession, link the world's mining societies, fulfilling an objective that your board of directors has had for years. OneMine.org was set up independent of SME specifically for that purpose. While we were in Beta testing, we physically called on each of the major mining professional societies in other countries, made a presentation of OneMine.org and solicited their membership participation in OneMine.org. However, we found was that our concept of making all of our digital archives (*Transactions, Mining Engineering, Minerals & Metallurgical Processing, Tunneling & Underground Construction*, preprints, out-of-print books) available to our members as a member benefit/service ran counter to the concept of the majority of these other organizations. Most of them saw the sale of publications as a revenue source, not a member service. Several organizations have joined us and I have complimented them on their dedication to their members.

Several of our members have expressed a strong opinion that we are "giving away" our technical content. This is countered by a significantly greater number of members that have taken the time to compliment the OneMine.org philosophy. The board of directors felt that SME does not own the technical content – you, our members do and you should be able to access it easily and freely for the benefit of our profession.

Member satisfaction is important to SME. Not only is your feedback wanted, it is needed. We can only fix things that are broken if we know they are broken and why. So contact your board members and let them know. The SME staff will go the extra mile for members. Remember, though, the staff must adhere to policies set by the board and committee members. When you ask them to bend the policies and they say they cannot, it is not because they do not care, it is because they are not authorized to do so. So contact me, board or committee members and let us know what direction you believe SME should be going. ■

by George W. Luxbacher, 2008 SME president

Membership renewal time — where does membership lead

Like most of us, I belong to a number of organizations. And, other than the monthly magazines, I really don't think much about that membership — until once a year when I get what I consider a reality check: my annual dues statement. At that time, I have to decide if I have received enough value during the past year to justify continuing my membership in that organization for another year. Your SME dues statement will be arriving in your mailbox shortly and I can only hope there is just one way to answer that question — with an absolute and unquestioned yes.

Despite the other mining magazines that I receive, some free, each month, *Mining Engineering* alone brings unique value and content, even more now that *Tunneling & Underground Construction* is included quarterly. My wife has often complained about my library of *Mining Engineering*. But with the formal rollout of OneMine.org at MineExpo 2008, I can now do a full digital search of the magazine, among a plethora of other content, without filling my bookshelves with the old issues. OneMine.org is included in your annual dues — no per



George W. Luxbacher

page charges to download, no additional subscription fees — providing a great value in itself if, like me, you are always searching for an article you vaguely remember. Add that to book discounts (we will have more than nine new releases for 2008-2009 to add to our estimated 130 titles), meetings (local section, annual, topical), the job postings on our Web site, and I get more value from SME than any other organization I belong to.

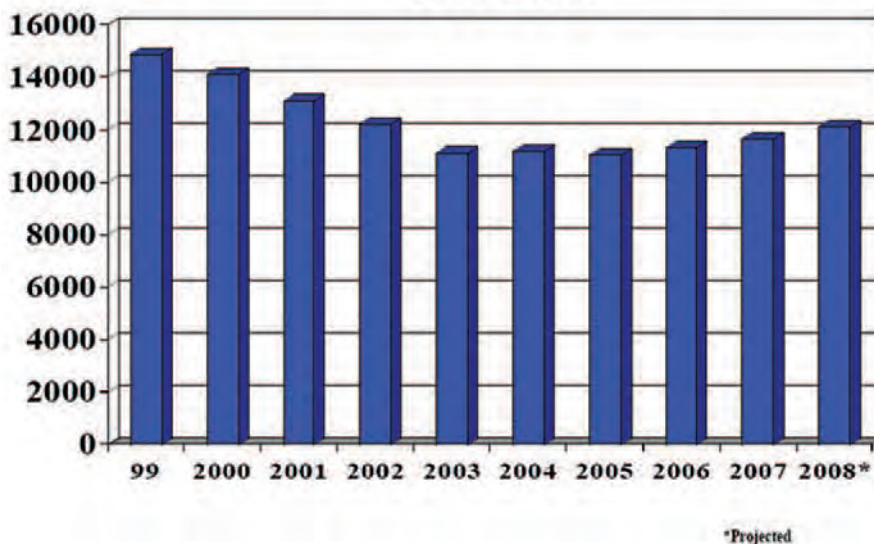
As I'm sure you are aware, during the last three years, our membership has started to increase once again. We anticipate closing 2008 with more than 12,100 members,

compared with a historical low in 2003 of 11,090 members. This growth correlates with the uptick in the industry and the acknowledgment (and subsequent actions) by the SME board of directors that we have an obligation to provide value to you for your membership.

Consistent with trends in the industry, the average age of an SME member today is 51.7 years but we have hopeful expectations that this number will drop. Were you aware that 73 percent of all SME members have told us that they either joined as a student member or were influenced to join by a university professor? We have received more positive comments on OneMine.org from our student members than from any other group within the Society. And, as a university degree provides the foundation for life-long learning, we need to continue to provide those resources as our members progress along their career paths. We have a number of initiatives under consideration to provide professional development opportunities to those who are unable to attend either the annual meeting or the topical meetings you might find of interest — more to come on that topic.

I'm one of a small group of SME members who have recruited more than 100 new members to our organization. One member, Gordon Presley, has recruited more than 1,000 new members. Many of you enticed several of your colleagues to join as well but have you thought about this recently? Despite the current softening of commodities prices and the historic cyclic nature of our industry, most of us believe that the current super cycle is indicative of fundamental changes that bode well for mining in the future. If that is the case, shouldn't we all be encouraging our colleagues to join SME with the intent to build a better career within a stronger industry? We all have a professional obligation to recruit new members and to encourage students to enter

TOTAL MEMBERSHIP 1999-2008



Continued on page 20

AWARDS

Two companies earn mine reclamation awards

Newmont Mining and El Paso Corp. were recognized for their accomplishments in restoring and preserving Nevada's environment at the annual Nevada Mining Association Convention.

The companies were the recipients of the Nevada Excellence in Mine Reclamation Awards.

Newmont Mining Corp. was given an award in the category of Wildlife Habitat Enhancement for its work at the Lone Tree Mine in Humboldt County near Battle Mountain.

Newmont's designed landforms and attention to detail for wildlife habitat elements were incorporated into the reclamation at the Lone Tree site.

A range of wildlife, including chukar, antelope and mule deer now frequent the reclaimed areas.

El Paso Corp. received the Leadership in Reclamation award for its work at the Comstock mill site in Storey County.

The site, located in American Flats near Virginia City, had been abandoned since 1982 and contained numerous public safety and hazardous contamination concerns. El Paso never operated the mill site and was not under any federal or state order to reclaim the property. However, the company voluntarily came forward and successfully performed the reclamation.

The Nevada Excellence in Mine Reclamation Awards are given co-operatively by the Nevada Division of Minerals, Nevada Division of Environmental Protection, Nevada Division of Wildlife, the Bureau of Land Management and the U.S. Forest Service.

Sixty-one projects and three

individuals have been recognized since the awards program began in 1990. ■

URANIUM

Cameco defers Cigar Lake license hearing

Following a second major flood at its Cigar Lake uranium mine, Cameco Corp. said that it would postpone efforts to extend the scope of its regulatory approval to overhaul the mine that flooded on Aug. 12.

The mine originally flooded while under construction in 2006. Cameco has since been struggling to get to the point where it can pump the water out and examine the damage.

In the latest setback, water flowed back into the mine while it was being drained. This forced the company to abandon its efforts and let it refill.

Cameco was scheduled to appear before the Canadian Nuclear Safety Commission on Sept. 18 to seek an amendment to its license.

However, the appearance was unnecessary, as the existing license will allow Cameco to analyze the recent inflow and take steps such as pumping out the mine and refurbishing the shaft, the company said in a statement. The planned hearing will be deferred until the company has more information.

Cigar Lake lies in the waterlogged ground of the Athabasca region of northern Saskatchewan. It is the world's richest undeveloped uranium deposit and was expected to produce more than 10 percent of global output.

Cameco, the world's top uranium producer, said it does not expect to have any significant new information until later this year. It will update the market when it releases its third-quarter results on Nov. 10. ■

PRESIDENT'S PAGE

(Continued from page 6)

mining and minerals-related fields of study. With the strong support of the WAAIME Division of SME (formed when the WAAIME joined us this past May), the other division scholarship programs and the numerous company programs, there are excellent opportunities for qualified students to enter our profession, to say nothing of the job opportunities that await recent graduates.

In past columns, I have noted how critical SME has been to my own professional development, starting as an undergraduate and continuing even today. If you feel as I do, you will have an opportunity to pay back that gift by serving as a mentor for students at the annual meeting. Our student member attendance has been growing each year and we expect about 450 in Denver, CO

in 2009. Please give serious consideration to participating in this effort if you plan to attend the annual meeting – the feedback from mentors and students, alike, has been nothing but positive.

I am more than halfway through my one-year term as your president and I remain encouraged as to the future of our Society from your responses to my columns. My advice to each member remains the same – find a way to be active. We need your participation at the local section level – the foundation of our Society – to impact the largest number of our members. The divisions (including the WAAIME) all have a burning desire for additional help and input. Then there are SME committees – like a smorgasbord, we have something for everyone's interest. Bring along a new member and help SME grow as well. ■

by George W. Luxbacher, 2008 SME president

What happens in Vegas ...

... **W**as good for SME. And I'm pleased to announce the good news to the membership following the fantastic mid-year SME Board of Directors (BOD) meeting held in September, in Las Vegas, NV prior to MinExpo. Please forgive the play on words opening this month's column, but I just could not resist. Upholding Las Vegas' larger-than-life reputation, our mid-year meeting was just that. If I had any doubts about the vitality that has been introduced by our new board and strategic committee structure, they are now gone.

First a little background. The SME board meets in person only three times a year: Sunday and Thursday at the SME Annual Meeting and at the mid-year meeting, which originally was held in conjunction with the SME Fall Technical Meeting. Since the fall meeting was discontinued in 1986 in St. Louis, MO. The location of the mid-year board of directors meeting has been chosen by the SME president. Attendance was typically limited to the board and a few of the divisions that held their executive committee meetings at the same time. This could be best described as a necessary, but less than well-attended meeting.

When the board was changed from 24 members representing the divisions and regions to six at-large members, the Society leadership was concerned about maintaining a strong tie to the divisions and the local sections. The divisions were asked to continue to participate in the mid-year meeting by scheduling their executive committee meetings at the same time and then provide a brief presentation to the BOD on their activities.

The majority of the divisions accepted, including our newest, the WAAIME division. Coupled with the six strategic committees, the SME Foundation board, the National GEM Committee, the OneMine.org board, the Offshore Technology Conference Committee and other SME groups/committees that also



George W. Luxbacher

met prior to MineExpo, more than 150 members participated in what could only be described as dynamic sessions. A number of us in attendance concluded that our revised leadership structure is working, albeit with some growing pains, for the betterment of your Society. We still need to find a structure for local section representation and participation at all of the board meetings. This is an issue that the strategic committees are currently working on. Those of you that are involved in your local sections, we have not forgotten you.

While mentioning the strategic committees (nominating, finance, organizational/governance, products and services, marketing and outreach, and education and professional development), I should note that the Society is now beginning to reap the benefit of having small groups of talented members focused exclusively on strategic issues. The ideas and concepts brought forth by these committees exceeds our ability to implement. So we are prioritizing. We have expanded these committees to six members each. This will allow them to operate more effectively. And joint working meetings between the committees will be scheduled, to share their efforts. These will take place at least twice a year.

When the Nominating Committee met at this meeting, I was impressed with the quantity and quality of candidates put forth for all of the open positions. I'd like to thank those of you that responded to my request and submitted nomi-

nations. That the committee had a hard time finalizing its decisions was a good problem. This speaks well of the candidates and bodes well for the future of the Society. Again, a heartfelt thanks. We sincerely look forward to your nominations next year.

I know a number of you have been using the OneMine.org beta version for a number of months (rather heavily, according to the statistics). The official launch of OneMine.org was held as a media event during MinExpo and received significant press coverage. OneMine.org is currently a cooperative effort of SME, AIME, SAIMM and IMMS, with NIOSH also participating. We took advantage of the attendance of several other international mining societies at MinExpo to open a dialog about expanding OneMine.org to include their members and content. We had slightly more than 45,000 documents online for the presentation, a testament to the fantastic progress that has been made. We have formalized an agreement with NIOSH to digitize and include its mining related publications within OneMine.org. Our intention is to work toward the former U.S. Bureau of Mines publications and research reports as quickly as possible.

MinExpo is always one of our stronger (if not strongest) book sales events. But we were also pleased with the number of new members we gained at the SME booth (85), primarily through interest in OneMine.org and the ability to access our out-of-print publications and meeting preprints.

I'm sure a number of you have heard rumors about the possible merger of SME and the Minerals Information Institute (Mii). This was discussed extensively at the National GEM Committee meeting, within several of the strategic committees and by the SME and the SMEF boards at the mid-year meeting. I am pleased to report the Mii board on Oct. 16 voted to move forward with the merger. I'll devote an entire President's column next month

Continued on page 16

Education issues highlighted by Jerry Pyatt

Editor:

The September 2008, article in *Mining Engineering* by Jerry Pyatt, chief operating officer, The Doe Run Company, provided an interesting look at a company critical in providing us with the lead used in our everyday lives. Pyatt mentions, "Doe Run regularly shares its expertise with universities to help educate future mining professionals."

Not only does it host tours and provide scholarships for college students, its Minerals Education Program also provides K-12 students with interactive opportunities to learn about minerals used in everyday life.

Not mentioned in the article, however, was Doe Run's participation in this past summer's 40th Annual All About Mining — A Total Concept of the Mining Industry at the Colorado School of Mines (CSM).

Twenty-three teachers from Colorado, Pennsylvania, Connecticut and Texas, benefited from learning about "lead smelting and refining," thanks to Matthew Pratt, senior plant metallurgist, Doe Run Company (Resource Recycle). He flew from Boss, MO especially to give the presentation and distribute materials on the subject. The Colorado Mining Association Education Foundation (CMAEF) and CSM express their appreciation to Matt, and also to Steve Arnold, general manager as well as Angela Nations, community relations specialist, for making the presentation possible on short notice when no lecturer on the topic could be located in Colorado. The teachers' current and future students will have a better understanding of this important commodity to society.

We look forward to Doe Run's participation again with the Class of

2009 next year. ■

Dan Witkowsky,
Course Coordinator, CMAEF

PRESIDENT'S PAGE

(Continued from page 6)

regarding this merger. But I wanted to share my enthusiasm at this time on such a positive step for SME and Mii.

I could continue with my glowing report of the mid-year board meeting but space limitations preclude that. Instead, let me remind you that our board meetings, other than a brief closed session, are open to all of you. I encourage you to attend, either at the annual meeting or the mid-year meeting, if it happens to be scheduled in a location convenient for you. Only then can you begin to appreciate the volunteer and staff effort that makes SME the great organization it is. ■

Breathe easy

Fans with forged blades
that are virtually
indestructible

JETAIR



Phone: (970) 259-0412 | Fax: (970) 259-5149 | www.jetairfans.com

by George W. Luxbacher, 2008 SME president

Content and value to our members: The Minerals Information Institute joins SME

Way back, in my elementary, junior and high school years, when web meant a spider web and personal computers were science fiction (gee I'm old), my only exposure to the mining and minerals industry came from my one surviving grandfather who had worked in coal mining. I was fortunate to have that family tie. However, I have often wondered what more can SME and its members do to engage today's students about an industry that touches all their lives but which they may only be exposed to negative aspects?

Well, we now have another part of the equation. If you read last month's president's column, you are aware that the Minerals Information Institute (Mii) and SME were moving forward with merger discussion. I'm pleased to report that effective Nov. 1, Mii was merged into the SME Foundation (SMEF) and that the Mii staff has joined SME. This concluded a process that was initiated in May in response to queries from a number of you at the SME Annual Meeting as to why our GEM program and Mii were not working together.

As a bit of history, SME formed its GEM Committee in 1974 to educate government, students, teachers and the media about the impact mining has on our daily lives. GEM originally stood for government, energy and minerals. In 1985, the name was modified to government, education and mining to better reflect the work of the committee.

In 1975, SME formed the Mineral Information Committee (MIC), which examined potential avenues to provide factual, science-based information for public schools. That same year, SME's Colorado Section formed one of the first local section GEM Committees. This was complementary to its Mineral Information Advisory Committee.

Mii started from the Colorado Section efforts and became a separately incorporated organization in 1979. It had strong support from a



George W. Luxbacher

number of SME members and others who recognized the potential for such an organization. In the early days of Mii, the organization was committed to underwriting the first edition *Global Science: Energy, Resources and Environment* (1981), a high school science textbook that was recently sent to press for a seventh edition. It has been distributed to thousands of schools and used by nearly two million students, according to Mii. Last year, 27 million classroom hours were spent studying the book. It remains as one of Mii's core programs. And it ranks as the third largest-selling integrated earth science high school textbook in the nation, Mii says.

The Mii organization has grown through the years, fulfilling a great need in kindergarten through 12th grade education. Science curriculum enhancements have been and continue to be provided, including teacher activity packets, a periodic chart, information on minerals and other information appropriate for studies in earth sciences. In addition, Mii provides its materials and information on an interactive Web site that provides teachers and students the opportunity to access and download educational and teaching materials. Who in the mining industry has not seen the Mii "baby" poster that depicts the amount of minerals, metals and the like that will be used by one American throughout his or her lifetime?

Annually, the Mii Web site, www.mii.org attracts more than one million visitors.

So why the interest on the part of both Mii and SME in a merger? Mii has done a great job growing as a "content originator and provider" under the direction of a number of dedicated individuals, companies and groups, its former president, Nelson Fugate, and the chairmen over the years (culminating with Marc LeVier in 2008). But its success required a focus on fund raising rather than content. At SME, our GEM program enjoys widespread support from the membership and probably, if volunteer person-hours were converted to a dollar equivalency, it would be the largest program expenditure within the Society. GEM is very successful at outreach, from the individual who goes to a classroom at the request of their children or a teacher to the National Science Teacher Association (NSTA) regional meetings where the queue for mineral samples is unbelievable.

While some of the SME Local Section GEM Committees have developed their own content (the Florida Section is an outstanding example), in general we have needed good content to assist the volunteer outreach effort. Couple content (Mii) with outreach (GEM), throw in a dose of proven fundraising (SMEF) and you have a winning combination that will do better than any stand alone program. While each continues as a "brand" (program) within SME because of its proven track records and strong support, the synergies are there for the taking as these groups develop a working relationship.

I encourage you to visit Mii's Web site and look at the plethora of material available for download or purchase. I'm particularly excited about the Rock Box, an opportunity for our members or their companies to provide teachers with a complete set of materials, including the Rock

Continued on page 13

LETTER TO THE EDITOR

Jerry Pyatt's Doe Run article was refreshing

Editor:

In view of the critical need of energy sources and other commodities in our ever-expanding world economy, it is obvious that a great deal of technical expertise is going to be needed.

As a graduate mining engineer, Lehigh 1951, and during my 57 years working in the mining industry, there has been a serious decline in enrollment at the remaining institutions.

The rise in natural resource prices no doubt has been an incentive in industry to explore and develop deposits that were left untouched in the past, with unprecedented returns.

It is refreshing to read the article in the September issue of *Mining Engineering* submitted by Jerry Pyatt (page 62) about the Doe Run mining operation.

The present condition of prosper-

ity in the raw materials part of our economy makes me curious as to how many other mining companies are offering educational opportunities to

interested persons. ■

Steve Mitchell, member SME,
Ocala, FL.

PRESIDENT'S PAGE

(Continued from page 6)

Odyssey video program and other DVDs and CDs.

We can all be proud of what Mii and GEM have done. I believe that bringing Mii into SME is a case where the combined resources (dedicated volunteers and superb content) will significantly enhance our mutual objective of ensuring that the role of extracted commodities to our way of life and national security are understood by all.

Want to help this program move forward? Please continue your dedication to minerals information

outreach. Please consider a donation to the Mii program through SME Foundation. We need to enhance content development and further the outreach of Mii through its Web site, through our GEM programs and at the NSTA regional meetings. All of that will only increase demand. One of the keys to the Mii success is the free material (look at the budget situation in most public schools today) – if we want to get our message out and positively influence the next generation of decision makers, we need to do it now and your contribution will help. ■

We Plug Holes!



CONCEPTS, LLC

- Polyurethane foam for reclamation & blasting applications
- Self-contained, single use, portable system
- Cap, close & seal mine openings & subsidence features
- Install culvert bat gates
- Deck, stem & plug drill holes
- Air deck pre-splitting (ADP) & trim blasting

800-566-9641

www.foamconceptsllc.com

TecsPak®
Bumpers
The Future Shape of Shock Absorption

MINER
ELASTOMER
PRODUCTS CORPORATION



TecsPak® bumpers outperform conventional rubber, polyurethane and coiled steel by providing

**Greater energy absorption per weight & volume
Superior endurance and resilience • More cost effective performance**

www.minerelastomer.com

1200 East State Street
Geneva, IL 60134

p: 630-232-3000 f: 630-232-3172

by George W. Luxbacher, 2008 SME president

Swimming against the current — showing optimism in the face of uncertainty

When I joined the mining and minerals industry in the very early 70s, the industry was just coming off the bottom of one of our notorious “cycles.” Since then, like many of you, I’ve seen and experienced enough to clearly understand why our industry is considered cyclic. That said, I talked about my belief in the fundamentals of our industry in my President’s interview while times were good in March 2008 (ME, March page 8) and I still feel the same today. We may be in an economic downturn, but there is still a real need for our products as raw materials in the developing world that sustain us going forward. The boom, where new projects were announced on what seemed like a daily basis, when equipment prices skyrocketed, when manpower constraints were all we could talk about may have dissipated, but fundamentally our industry is still strong.

I recently attended the Arizona Conference, an annual regional meeting put on by all the SME Arizona Sections, held in Tucson. The keynote speaker was James R. Moffett, Chairman of Freeport-McMoRan Copper & Gold Inc. – he entitled his talk “Swimming against the tide.” I thought it was so pertinent to the message we all should be carrying that I’ve borrowed it for my President’s Column this month.

My tenure as SME President began at our Annual Meeting, where our keynote addressed the super cycle our industry was in. My tenure continued as we debated the super cycle’s sustainability; watched over the year in which metal prices hit new highs, and then

We have gone from digging haul truck tires out of dumps due to critical shortages of new tires to a re-entrenchment and, in some segments of our industry, layoffs almost overnight. BHP Billiton abandoned its proposed acquisition of Rio Tinto, other companies are suffering be-



George W. Luxbacher

cause of their acquisitions, virtually every mining company has revised their operating and development plans, halting announced and scheduled restarts or expansions, reduced production levels, etc. in the wake of weak markets. So what does the current state of our industry mean to our members and what can they expect from their Society?

The Arizona Conference, like every other SME section, regional or topical meeting I attended this year, despite the changing industry fortunes, was impressive in attendance. Preregistration for the Annual Meeting in Denver is ahead of expectations. While companies are already scaling back budgets, there appears to be more of a recognition today than in the past that industry forums, such as SME, are critical to maintain the industry. I urge members to continue to press for participation at meetings, section or annual – just one of the concepts or ideas you pickup, whether from a formal presentation, conversation with other members or an exhibitor, might be crucial to your company’s or project’s survival.

As a society, we intend to continue providing the services you have come to expect and need even more during this downturn. While our portfolio reserves have taken a severe hit and many of the Divi-

sion and WAAIME scholarship programs that depend on portfolio performance may slow, we realize that our core mission of technology transfer and continuing professional education must continue unabated. We will continue to expand OneMine.org to include all of our Society’s papers with access at no additional cost to you. We will continue to work cooperatively with the National Institute for Occupational Safety and Health (NIOSH) and other professional societies to include their content, and we will further develop this resource that, according to your feedback, has been a resounding success. While MiningJobs.org may have fewer listings in the near future, it will always be there if circumstances dictate a job change. We promise to push to improve our annual meetings, to make them even more pertinent to the needs of your employment. We will be there to support the mining and minerals university programs to make sure that educational sustainability is not an empty promise. We will launch continuing education projects to deliver training you need on your schedule. We will continue to make SME the premier professional society in our industry.

One nice thing about a cyclic industry – having ridden a few cycles, you always know one more is just around the corner. There is a significant portion of the world’s population that still needs our assistance to attain the standard of living to which they are entitled. The United States may soon embark on a major infrastructure redevelopment program, again drawing on our commodities. This will be a brief downturn and a return to what hopefully will be a more rational, measured industry growth – let’s all do our part to stay prepared. Remember that salmon, swimming upstream against the current, are moving toward a new beginning. ■

by George W. Luxbacher, 2008 SME president

On the road to zero — mine safety

While it did not make the headlines (and might not even have been buried in the fine print on page 5) in your local newspaper, our industry achieved a major milestone on the road to zero fatalities in 2008. The number of miners killed on the job in the United States fell to 51. This is the fewest number of deaths since officials began keeping records nearly a century ago, according to preliminary data released by the federal Mine Safety and Health Administration (MSHA). The previous low was 55 in 2004 (see Newswatch page 12).

The high profile events in the coal fields have kept mining in the public eye in a negative context during the last several years and led some to question our industry's commitment to safety – you would think this milestone in 2008 would have attracted more media attention. While 51 fatalities are 51 fatalities too many — 51 families adversely effected, uncounted lives these individuals had touched adversely impacted and a level that none of us can accept but the trend is positive and reflects well on the moral obligation of our industry.

Revamped safety laws and beefed up enforcement were among the primary factors that MSHA cited in leading to the overall decline in mining deaths. However, laws and enforcement can only be part of the story; as a professional society, we make our contribution through education, training and as a forum for research and development.

Some 35 years ago I started my first job as an unskilled laborer in an underground coal mine. Among my vivid recollections of the first day I have not forgotten were two signs at the portal: "SAFETY FIRST" and "YOU ARE RESPONSIBLE FOR YOUR BUDDY." To me, those two signs together demonstrated the core value of safety in mining: the collective responsibility of the owner, engineer, supervisor and worker, in assuring that mining is conducted responsibly and in a safe manner.

Since that time, our industry has



George W. Luxbacher

advanced and technology, management systems, training, regulations, etc. have all played a part. For example, since the day I first walked down the mine slope to work (1970), coal production has increased by more than 80 percent while fatal injuries have decreased by more than 90 percent – more than half of the coal mines in this country operate without a single lost time injury.

For most of the 20th century, the U.S. Bureau of Mines (USBM) was the agency driving toward and the focal point for health and safety innovation. When the USBM ceased to exist for a variety of reasons (including lack of strong industry support and possibly the political incorrectness of "mining") on Sept. 30, 1996, portions of its mission was transferred to the National Institute for Occupational Safety and Health (NIOSH). While NIOSH has continued many of the USBM programs and has become a respected mining research institution in its own right (the 2010 SME Annual Meeting will celebrate 100 years of government mining research), many believe that the industry lost both its best health and safety resource and a critical source of funding to university programs in this area.

The Mine Improvement and New Emergency Response Act of 2006, which amended the Mine Safety and Health Act of 1977, has provided some specific areas with additional funding, however more is required. Universities with programs in mining

engineering need sustainable funding to develop and maintain faculty and facilities to produce both the future generation of health and safety professionals and to advance mining technology.

Mining engineering is a unique discipline, involving the design and engineering of an extractive process taking place within a complex, continually changing geologic matrix. Despite that uniqueness, there are just 14 accredited mining engineering programs in the U.S. today, down from 30 in 1980. It is difficult for many of those programs to exist in an academic environment where the more traditional high-enrollment engineering disciplines are preferred or favored by university administrators.

Consequently, both university programs and undergraduate enrollment have been on the decline, despite job opportunities driven by expanding industry needs (at least until our recent economic downturn) and the retiring baby boomer generation. SME has both an Educational Sustainability Committee and a Research Council that are trying to help address these issues.

When the Environmental Division within SME was established in 1997, the initial proposal was for a health, environment and safety division. That proposal was shelved amid protests by the other SME divisions, not over a turf war, but rather, because health and safety was such an integral part of each of their practice areas. Indeed, at our section or annual meetings, it is difficult to find a presentation that does not address some aspect of health and safety. A quick review of the papers available on OneMine.org supports this.

Health and safety research programs, strong university programs in mining engineering, committed graduates, and the forum provided by professional societies such as SME will continue to push our technology boundaries forward; we all have an obligation to attain zero fatalities as

Continued on page 24

LETTER TO THE EDITOR

Operator safety and reliable material handling

Editor:

I read with interest the October 2008 issue (*Mining Engineering*, page 30) "Small mine contractor safety – case studies" by Calizaya et. al., especially the examples of unsafe conditions that develop when operators have to intervene to clear hang-ups in solids handling equipment. Arches, ratholes or plugged chutes can bring a process to a stop. Operators attempting to clear such blockages risk injury not only because they often have to lift large sledge hammers or pipes above their heads to strike the equipment, but also in some extreme cases risk being engulfed by the bulk solid.

Such flow problems are avoidable if the equipment is designed based on the flow properties of the bulk solid handled. Although

solids handling equipment design is not a part of most engineering curricula, a robust design methodology developed by Andrew Jenike has been successfully used for decades. Jenike's design method uses measured flow properties of the bulk solids being handled. Solids handling equipment design should

be performed by engineers with appropriate training. Operations personnel should be educated on the principles of solids handling to ensure they are aware of the risks involved. ■

Jayant Khambekar, member SME,
Tyngsboro, MA

PRESIDENT'S PAGE

Continued from page 6

quickly as possible. When I exited the mine on my first day 35+ years ago, the sign at the top of the slope I saw just before stepping outside is still indicative of the path we need to follow today: "STAY SAFE, THINK SAFETY."

As I exit my year as SME president I would like to say a heartfelt thank you to the SME staff, the Board of Directors and all the vol-

unteers I have had the pleasure to interact with during what seems an altogether too brief tenure. While I have always been passionate about SME, my experiences and the members I have met as President have, if anything, reinforced my belief in the value and critical need for SME within our industry. Rest assured, your organization is in good hands and on the right path. ■



P.O. Box 577
Hazleton, PA 18201
Ph. 800-233-6181 Fax 570-455-0626
www.vibra-tech-inc.com

P.O. Box 506
Warrendale, PA 15086
Ph. 800-992-9395 Fax 724-934-2999
www.geosonics.com

Vibration & Sound Consulting
Blasting Seismology
Instrument Sales & Service

FEATURED SERVICES

- | | |
|-----------------------------------|------------------------------------|
| Structure Inspections & Surveys | Geophysical Investigations |
| Water Well Investigations | Public Service & Training Seminars |
| Damage Claim Investigations | Professional Testimony |
| Vibration & Acoustical Monitoring | Expert Witness |
| Vibration & Acoustical Studies | Consulting & Engineering Services |
| Remote Monitoring Systems | Manufacturing Services |
| Custom Equipment Packages | Seismograph Sales & Leasing |
| Data Management & Reporting | Long-Term Service Plans |

WHEN IT MATTERS MOST...



It's the people you know and trust,
the technologies to get the job done,
and the service that ties it all together!

Visit us at AGG1 in Orlando, Booth #923

Model VS-88 Vertical Shaft Impactor



- Feed sizes up to 5" with capacity up to 500 TPH
- Innovative housing & rotor designs
- Easy access
- Higher operating speed for finer grinding
- Hydraulic drive system
- Patent pending



800-262-5401 • stedman-machine.com
129 Franklin St. • P.O. Box 299 • Aurora, IN 47001
Fax: 812-926-3482 • Email: sales@stedman-machine.com
Celebrating 175 years of continuous service

ACCIDENT

Accident claims the life of SME member

William J. Gregg, 60, member SME, died after falling 69 m (225 ft) while attempting to install emergency ladders in the mineshaft of the Quincy Mine in Hancock, MI.

Gregg was an associate professor of geology at Michigan Technological University and was a volunteer at the mine.

In a written statement, John Sullivan, secretary of the Quincy Mine Hoist Association, wrote Gregg was a QMHA board member for the

past several years, and he often volunteered on maintenance, operation and safety issues at the site.

Jimmy Diehl, Tech professor of geology, said he and Gregg started their careers as faculty at Tech 30 years ago.

Diehl said Gregg used the mine as part of his instruction. Diehl said Gregg was a very good instructor, and many of his students received national awards for their master's theses. Replacing Gregg in the classroom will be very difficult.

"Our students are going to lose a lot of expertise with him gone," he said.

Wayne Pennington, chairman of the Tech Department of Geological and Mining Engineering and Science, said he conducts exit interviews with students in the department, and most of them have very good things to say about Gregg.

"For the last three years, those students have said universally he was the best teacher they had," Pennington said. "He'll be missed. We don't know how we'll fill the void." ■

LETTER TO THE EDITOR

October issue hits close to home

Editor:

The October issue (*Mining Engineering*) has numerous subjects that relate to my career, hence this letter.

I have been retired for more than 15 years. In itself, that does not differentiate me from many of your readers/members, but nostalgia being what it is, here it goes.

I prospected for uranium in 1954 and 1955 in eastern Wyoming and southern Utah, primarily. It was a "hot" commodity then, as you all know, but yellowcake was just \$9.50/lb. Exploration methods were perhaps primitive, but for a 21-year-old, it was exciting. The Wyoming discoveries were eventually mined. The Utah findings would have met opposition from environmentalists due to the Grand Canyon proximity.

My career path took me to the Mesabi Range in the 1960s and a connection with the autogenous grinding and taconite ores. The comminution method was new and challenging. Our ups and downs depended more on steel demand than our hydrometallurgical wherewithall.

Of course, the piece on truck haulage is/was very relevant to the Mesabi Range. As a mine manager, I did not ever study that component of mining, I only focused on "efficiency" as was perceived as an operator.

Did you ask about the rest of my career?

I ran a small coal company from 1984 to 1992. Can't say that I knew George Luxbacher, but he was stationed in the same city, with Island Creek.

Perhaps what struck me most was the necrology. John Owens was a loved and admired friend of mine for many years. My wife and I attended

his memorial service. Dave Wick was an associate for a few years. ■

Vaughn R. Kemp, member SME, Sedona, AZ.

**VIBRA-TECH®**
P.O. Box 577
Hazleton, PA 18201
Ph. 800-233-6181 Fax 570-455-0626
www.vibra-tech-inc.com

**GeoSonics®**
P.O. Box 506
Warrendale, PA 15086
Ph. 800-992-9395 Fax 724-934-2999
www.geosonics.com

Vibration & Sound Consulting Blasting Seismology Instrument Sales & Service

FEATURED SERVICES

Structure Inspections & Surveys
Water Well Investigations
Damage Claim Investigations
Vibration & Acoustical Monitoring
Vibration & Acoustical Studies
Remote Monitoring Systems
Custom Equipment Packages
Data Management & Reporting

Geophysical Investigations
Public Service & Training Seminars
Professional Testimony
Expert Witness
Consulting & Engineering Services
Manufacturing Services
Seismograph Sales & Leasing
Long-Term Service Plans

WHEN IT MATTERS MOST...



It's the people you know and trust,
the technologies to get the job done,
and the service that ties it all together!



SME President
James R. Arnold
VOL. 59 NO. 3 – VOL. 60 NO. 2

March 2007: VOL. 59 NO. 3

James R. Arnold: An interview with the 2007 SME President

April 2007: VOL. 59 NO. 4

(No Article)

May 2007: VOL. 59 NO. 5

Cody's story

June 2007: VOL. 59 NO. 6

Shortages – the past predicts the future

July 2007: VOL. 59 NO. 7

Mine life

August 2007: VOL. 59 NO. 8

(No Article)

September 2007: VOL. 59 NO. 9

Making the connection

October 2007: VOL. 59 NO. 10

An open letter to Bob Murray

Letter to the Editor: Arnold's letter to Murray on target (VOL. 59 NO. 12)

November 2007: VOL. 59 NO. 11

The mining life

December 2007: VOL. 59 NO. 12

Dear Mr. Chief Executive Officer

Letter to the Editor: Arnold's call to CEO's is an important issue (VOL. 60 NO. 2)

January 2008: VOL. 60 NO. 1

Work to do

February 2008: VOL. 60 NO. 2

Cody's Story 2

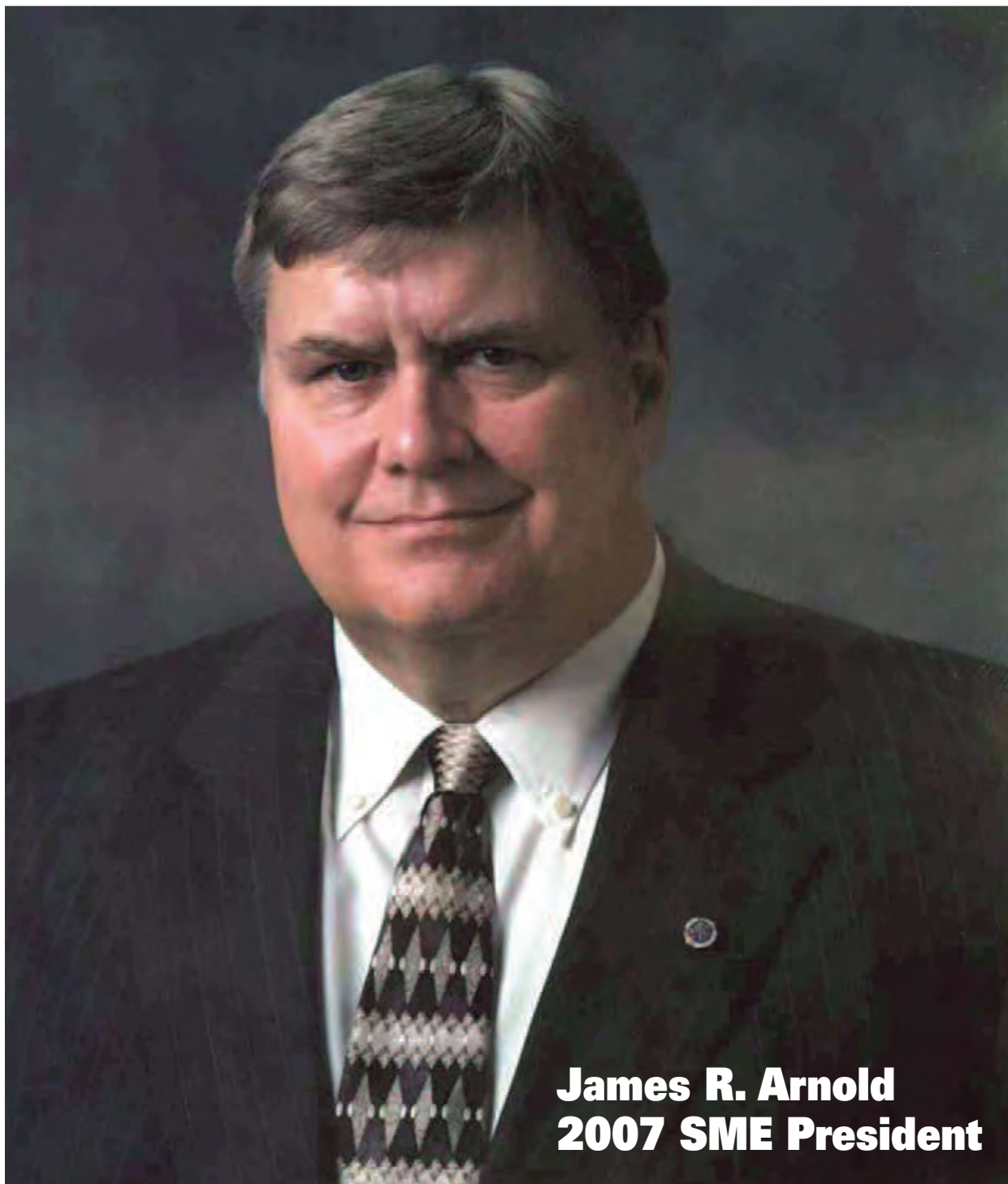


MARCH 2007

Mining

ENGINEERING

A PUBLICATION OF SME



James R. Arnold
2007 SME President

James R. Arnold: an interview with the 2007 SME President

How did you get into mining; were you from a mining town or mining family?

Not at all. I grew up in northwest Kansas. I liked to hunt and fish, so I thought it would be fun to work for a company that made knives or guns. It seemed like metallurgical engineers would be something those companies could use, so I started in physical metallurgy. I got a summer job at the great Climax molybdenum mine near Leadville, CO shoveling muck onto conveyors. I was hooked. I loved everything about mining, so in the fall, I changed majors from physical metallurgy to mineral processing.

For many years you actually discouraged young people from studying the mining disciplines. Could that be right?

That's true.

Why was that? Would you recommend the mining industry as a career path for a young college student today?

I would very strongly recommend mining to anyone today. I have always felt it's a great industry. But during the 1980s and 1990s, the industry was under attack and not doing a good job of protecting itself. I looked at the trends and realized that any students who wanted to study mining would be relegating themselves to a career overseas. Also, the up-and-down nature of the industry was tough, so I was hesitant to recommend it.

Today, things have changed. The worldwide demand for our products is strong. Hardrock, industrial minerals and coal are healthy, and the aggregate industry has evolved.

The day of mom-and-pop sand and gravel operations is over. The aggregate industry is a sophisticated, highly technical business that is placing great demand on our mining schools for graduates. We are doing a better job than ever of protecting the environment, and most of society and the communities we work in seem to recognize this. New mining graduates can pick and choose their industry and location more than ever before. They can also look forward to a long, stable, healthy career in mining. It's a great place to be.

But your kids didn't study mining.

No, Julia can spell and Jim can write, so they were ineligible for engineering. Just kidding. Actually, Jim went into construction when he got his finance degree, and Julia is in human resources, so there is still a chance.

So you were wrong?

Yes, I was wrong.

But what about the trend to move more tons with fewer people?

It's there, but that trend has been possible only through advances in technology. In 1900, about 3 percent of the American workforce was employed in the mining industry. The industry in America has shrunk, and the tons per man-shift have greatly increased. The molybdenum mine I manage in Colorado, Henderson, started with 2,000 employees. We have 600 today. We are looking at reopening the Climax Mine. The workforce there will be 300 people, where at one time the mine employed 3,000.

While we might be reducing the number of miners, we are requiring them to have more advanced skills than ever before. The drive toward technology has mandated more engineering skills than ever before. That trend will continue. We will continue to see challenges that can be overcome only with technology.

The first job I had out of school was in northern Montana. When I interviewed for the job, the manager said the mine had 400 years of ore. That mine has been shut down for years (and no, I'm not 400 years old). The mine was unable to overcome an asbestos problem.

My next job was at a mine that supposedly had 80



years of reserves. It shut down seven years later because of economics. Almost all of our orebodies are dependent on advances in technology being implemented locally, and to stay on top, we need a steady infusion of strong technology professionals.

There will be great opportunities for people with the skills mining needs. Our workforce is aging. Many will retire during the next few years, and that will create unprecedented opportunities for our new graduates.

Aren't mining's critics still there?

Oh, sure. They aren't going anywhere. Not that long ago an orebody could be discovered, developed and started in a couple of years. Now, with permitting and multiple rounds of public comment, you are lucky to get that all done in seven to 10 years. As a result, as the demand for minerals goes up, the industry cannot respond as quickly as we once could. I recognize the importance of transparency and the importance of allowing for public comment, but it is also important to make sure the world has timely access to an adequate supply of the essential materials we need to build and strengthen infrastructure.

While on that subject, what is your assessment of the state of the industry?

We are healthy, but we need to stay on our toes. The long-awaited rebound in commodity prices has helped get the industry back on its feet. Most companies have used their recent earnings to pump cash into their properties and pay off debt. They are back hitting on all cylinders. We have learned from many of our past mistakes and should be smarter at anticipating threats to our business.

We are getting smarter but the business is getting tougher. From a pure business perspective, there are some fads that have run their course but others that seem to persist.

Like what?

One trend was the move away from base metals. I'm glad to see that many mining companies are becoming broader again in their mix of products. This helps them weather the storm when one commodity has a dip.

Some companies still seem to focus too strongly, I believe, on just one or two metrics, such as net present value or return on investment (ROI), instead of using a comprehensive set of metrics to manage a mine or a company. These metrics have some use but work better for manufacturing businesses than for finite operations like mines.

Also, publicly traded mining companies have to deal with the stock market's short-term focus on stock price. Investors have a right to expect strong performance from their investments, and they have certainly seen good performance in mining in recent years. Dealing with these often short-term concerns adds an extra layer of challenge in a business like mining, which has to be managed for the long term.

What's wrong with using return on investment as a decision tool?

It has to be used realistically, and it cannot be used in isolation because, by itself, it ignores many other factors. Suppose you came to me with an orebody and you wanted me to develop a mining plan. If I developed two options, one with an ROI of 25 percent and another with an ROI of 33 percent, which would you choose? The 33 percent? What if the 25 percent option had a mine life of 15 years and the 33 percent option had a mine life of six years? What about capital for each? Are you going to be able to get a decent workforce for a mine that will be around for only six years? How much community support will you get for a six-year mine versus a 15-year mine? Will your high-production option flood the market with product? ROI is a tool but only one tool in the decision process. It works much better if you are building a widget factory that does not have a finite life.

What technological advances in the industry are you seeing as important for the future?

The computer will continue to change business in ways we cannot foresee as it has in the past for both the better and worse. The speed in data collection and processing has helped the industry tremendously. Our engineering is better, we get products more cheaply and we can do more in a day with fewer people.

Arnold helped write Nevada's environmental laws

Jim Arnold is the general manager of the Henderson molybdenum mine near Empire, CO which belongs to Climax Molybdenum Co., a business unit of Phelps Dodge Mining Co.

Arnold's background is primarily in operations. He started at the W.R. Grace vermiculite mine in Libby, MT as a shift boss before moving to Kennecott's Ozark lead mine in Missouri, renamed the Sweetwater Unit by Doe Run. He held various operational positions at the Sweetwater Unit in the mill and in maintenance.

Arnold then moved to the gold business, where he worked for Gold Fields Mining, which was later acquired by Santa Fe Pacific Gold. As general manager of several gold operations, he was heavily involved in the environmental arena. He helped write most of the mining environmental laws in use in Nevada today. Arnold served as a board member and chairman of the Nevada Mining Association, where he spent time working with

the Nevada legislature on mining initiatives.

In 1997, Arnold joined Knight Piesold and served as principal and president in Denver before joining Coeur d'Alene Mines in 2002 as vice president-technical services. Last year, he joined Phelps Dodge.

With SME, Arnold has served as chairman of the Mineral Processing Division, chair of the Professional Registration Committee and as a member on many other committees. He has received the Ivan B. Rahn Award, the Richards Award and, in 2006, was named SME Distinguished Member.

Jim and his wife, Laurie, have two children, Julia, a graduate student at the University of Minnesota, and Jim, who works in North Carolina. The incoming SME president is an avid outdoorsman and has been active in coaching wrestling and softball. He was a charter board member of the Nevada Chukar Foundation, an organization that has raised more than \$1 million for Nevada's wildlife. ■

You say that in some ways computers have changed things for the worse?

They haven't really changed businesses for the worse, but they have changed some of our work practices for the worse. When I started work 30 years ago, I didn't have a computer or even an office. I spent my time in the plant. I learned how the place worked. I had very little paperwork to do because it was a hassle for someone to send it to me and a hassle for someone else to process my paperwork. If I got a report, it really meant something. A lot of effort went into a report. If I wrote a report, people read it. I once got maybe three letters a week. Now I get more than a hundred e-mails a day. Today, our engineers are strapped to a chair staring at a screen. Do they know the mine better by sitting in an office all day? How many of our young metallurgists can run a flotation cell? I wonder how much of today's crush of information and communication is really contributing to the business.

This is a new age and we need computers to do our work and even basic communications. So I'm not advocating getting rid of them. But I often wonder how much we are missing by not spending time being miners.

How will you change SME?

I hope I don't.

Really. No changes?

Lots of changes, but they shouldn't come from me. The collective brainpower that we have in the membership of this Society, along with the SME staff, is more than sufficient to carry us into the future. We just have to tap it. My duty as president is to facilitate getting those ideas to the forefront and helping them become reality. The presidency is just as much a service function as a leadership function. I'm here to serve the membership, staff and committees.

In the past few years, I chaired both the Governance Committee, which recommended the new structure that Brij Moudgil rolled out in 2006, and the Executive Director Search Committee. I had not worked with some of the members of those committees until then and I can say that I was truly amazed at the managerial skills, capacity for hard work and flat-out wisdom of our members. We have a great organization, and I believe our emergence from the tough times has been no accident. It has been done with hard work by our members and the SME staff. SME is as well-equipped for the future as it has ever been.

So are you happy with SME the way it is?

I'm very happy with the progress we have made during the past few years. We have had tremendous leadership from the SME staff, Dave Kanagy and the past presidents. We are in the black, the membership numbers are growing and the industry is healthy. How long has it been since we could say all of that?

Do I think SME is where it needs to be? No, there is a lot of room for healthy growth. Our new organizational structure is just now evolving with our strategic committees meeting for the first time at the annual meeting last month. There were lots of new ideas that came from that. We have never had committees that were charged with strategic thinking before. This will be a healthy evolution. The Society has become more nimble, so those strategic ideas will be acted on more quickly than ever before.

The interplay between the strategic committees and the functional committees should create a discussion that will continue the evolution of thought.

What do you see as the industry's major challenges in the future?

Pretty much the same challenges as in the past. Reacting to changing market demands will always be something that any business must do. But I believe there will be more of a shortage of minerals than an oversupply for at least 50 years.

Dealing with increasing regulation will continue to be an issue. Although mining and agriculture are the lifeblood of society, it is hard to get our message out. We may be a critical industry, but we are a small industry. I recently read another newspaper article critical of mining. Same old misrepresentations that ignore or downplay the critical role we play in the world.

Costs will also continue to be a challenge. I expect to see energy costs and other inputs continue to rise. But we all know that in mining success will come to those who perform as low-cost producers.

As these challenges occur, the role of SME as a forum to share technology and join forces will become more and more important. This is true domestically but it will become increasingly true internationally.

Where can we get better?

I would like to see growth in our international membership. We are becoming more of an international business based in the United States, so taking our technical expertise overseas will be better for them and better for us.

The SME Foundation is doing increasingly important work and has actually started funding some of the SME activities. Without the Foundation, SME literally could not function the way it did 10 years ago. I would like to see a growth in the focus on the Foundation.

One of SME's major jobs is information exchange. We will soon start to see a rollout of a 21st-century metamorphosis in this area spearheaded by the SME Information and Technology Services department. We are working on becoming the standard by which all others will be measured in our techniques for technological exchange. It is really exciting.

We need to do more to support our universities and students. Can you imagine what it must be like to be an under-40 engineer nowadays? I joke to our young engineers that in the next few years, they are going to start getting a promotion a month until one day they will walk in and be the boss of everything. They will be the only ones left. It may be a joke, but it's not that much of an exaggeration. This is an exciting time to be a young mining engineer. If we need these universities to preserve our future, we need to act like it. I'm proud that Phelps Dodge has focused on this area. During the past 10 years, the company has invested more than \$5.5 million in endowed chairs and scholarships to help increase high-quality faculty and graduates in mining disciplines.

I would also like to see a growth in our services to the aggregates industry. We need each other and it is important to the country.

There are lots of places where we can get better. Everywhere I look I see opportunity. ■

by James R. Arnold, 2007 SME president

Cody's story

After the referee raised his hand in the air Cody walked to the opposing coach and shook his hand. Then he hugged his own coach, thanked the referee and went directly to his adoring dad. A class act by a class kid. Not surprising, Cody had always been a class kid.

Winning the state championship in wrestling in Winnemucca, NV is not a rare feat. The National High School record book is literally filled with the names of kids who wrestled in Winnemucca. I don't honestly think that Cody was the greatest wrestler to come from Winnemucca but there has never been a greater kid.

When you win a state championship, especially a second one like Cody had just done, everyone is your friend. The other kids on your team crowd to congratulate you, the other wrestlers and parents in the stadium seem to let their glance linger a little longer and the cheerleaders notice you a little more. News reporters who never gave you a thought before want to interview you and kids you don't know want your autograph.

After Cody walked off the mat, he made a straight line through a thick crowd of admirers, new-found friends and back-slappers, all the while stopping to give attention to each one, patiently and graciously accepting congratulations as he gradually climbed the stands to sit down by me. I shook his hand, we talked. He asked how my son, his long-time wrestling partner was doing in school. I admired what a great young man that the boy that I'd known for years had evolved into.

Cody had lots of people who wanted his time right then. But what he wanted was to share a little time with people who were part



James R. Arnold

of his foundation; the people who knew him long before he was a two-time state champion. A class kid.

When I had to decide what my first message as incoming president of SME should be it was an easy decision. At Phelps Dodge, we start every meeting with a safety share. It is usually just a few sentences of safety reminders or news about safety. It is meant to drill into every worker that safety is our first job. It is an opportunity to keep the theme of safety front and center; always the top priority.

Some times we joke that we say the same things over and over; wildlife on the road, cold weather dangers, wear your seatbelt. Goofy, huh? We all live in Colorado. We know that there is wildlife on the road and that the roads get icy. Isn't repeating these things as our safety message just a sign of laziness? Surely we can come up with something original if we think about it, can't we?

Actually, I don't have a problem with this repetition. My favorite philosopher and former SME president, Bob Shoemaker, used to say, "There are no new mistakes." He's right, we just keep making the same

ones over and over. Every year here at the Henderson Mine someone plows into a deer and someone else slides off the road. I don't think that we can repeat ourselves too many times when it comes to delivering important messages. Who knows, maybe it's the latest message that will finally sink in. Maybe the latest reminder will save a life. I really believe that there are people walking around today who wouldn't be if someone had not put one of those repetitious safety messages in their mind just before they did a job.

When Cody died in a traffic accident in November, I was crushed. I'll bet you can guess what happened — single car accident, rolled, not wearing his seatbelt. Cody was an only child and no child was ever raised by a more dedicated dad. I'll bet that Cody didn't travel in a car more than 10 feet growing up without a seatbelt on. His dad wouldn't have allowed it.

When I think about Cody a flood of memories, happy memories, wash over me; the little boy who practiced wrestling in my basement (yes, I really did have a wrestling mat in my basement); the dozens, maybe hundreds of times that I watched a referee raise his hand after a match; hearing about his latest hunting trip. But mostly I remember Cody walking up those steps toward me after his last high school match.

I want my first president's message to be important, fundamental. I'm reminded of the quote Cody left in his "My Space" Web site, "I like people that are honest, because when we leave this world all we will have is our word."

What's my first word? You've heard it before. Please wear your seatbelt. ■

by James R. Arnold, 2007 SME president

Shortages — the past predicts the future

Remember the gasoline shortages of the 1970s? If you wanted to make sure that you didn't run out of gas, you had to plan ahead. You had to top off your tank when you found an open gas station because there might not be another one down the road. Topping off was a problem because often you had to wait in long lines to get gasoline once you did find an open station. You filled up more often and it took more time to do it. It was, for the most part, an inconvenience, not really a crisis (although everyone called it a crisis).

But if you want to talk about a crisis, I have a crisis for you. Let's imagine a minerals shortage. The concept is just as easy to imagine as an oil shortage, isn't it? Imagine a world in the near future where mining has been curtailed in some areas; where several mineral-rich countries have either outlawed mining or put up barriers that are impossible to hurdle. Yea ... whole countries acting just like Oregon.

Are you picturing this?

Since the earth's crust is not evenly distributed with minerals, there could be some serious issues if "no mining" signs surround large areas. Some minerals tend to be localized, so closing off even small areas could severely dampen the supply of certain metals.

What will happen if some of our mineral-rich areas get closed off? Actually, things will probably clip along with the world economy pretty well for a little while. There are stockpiles and recyclable metals. But, as they dwindle, the shortages will start to appear. In some areas, the shortages will be taken care of by substitutions, which will lead to worse shortages in the substitute materials. Soon shortages in a few metals expand to shortages in many



James R. Arnold

metals. As relative demand builds in the face of shortages, the prices of our building blocks go up.

Soon, the foundation of inflation takes root. For a manufacturer there is no more fundamental cause for price increases than if the costs of your supplies go up. Inflation in metals leads to inflation in manufacturing — all manufacturing. If the costs of everything — everything — we make, except food and lumber, go up, then eventually the costs of even food and lumber go up. This is not just a local or even national inflation. It's an increase in prices worldwide, as the entire world chases the rare remaining commodities. Soon, you really are looking at a crisis.

This will last for a while, then we move into the really scary phase. As the public and industry get more vocal about inflation and shortages, governments step in to control the situation. Now you're talking about turning a crisis into a full-blown disaster. Since government controls rarely acknowledge market forces, politics will determine who gets what.

Where once grim inflation ruled distribution, the decisions will be

made by the governments of the remaining producing countries. International diplomacy may determine where minerals go. Did Greenpeace get to Indonesia? Then, if you are a tin consumer, you better have friends in South America. Problems with China? Where will you get your tungsten? You say that Missouri has lowered its lead standards? What will you substitute for a lead battery, or how much are you willing to pay for one? Need cobalt for your tool steel? If the African block has better friends than your country, you better get used to changing your bits regularly. Third World dictators will have enormous power to distribute supplies to their friends and withhold them from the rest.

Worse yet, as your supplies dwindle, so will your overall economy. You might work in a big manufacturing area today but, if you can't get the materials to make your products, it won't matter. The producing countries will be the ones calling the shots. They will get to decide who makes the televisions, computers, cars and ships of the world. And usually these decisions won't be made by the highest bidder. It will be made by heads of state.

As your manufacturing disappears, new plants will spring up closer to the producing nations.

What's that you say? Maybe trade will save your economy? What have you got to trade? You lost all of your base production of minerals, you're paying more to get them from someone else, manufacturing is moving closer to the supply and you're losing your jobs. But don't fret. Soon you'll be a Third World country so at least you'll have cheap labor.

How about recycling? Can't that take care of our problems? Not unless we find a way to reduce consumption — when was the last time

that happened? — or get around the second law of thermodynamics. If you process a municipal dump to get all of the iron out, you must factor in this troublesome mining term called recovery. If you get, say, 90 percent of the iron, you've just mandated that you lose 10 percent. If you recycle the waste dump again, now you've lost 19 percent of your iron. What's going to make up the losses if you don't have a mine?

So we'll substitute, right? Yes, that will work for some metals. But think about that one. How many metals have true viable replacements in very many applications? How are you going to replace iron? Even lead, moly and most metals used for catalyst need new supplies? Yes, there are a few true options for recycling some metals in some uses, but not many. What will we do if we have a shortage of aggregates? What do you substitute for aggregate? I

don't know, but California is about to find out. Close the nation's coal mines and we won't just flip the switch on for other energy sources. We will instead flip the switch off on the nation's energy.

Grim picture? We're talking about a shortage that makes the oil shortage look like a picnic. But think about it and some of the elements of this scenario already sound familiar. Greenpeace shutting down mining areas...is that farfetched? Third World dictators controlling supplies? Forced substitution? Mineral-based inflation? We have seen all of these. Understand, I'm not saying that this is something that might happen — I believe it's already on its way.

So can't we turn it around? When things get really bad, can't we just open the closed areas to mining? No we cannot. With the possible exception of zinc and copper, the world cannot simply ramp up its

supply of metals and minerals. To exploit orebodies, they have to be discovered, built and commissioned. As time consuming as each of those functions are, permitting them takes even longer, even in those last developing nations.

When we run out of silver, arguably the most versatile metal, we can't simply go start another mine to take care of the deficit. Name five operating silver mines...quick...got them? I didn't think so. Pure silver orebodies are rare and, if you named five, you're probably in the silver business. Name five new silver orebodies. Same result? If we run into a silver shortage, it will have some staying power.

Mining is not an archaic relic of our past. It is a critical, indispensable pillar of our present and future. There is no substitute for mining and those without minerals are at the mercy of those who have them. ■

LETTERS TO THE EDITOR

Mistake realized more than 10 years after death of Bureau of Mines

Editor:

On page 8 of the April issue of *Mining Engineering*, the following appeared under the headline:

"NMA asks for full funding for new mine safety office."

"The National Mining Association (NMA) gave senators a detailed report on the strides made in improving underground coal mine safety at a subcommittee hearing. The group asked senators to fund the newly created Office of Mine Safety and Health to ensure that safety improvements are more readily accomplished."

After killing the U.S. Bureau of Mines (USBM) on March 31, 1996, Congress apparently now recog-

nizes the errors of its ways. The subcommittee hearing mentioned above is more than the USBM received. Not a single hearing was held prior to cutting off appropriations to the USBM.

The USBM was established in 1910 for the principle purpose of improving underground coal mine safety, hundreds of coal miners having been killed in the prior decade. There can be no question but that the safety procedures developed by the USBM and adopted by coal mines saved the lives of literally thousands of coal miners during the period 1910 to 1996. Had the USBM not been dismantled, the more recent mine disasters may still have occurred,

but we will never know.

Apparently Congress and the NMA now believe that a government agency is again required to address mine safety and health issues. How long will this agency last — until Congress again looks for a way to take a miniscule bite out of the budget? Where will the skilled mining engineers that previously led safety research be found? Mining companies are desperately searching for them now, there being a great shortage of mining engineers. ■

Robert C. Horton, member SME
Director, U.S. Bureau of Mines,
1981-1987

by James R. Arnold, 2007 SME president

Mine life

I spent much of last week in Winnemucca, NV, one of my favorite places to spend a week. The town is doing fine because a healthy gold mining industry is its primary economic engine. Even so, it was a little troublesome to me driving by the Lone Tree Mine and seeing that it had shut down, the pit rapidly filling with water. I remember back when both Lone Tree and I belonged to Santa Fe, how hard the Lone Tree team worked to keep that pit dry. It made me sad to think of all of the great mines near that town that were once so vibrant and vigorous but now employ only reclamation specialists.

In a lot of ways, the lifecycle of a mine is like the lifecycle of a person. It is born amid wild enthusiasm and is the center of attention in the corporate family through infancy. And why not? In the months leading to its birth, it was all anyone could talk about. So it was no wonder that there was terrific excitement at its birth.

Like an infant, it required much attention, caring, nurturing and it made more than its share of messes. It woke you up in the middle of the night with special needs but you didn't mind tending to them because you knew that you were rearing something good, that every midnight phone call was one step closer to curing its ills and helping it mature into the vision that you had held for it.

With time, it seemed to almost get stronger, running smoother, requiring less hour by hour care as it became more independent and vigorous. It developed a personality that was a reflection of the combined personalities of those who conceived of it, designed it, built it and worked there.



James R. Arnold

If you had done your part, as your mine matured, it became a wonder of health. If you trained it well, it did things that were amazing, things that made you proud. You loved showing your mine to friends and bragging about what it could do.

And as people do, with time, your mine grew old. The exuberance of youth faded and, although you worked hard to breathe life in the old man, he weakened as life-giving ore played out. Eventually, the sad day came when the last blast was shot, the crusher ate its last rock and the lights went dim. All that was left was to gussie up the corpse for the funeral.

That mine was more than just rock. If it was an underground mine, you figured out how to get it oxygen. If it was a surface mine, you got it water. It ate diesel and steel; occasionally men. It grew, it got sick,

it had needs and wants and your job as a miner was to direct all of those things. If you worked in maintenance, you knew that the mine needed rejuvenating sleep once in a while where it could heal its bruises and contusions.

You knew that a clean mine, like a clean person, was a healthier mine. You planned its future, and if your direction was good, it did what you wanted. You gradually learned that every orebody is a unique gift and every orebody should be treated that way.

There is a melancholy that comes over a miner as the last days of a mine unfold. It's not just the prospect of the end of a job or moving the family; it is the end of an era, a story, a friend.

In a few years, Lone Tree will be a nondescript gravesite with grassy hills and a lake. It will be no more noticeable than the great old Sleeper Mine is today. Lone Tree, the old man who helped build a company,

provided health to Winnemucca, gave jobs to workers and put kids through school, won't even have a tombstone.

But 100 years from now historians will venerate the mine. They will interview the

grandchildren of its workers. There will be books and paperbacks about the mine, the district and the quality of life it gave to its employees. You or I won't be remembered in the text, but our grand old friend will be forever a part of history. A history we are all making today. ■

There is a melancholy that comes over a miner as the last days of a mine unfold. It's not just the prospect of the end of a job or moving the family; it is the end of an era, a story, a friend.

by James R. Arnold, 2007 SME president

Making the connection

It has been six months since I became the president of SME and I thought I would use this issue of *Mining Engineering* to update the membership on the activities of the past six months and report on several outcomes. At the March board meeting, SME staff presented an overview of SME's OneMine.org project. OneMine will digitize all of the SME technical documents (feature articles, proceedings, technical papers, out of print books, etc.) and index them into an online global library. This library will be a searchable tool that will allow all members access to the contents. In short, all of SME's documents will be indexed for the first time ever. You will be able to search "grinding," for example, and bring up all of the articles ever printed by SME from the comfort of your own office.

The SME board approved the idea and formed an ad hoc committee, chaired by George Luxbacher, to help develop the program. At a special board teleconference meeting in late June, funds were authorized to develop the idea. A plan was also developed to solicit the participation of other international and domestic organizations so that we might develop a "world repository" of all mining and mining related documents indexed and accessible to the industry.

On Jan. 1, 2008, we expect OneMine to become a reality. Please continue to look for updates on the SME Web site and in *Mining Engineering*. I'm truly excited about this new program and I expect it to become a real benefit to all members.

As you recall, in January 2006, SME created its Registered Member Category. Since then, we have secured recognition with the Australian Joint Ore Reserves Committee and the South African Mineral Resource Committee. But we have been unable to list SME on the Canadian 43-101 Appendix A legislative document to be recognized in Canada. After following the guidance provided by several organizations in Canada to secure registration, SME has now engaged Canadian legal counsel and is aggressively working to finalize its recognition. We hope to have positive news by the end of the year.



James R. Arnold

The new governance structure continues to provide benefits to SME. All six strategic committees met during the summer to evaluate and analyze programs, activities and products of the Society. As you can appreciate, the significant changes SME undertook to improve the operation of the organization have taken some time to fully implement. But the results for the Society will be amazing.

Membership continues to grow, with overall SME membership expected to increase by 250 to 500 members this year. Conference activity also continues to increase. Several new specialty programs and regional conferences are being developed, along with the biennial RETC program and annual Offshore Technology Conference being held in the last few months. New management and accounting software has been purchased and implemented with a new generation Web site to be debuted shortly.

By the way, have you noticed a few changes in *Mining Engineering*? In the past year, we have added several new sections, special focuses and features that have all received positive feedback. In 2007, SME reached the \$1 million dollar mark in advertising sales for the first time in the magazine's history. More importantly, the feedback from readers and advertisers has been positive and we know that these changes will benefit all members... look for the new Buyer's Guide coming in November.

The Underground Construction Association of SME (UCA) has really impacted positively on the Society.

The added professionals and technology brought to the organization has fostered greater appreciation for the engineering and science of tunneling and underground space development. This group will reach the 500 member mark in a few more months and likely will be the next Division of our organization. SME is pleased to have this expertise and to welcome these professionals as part of the Society.

Finally, the SME organization really has something special going right now. Yes, the industry has done well during the past few years, but the SME staff has been tremendously aggressive in trying to deliver the real value and respond to all members. Financially, the organization is on sound footing; probably better than at anytime I've been a member of the Society. In 2007, SME will have a record revenue year and a record surplus. Good business sense is being used to determine what we should do as an organization, and, for the third year in a row, SME will have an operating surplus and probably a very significant one. Come see us at the annual meeting in Salt Lake City in 2008 and you will learn how we will use our funds to support the SME mission. Congratulations to the SME staff for the tremendous work that they are doing on our behalf.

With all of the improvements in the organization, the new products and increasing membership, have you made the connection? The time is now for you to find a place to connect within SME. Talk with other members, attend a local section meeting, visit the SME Web site, respond to a Web site forum or respond to an article in the magazine, but whatever you do, please make a connection. You see, SME is an organization made up of people. People like you and me wanting to see the mining and minerals community thrive. For all of us to have a long, successful career, we all need to make a connection to support this great industry. So, let's make a connection. And, while you are doing that, make sure everyone you work with is a member of the Society. In short, the staff, committees and membership are working hard to make your Society better than ever. And it's working. ■

by James R. Arnold, 2007 SME president

An open letter to Bob Murray

For my first 34 years in the mining industry, the worst work related accident that ever happened to a miner I knew was a broken ankle. It was also the worst accident that ever happened to an employee at a site that I worked at. Then, this summer, two people close to me and my family were killed in mining accidents.

This has brought our industry's worst-case scenario too close to home for me. It is a scenario that I was beginning to think that I would get through this industry without seeing.

My brother lost a close friend in a mine he managed that has been fodder for an emotional cocktail that I doubt that I'll ever be able to imagine.

We all got to witness the range of those emotions as one of our own, Bob Murray, SME Past President, met the cameras in August. The Crandall Canyon Mine accident, where nine men died, punctuated the dimmest part of the history of mining and brought a mostly quiet industry to national prominence in the worst light. We knew from the start that the situation was grave. Those of us who know Bob knew that we would see his passion, emotion and unfettered love of his industry. That's Bob; he couldn't hide it if he wanted to and he doesn't want to.

If a mining disaster has ever been handled perfectly, I haven't seen it. There were things that I would have probably have done differently if I were in Bob's shoes, but there were things that I personally thought that he did right.

First of all, Bob didn't hide in the cubby hole under his desk. He was there, front and center throughout the ordeal. In the face of incredible pressure, viscous and unfair attacks, marathon hours and crushing emotional weight, he did his best to keep us informed. Where most CEO's would have hired a big-time publicist to "manage" the press, Bob was right there saying, "this is my property and I'm responsible for what happens here."

We knew from the start that regardless of the outcome Bob was going to be the face that we would remember. We also knew that he was placing himself in a no-win situation. Regardless of how things turned out, there would be finger pointing and we



James R. Arnold

all knew that inevitably those fingers would point to Bob. I'll bet he knew that, too.

Bob also did the best job of communicating in that situation that I have seen. Any time, especially early in the timeline, you could turn on the television and see Bob giving an update. Often visibly tired and racked with emotion, he faced the cameras time after time when we all knew that showing hope in front of those cameras was becoming an increasingly difficult task. He was not always at his sharpest and I am sure that there are statements that he wishes he could have wordsmithed a little better, but he was there with the latest news. One of the things that I liked most about the way that Bob communicated was that he did not talk to us until the families were informed first. He met personally with the families and tried to inspire hope for as long as a whisper of hope could be held.

Bob tried hard to work with the press. He took them underground right to the face so they could see what they were up against. He showed them clear and useful graphics. He answered their questions, many over and over, and at times he showed terrific patience. Bob also let them know when they were being inaccurate and unfair. I liked that. But I don't know that it helped him personally. Something sticks in my memory about getting into fights with people who by ink buy the barrel. I still liked it and wish more people would do it. The fact that he was unfairly attacked by some of those people who he showed such courtesy to was not personal; it is just the way they do business. A fall guy had to be found

and Bob was available.

I liked the fact that Bob put a human face on management. Think of the other mine disasters that we have followed. Do you remember a face?

If you do, it was probably an MSHA official or professional publicist who cannot seem to get the facts straight because he knows nothing about mining. Bob's information was accurate because he's a miner.

Bob spared no expense and pursued absolutely every avenue to rescue those men. He took a multiple pronged attack and did everything possible. Once the situation came to its grim conclusion, Bob closed the mine and said that he would not open it again until it can be opened safely. I'm not sure that those messages were clearly conveyed in the other mine disasters that I have followed.

As I said, there are things that I would probably have handled differently, but I wasn't there. I don't know how I would have reacted in that situation and I intend to never find out. I guess that Monday morning quarterbacking is the prerogative of the press, but it's not mine. And yes, there is a message to all of you in that statement.

A lot of courage was on display in Utah. We saw the superhuman efforts that the miners were making to rescue their fellow miners, and we knew the risks those rescuers were taking. Rescue efforts are by definition risky. Unless something has gone wrong, you don't need a rescue. Those miners knew that but they went in anyway. Brave men by any standard.

Bob, your friends in this industry are thinking about you, your miners and their families. We thank you for being the voice of the industry. We thank you for sticking up for us in the face of some inaccurate, intentionally inaccurate and shoddy reporting. Thanks for inspiring the courage in your men and thank you for your own personal courage throughout this. Thanks for all of your years of being that animated, effervescent miner with a sparkle in your eye and an unending energy that has supported our industry.

Given the nature of finger-pointing and the players involved, I'm guessing that things might get worse before they get better. But, Bob, know that is not all of us. Your friends are still here and we want you to know that. ■

by James R. Arnold, 2007 SME president

The mining life

The tuxedoed waiter deftly placed the plate square in front of me. "Gracias." I've eaten lots of tamales and my share of foie gras, but never on the same plate. That is a combination that I would not expect to find in any square mile, much less in one restaurant, even less on one plate. The combination was terrific, as most upper end Peruvian food is. I finished my appetizer and as I waited for the main course of roasted suckling pig I pondered back to my many experiences like this one that would probably never have happened if I had have gone into any field other than mining. One of my best decisions in life, my future profession, was made when I was 20 years old. I wish I could talk to that 20-year-old kid and tell him, "good decision, kid." It led me on an adventure that started early and continues to this day.

Yes, there is adventure in other businesses, but the heritage of exploring has atrophied in most fields other than the extractive industries. Exploring is what we miners do. It's always been pretty obvious to us vagabonds that the undiscovered orebody is likely in undiscovered country. I was once asked why we miners mine so far from town. Horrifically, that question came from the head of a mining school. No kidding. I have witnesses.

There are few mines in New York City. We understand this when we decide to go into mining. We understand that the business will take us to far off locations. For many of us, that is the attraction. Some students, starting out in college, decide that the urban life is for them and if that's what they want, more power to them.

But when I think back on the experiences that we get from this field, I wonder if they know what they are missing. Yes, they have the opera, but so do we. The difference is that, for us, it is likely in Sydney or Verona. They have shopping but there is a difference in buying something from Pier One and buying it from the artisan who made it. In the sticks, we can't go to the pro sports games, but see a futbol game in Brazil and tell me how that compares. You might talk about that Yankees game all week, but you'll talk about that futbol game all your life.

I have seen waterfalls tumble off



James R. Arnold

the very peak of a mountain. Impossible, yet there it was. On business trips, I have filled my house with big game trophies, seen all of the African dangerous game, caught fish that have never seen a line and laughed and told jokes to people who could not speak a word of English, and I could not speak a word of their language (except "thank you" - I always learn that translation first and many times it's enough to get you by). I've worked in all of the inhabited continents, met amazing people and seen projects I did not know could be built.

I'm told by our mining professors that nowadays students don't think mining is "sexy." They say that the kids coming out of high school want to work in the field de jour - computers, investment banking and the like. They don't want to get their hands dirty. I would remind them that when I got out of high school the "sexy" field to study was nuclear engineering. If students are not taking a hard look at mining today, they should be. Never in the history of our field have the prospects been as bright for a miner.

While we cussed the environmental obstructionist (let me be very clear on that we did not cuss people who wanted a better environment, our ire was directed at the obstructionists), their net result is a huge gap in time between discovery and exploitation of an orebody. That means we cannot meet increased demand by just starting a new mine or even expanding an existing one like we once did. When there is a shortage of minerals in the future, the shortage will likely last for many years. Will that mean an end to the cycles that all of us old-timers have had to live through?

My prediction is that they will still exist but I don't see them being as frequent or as severe in the future.

The fact that we old-timers are being followed by a generational gap is also something that a prospective student should think about. Every other field has a ready supply of 35 to 45 year old engineers ready to take the reins from the retiring baby-boomers. Not mining. Our down cycles of the 1980s and 1990s scared most students away and a lot of our employees. They are not impossible to find, but it is easier to find a 1961 Willie Mays baseball card. Promotions are going to come fast and furious for the younger set. That will go on for a few years and then one day they will come to work and find they are the only ones left.

Salaries are reflecting the shortage and this is a trend that will continue. Some recent grads are already getting what were superintendent level wages just five years ago. The salary compression and competition for engineers is a major issue.

But with all of the exciting prospects in the way of adventure, promotion and salary, possibly the most compelling reason to become a miner today is the challenge. The size and scope of projects, the technical complexity of the business and the evolving nature of worldwide competition make the challenges of mining greater than they have ever been. This is a really exciting place to work.

Maybe my favorite part of our industry is the people you meet and work with. Miners really are different. The intelligence, independence and initiative that attract people to mining are rare. That's why miners are rare. In my career, there have been characters I'll never forget, bona fide geniuses, true heroes and leaders I would follow anywhere.

I really like being around miners. Convincing my brother to go into mining 30 years ago was one of the nicest things I ever did for him.

So, if you decide that you want to spend your life writing code for computer games in Seattle or approving loans in New York, hey, go for it. I'm sure that you will have a great professional life. Just don't compare notes with your mining buddies at the class reunions. ■

by James R. Arnold, 2007 SME president

Dear Mr. Chief Executive Officer

I realize that you are busy so I'll get right to the point. I want something from you. Wait, wait, before you turn the page, let me quickly justify why I think that SME has earned a request from you. Everywhere you turn, someone is wanting something from you. But this one is easy and it will return big rewards. A no brainer.

First of all, we shouldn't come asking unless we've performed. So how have we performed? Take a look at the accompanying membership chart. The society's membership has increased the past few years. We are back on the upslope after a 25-year decline.

We cut our costs by \$350,000 in 2005. The other two charts will show you the dramatic improvements in SME's revenue and operating income in recent years.

Along with membership and fiscal success, look at this:

- OneMine.org is being developed. It will likely be the greatest member benefit introduced in more than 50 years. OneMine will be an online, members only repository of all SME technical material going back to the society's beginnings. Included will be all feature and technical papers published in *Mining Engineering*; all technical papers published in *Minerals and Metallurgical*



James R. Arnold

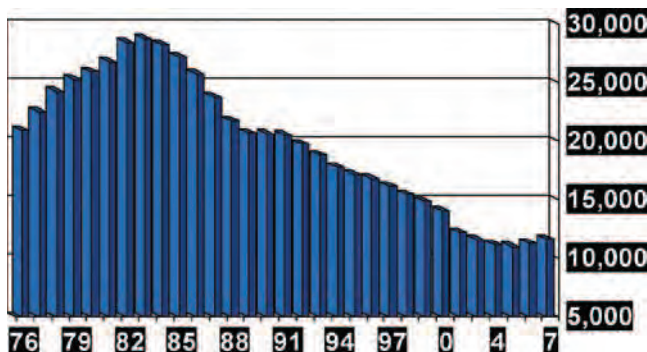
Processing and the annual *Transactions* volume; SME published books; and SME annual meeting preprints. OneMine.org will be operational early next year. This will be a must resource for all professionals in the industry.

- Student enrollment in SME has increased, and SME-administered scholarships have also increased. SME puts more dollars in universities than any other society — 350 of these students will attend the annual meeting next year. This is the best young talent available.
- *Mining Engineering* magazine has set advertising records

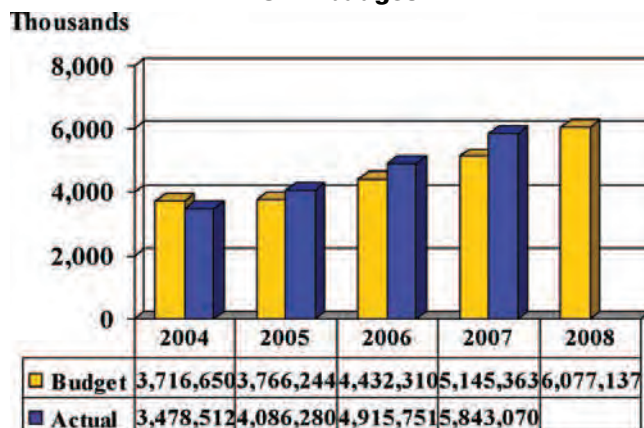
in each of the past two years. In fiscal year 2007, advertising for all SME periodicals cracked the \$1 million mark in gross sales.

- SME has retired its debt. All of it.
- The society's governance has been restructured, making management more nimble, engaged and effective. SME is able to react and respond to the needs of its members, including you.
- In 2006, SME purchased the assets of the American Underground Construction Association, forming the Underground Construction Association of SME. This acquisition brought in about 500 new members to the society, along with significant increases in revenues and advertising. The UCA of SME was granted division status earlier this year. Most importantly, SME members have access to a related technology group with research information and practical mining technologies.
- The Womens Auxiliary of AIME will be added as an SME division. This is expected to add an endowment of more than \$8 million for min-

SME membership



SME budget



erals industry scholarships. Yes, we owe much of SME's recent successes to you, mining industry management, and to the improved state of the industry. But not all of it. We have worked hard, planned well and have made good business decisions. We think that we have earned your attention. Do we have it?

Great, here is what we want:

- Every new eligible employee of your company gets an SME application the first day of work. It comes in the packet with the sign-up sheets, medical benefits, etc.
- You pay for their membership. Every year.
- Support attendance to local section meetings, regional meetings, and, if your employee earns it, SME annual

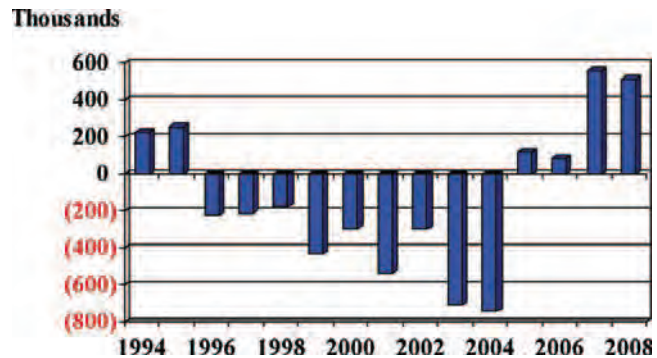
meetings.

- Encourage your people to publish. It shines a positive light on your company and your employees.

That's not much to ask, is it? You are probably doing some, if not all, of this right now. The next step is to broadcast your support to your managers. They will do the rest.

What will you get? You'll get more of all of the above. You and your people will get opportunities for networking, technical growth, industry advancements, more students,

SME revenue



professional registration, news in the industry and much more. We will arm you with the information that you need to take care of your biggest problems — energy concerns, safety advances, environmental legislation and where you are going to get the best people.

A no brainer. ■

MINERAL ECONOMICS AND FINANCE

by Douglas B. Silver

Goring the Nobel Peace Prize

The recent announcement that former Vice President Al Gore won the Nobel Peace Prize absolutely took the wind out of my sails. My shock had nothing to do with my personal political beliefs. In fact, it had very little to do with Gore, his politics or his past life. What blew me away was that an award was being given to someone for a subject that is only in its infancy of understanding. How could the revered Nobel committee be awarding anyone a prize on global warming at this point in time?

I do not dispute that global warming exists. I do, however, dispute the viewpoint that mankind is the dominant or sole cause for the warm-

ing. There are many different perspectives on this issue and scientific dialogue mandates that the various viewpoints be heard, researched and debated. As far as I can tell, only celebrities and the media have reached a firm conclusion on this issue, while the rest of the world, occupied by people with far more open mindedness and concern for finding the correct answer, continue the discussion.

Folks, this is not a simple issue. To think that the answers are known at this juncture is naïve. The mere fact that there are two very distinct camps separated by an enormous chasm of disagreement should give everyone pause. Until such time as the two sides move toward each other, we should critically question both of their respective positions. This is hardly the time to be awarding one side or the other a prize of such international recognition and prestige.

For those who doubt my position, I strongly recommend they read Avery and Singer's new book, titled *Unstoppable Global Warming: Every 1,500 years*. This marvelous treatise from NASA's former chief climatologist contains chapter after chap-

ter of sound scientific arguments that are contrary to those espoused by the media. They effectively hack apart the oversimplified views of those who blame mankind. Their perspective leans on solar cycles as a major contributor to global warming and they actually use scientific data to defend their positions. Hearing sound science is something that has become politically incorrect as this debate moves from the hallowed halls of science into the restrooms of media and political sensationalism.

One of the most compelling issues facing all investigators of global warming is that nature does not behave as a linear system. Nature is a series of complex interactions, many of which are beyond man's capability to model. When the alarmists, such as Gore, present their logic in a linear fashion, we should question their conclusions and motives. I appreciate that oversimplification is often necessary when politicians open their mouths (both for their sake and ours), but nature is anything but simple. Presumably, their scientific advisors have pointed out this inconvenient truth. But by advocating

Mineral Economics and Finance is prepared by Douglas B. Silver, president of Balfour Holdings Inc. Balfour Holdings is a mineral economics consulting firm specializing in corporate planning appraisals and the acquisition of international metal deposits and companies. Balfour Holdings is headquartered in Englewood, CO, e-mail dugag@aol.com.

by James R. Arnold, 2007 SME president

Work to do



James R. Arnold

The mining industry is going through arguably the best run that it has ever been through. With prices up, we have money to catch up on long neglected maintenance, replacements, projects and wages. We still have a lot to do, but we are getting there.

We may be catching up on the maintenance, replacements, projects and wages, but there are areas where we are still way behind. In no particular order, six issues that come to mind are:

Safety

Yes, we've got a bad rap on the safety front during the past couple of years. For some reason, the press seemed to discover mining fatalities at Sago and it has been coiled to strike at any new fatalities since then. It's true that we have lowered mining fatalities from more than three thousand per year to less than a hundred per year in the past century. It's true that 10 times as many people get hit by lightning or trains every year in America as die in a mine.

But let's be honest. As long as one worker comes home in worse shape than he went to work, we have work to do. There are too many miners and mines working at zero fatalities, zero lost time accidents and even zero reportable accidents to deny that zero is attainable. The answer isn't in more regulation. The answers need to come from us.

Public perception

"If it can't be grown it has to be mined." That statement is as equally true today as it was when Alan Weakley invented it in Missouri in the 1970s. Somehow we have not gotten that message across to the general public. Our message is not complicated and it shouldn't be difficult. But we are miles from turning this around.

We regularly shake our heads in disgusted disbelief at the naïveté and misconceptions of the general public about mining. Whose fault is that? They don't want to be wrong, they just need the facts. Let's supply them.

Environment

See "Public perception" above. As mines get less intrusive and our impact to the environment gets less, especially

domestically, it seems that our environmental struggles get more difficult. What's going on here?

First we need to remember that there are those who just don't understand. Let's help them understand. Then we need to recognize that there are those who understand perfectly, they just don't want us around. Educating them won't help. We are in a fight with that small but vocal minority and we need to treat it like a fight. Be professional, truthful, and act with integrity (even though we don't always get offered the same courtesy). But do not think that you will meet them in the middle. They do not compromise. We have been on the losing end of skewed compromises too many times. Gather your facts (they hate that) and be prepared. Fortunately, for the most part, the decision makers are looking for the truth and if we are doing our job environmentally, we have a good story to tell.

People

The biggest problem that I hear mining managers complain about is the lack of people. Not just the ever-scarce mining and metallurgical engineers but miners, electricians, operators. We are even short of geologists! Getting people to help with these new projects is going to become nothing but harder as they move from the drafting board to the field. We need to gear up for training in every facet of our business. Our demand for mechanics is not going to diminish anytime soon. What are we doing to educate our future miners? Which brings us to...

Universities

No group was hit harder by the

tough times of the past 20 years than our academics. Funding, industry support, students and legislative support all dried up as things got tougher for mining. The good news is that the mining schools that survived are excellent. They are staffed with outstanding professors; men and women dedicated to our industry and their students. Engineers coming out of school have the most eclectic and intense education in history and they are deserving of those big salaries that it is taking to get them.

As you recruit, please do not forget where these young engineers came from. These professors and the schools that stuck with us deserve our recognition.

Mining research has been on a hiatus during the past couple decades. It is time to financially revitalize our mining schools. It will be good for drawing more students, good for preparing them and it will be good for the advancement of our industry.

Communities

This one is embarrassing. During the toughest of times, some of our mining companies, even the biggest ones, forgot about the communities that housed them for many years. The local businessmen were forgotten in favor of the lowest bid. Charitable contributions dried up. Miners worked long hours and no longer had time for the hospital or school board. Who could coach little league when they got home at 7:30 p.m.? It was tough enough just to make it to the kids' games.

We might be as busy as ever, but let's not forget the people who we go home to every night. If there are any people who really understand mining, it's our own people and they deserve our support.

So what can you do? Plenty. The foundations are in place to help in any of these areas. Pick one. Pick them all. Give the one thing that is hardest to give today; your time. And more importantly, encourage your employees to do the same. Everyone should devote a few hours per week to help your industry inch forward. There are many organizations; the Mineral Information Institute, schools, mining museums, mining foundations, environmental organizations, state mining organizations, and, yes, SME that need your help. Become an advocate.

We need you. ■

by James R. Arnold, 2007 SME president

Cody's Story 2

The event of the year in the mining towns of northern Nevada, at least among the hunting crowd (which is just about everyone) is the Nevada Chukar Foundation banquet in Winnemucca. People jockey for position for months, even years to get a ticket. It's a big event and the mining community supports it tremendously.

When young Cody died in a traffic accident last year, the community that he loved and who loved him back set up a scholarship in his memory. The Nevada Chukar Foundation auctioned off a shotgun at the banquet and donated the proceeds to his scholarship. When the gavel dropped a local had bought the gun for \$4,000. If you think that's a lot to pay for a shotgun, you're right. But what happened next is the start of this story.

The winning bidder donated the gun back to the Foundation. It was immediately auctioned off again, this time bringing \$3,000. After again being donated back, Llee bought it for \$2,000, donated it back where it brought another \$1,000 at auction again. One gun, one night, four buyers, \$10,000 for the memory of a class kid. The fourth winner handed the gun to Cody's dad who was attending the banquet for the first time. God, I love that town.

What is surprising about the story is that Llee never met Cody. He'd heard stories about the lad and decided that the scholarship was a cause that he would support. Llee's a miner and he's better at what he does than anyone I've ever met. He isn't a wealthy guy so \$2,000 is as much money to him as it is to the rest of us, but that's the kind of guy Llee is.

Llee's not alone. There are so very many very special people who work in the mining industry. I think of my old boss, Harry, who as a young man with a wife and kids, risked his life to enter the Sunshine Mine in a carbon monoxide atmosphere so toxic that one weak seal



James R. Arnold

in his breathing mask would have meant certain death. He did it in hopes of finding a fresh air pocket somewhere that would be safely harboring miners he knew, or ones he didn't. I remember when Harry, as tough a miner as you'll ever meet, finally talked about the Sunshine fire. He would drop his gaze; his lower lip almost imperceptibly trembling. He talked about filling body bags; talked about the many people who were true heroes that day, yet it never occurring to him that he, himself, was the very definition of a hero. When heroes from my own mine went through the same thing this year for a neighboring business, all I could think about was my pride in knowing them and knowing guys like Harry.

Heroes of all sorts populate our industry. Miners are special. The people who donate their time, money and emotion to those around them are everywhere in our mining camps. There is John, the hardest working person I know, who came home early to make it to the 7:30 p.m. school board meetings. Dale and Tim, who spend their own money to attend SME meetings, buying expensive tickets from Kentucky and Alaska so they can give back to the industry that has given so much to them. An old Nevada prospector funded numerous scholarships for Battle Mountain never expecting anything in return. There is Roger and Phil and many others, whose

family devotion is so intense that they could have easily been three or four rungs further up the ladder had they not declined promotions because of family concerns. And speaking of families, how about the spouses who sacrifice so much for their miners and their contributions to schools, churches and communities; communities that they have sometimes literally carved out of the wilderness?

These aren't rare stories, or one-time occurrences. For the people I talk about, it's part of their fiber, imbedded in their souls. These are traits that are learned early in life and become what these people are, and by default what this industry is.

What's my last message as SME president?

When Llee was a high school kid, a little younger than Cody would be today, he was one of the greatest athletes in Idaho. He went on to play basketball for a team that went to the NCAA Elite Eight, beating UCLA in the Marques Johnson era. So gifted was he that news reporters would wait to interview him after games his junior year – in high school! You know what life is like for a high school athlete like that. They have their pick of the cheerleaders as prom dates, they get the best summer jobs and they can surround themselves with the most athletic, popular guys in the school. Who was Llee's best friend? Eddie. Eddie was a little guy with Down Syndrome who Llee picked up every day before school. Eddie followed Llee, his hero, around all day until Llee would take him home after practice and pick him up the next morning. Eddie ran with the crowd because he was Llee's best friend. When Eddie died, his friends tagged Llee with the nickname Eddie. It was sort of a tribute to the little handicapped boy and the superjock who made his short life so special. Like I said, that's the kind of guy Llee is.

God, I love this industry. ■

BUSINESS NEWS

Caterpillar adds computerized tracking to machines

Caterpillar's computerized remote asset management solution, EquipmentManager and Product Link will now be included as standard equipment. The system will be installed in all mining and industrial machines sold in Canada and the United States.

Caterpillar will phase in EquipmentManager/Product Link be-

ginning with wheeled hydraulic excavators and articulated trucks. The system comes with a three-year subscription to Asset Watch, the remote asset management portion of EquipmentManager. The system types of machines will be phased in throughout 2008 on other types of equipment.

EquipmentManager is a secure, Web-based application that uses

key indicators from equipment such as hours, location and diagnostic codes. Combined with tools such as mapping, maintenance scheduling and troubleshooting instructions, EquipmentManager sorts through machine data to identify events that require attention, and delivers information in a meaningful and actionable manner. ■

Jenmar's Campoli assists in regulation compliance

In the light of the recent regulatory measures and implementation of many new and somewhat confusing requirements regarding mine sales, Jenmar Corp. offers the services of Al Campoli, Jenmar's vice president special products, to its customers.

Campoli has been involved in the design, regulatory approval, and installation of ventilation seals for many years and is familiar with the current mine sealing challenges.

Before assuming the role of vice president special products for Jenmar, Campoli served as a Minova USA's business development manager, consulting engineer and U.S. Bureau of Mines Researcher. He focused on coal mine ground control, ground water containment and ventilation issues. Campoli has a bachelor of science degree in mining engineering and masters of science degree in engineering management, both from the University

of Pittsburgh. He also has his Ph.D. in mining engineering from Virginia Polytechnic Institute.

Campoli is a registered professional engineer and certified mine foreman, former chairman of the Pittsburgh Section of SME and current chairman of the Central Appalachian Section of SME.

He also served on the professional registration, research council, and program committees of SME. ■

LETTERS TO THE EDITOR

Arnold's call to CEO's is an important issue

Editor:

Good for Jim Arnold. A great, great letter on the President's Page of the December 2007 issue of *Mining Engineering* (pp. 6-7) entitled "Dear Mr. Chief Executive Officer," addressed to the CEOs of the mining companies and of the providers of goods and services to the mining industry.

A couple of years ago, a subcommittee of the SME Membership Committee (of which I was a member) decided that such a letter should be prepared and sent out to these CEOs. Neil Eurick, of Golder Associates, prepared a draft letter to be signed by Arnold and Brij Moudgil. Following some changes made by me and Tara Davis, of

SME, and Bud LaBarr, I sent it out to several people under the heading of the SME International Committee. We had some very favorable responses from Mongolia and Mexico.

The mining companies Boroo Gold and Minas de Oro signed up some 50-60 new members and paid their membership dues. An added benefit was the formation of a new local SME section in Ulaanbaatar, Mongolia.

I am extremely happy that Arnold has taken up this matter. He clearly expressed the recent important successes of SME and the benefits to the CEOs and their staffs by having their employees sign up for membership at company expense. Incidentally, this was the way I joined SME (then known as AIME) as a junior member almost 60 years ago.

I plan to send an electronic copy of this letter to some selected CEO friends in the mining industry. ■

Leonard (Len) Harris,
member SME
Lone Tree, Colorado

Mining Instrumentation

For monitoring the safety and stability of mines and underground caverns.

- Proven long-term stability and reliability
- Remote and web-based datalogging capabilities



GEOKON The World Leader in Vibrating Wire Technology™

Geokon, Inc. • 48 Spencer Street • Lebanon, NH 03766 • USA

☎ 1-603-448-1562
☎ 1-603-448-3216
✉ info@geokon.com
🌐 www.geokon.com

VISIT US AT SME BOOTH #1540

linear systems, they are knowingly promoting fraudulent concepts. This may be nothing new to politicians but it sure won't fix the problem.

If Avery and Singer are correct about the significant influences of solar cycles on global warming, then why is Nobel so quick to award prizes to humans for something they have no control over? Perhaps Gore also takes credit for the sun in the same fashion as he took credit for the Internet?

I must confess that, in my opinion, Gore is also not worthy of the coveted Nobel prize. One only has to review the finding of the British educational establishment to understand his fundamental lack of integrity. The High Court of London found nine errors in his *Inconvenient Truth* movie that were so blatantly lacking scientific veracity that it required him to issue a disclaimer and guidance notes before the movie could be shown in their schools. The judge said that without this corrected guidance note, he would rule that the government had engaged in an unlawful contravention of the Act of Parliament prohibiting the political indoctrination of children.¹ Does this sound like Nobel prize material to you?

For instance, Gore said that water levels are projected to rise 6 m (20 ft) during the next century due to the melting of either Western Antarctica or Greenland. Yet the scientific community only projects a maximum of 6 cm (2.5 in.). It is reasonable to assume that Gore had fact checkers, so how could his "facts" be so grossly off base? Could it be that his "facts" make a better story?

I do not see how his post-governmental ramblings contribute to world peace. If Nobel is looking for someone actively improving the world, I would suggest they look at the amazing world of medicine, or Bill Gates for his personal fight against poverty, or others who work on behalf of underprivileged children. Give it to someone who spends their own money and executes plans to cure the ills of the world. What about Bono for his work in Africa? In my opinion, giving Gore any prestigious award is on par with giving Michael Moore an award for his humanitarian efforts. Perhaps they should give it to a mineral economist for his insightful views?

In Gore's defense, humanity's wastefulness is always worthy of discussion and should be reduced whenever possible. We do have to work harder at lessening our impact on the planet. But this problem is everyone's problem. It's the problem of miners knowingly dumping effluent into drainages and the average Joe driving his SUV. But creating awareness is not worthy of awards. Only actions are worthy.

I would suggest that Gore partner again with Bill Clinton and benefit from Clinton's ability to raise large sums of money. They could then spend this money fixing the planet rather than just talking about it. For instance, they could buy ice-making machines for West Antarctica. They could send life jackets to Polynesia for those destined to drown when the water levels rise 6 cm (2.5 in.). Al and Bill could buy sunscreen for Mount Kilimanjaro. They could paint Brown Bears white to increase the polar bear popula-

tion. They could get psychological counseling for Greenland's ice sheet so it wouldn't be so unstable. There are lots of things they could do to fix the environment.

It is time to realize that global warming is no longer a social or a scientific issue. It has become a commercial enterprise generously funded by governments. There are literally millions of dollars available to those willing to take up the cause. Yet seldom, if ever, does one see funding available to those who question the politically correct. I find it disappointing to see so many people so quick to assume that the world is coming to an end. Everyone knows that it is easy to criticize but hard to take corrective action. Apparently, the rules have changed. In today's world, simply playing Chicken Little wins big time.

If the Nobel committee wants to recognize Gore for his contributions to mankind, it should first start by determining whether he has made the world a better place. Whining about the environmental may be an effective way to win an Oscar and Emmy, but can anyone really measure the extent of his impact? Probably no more than they can measure the impact of mankind on global warming. ■

¹ 35 *Inconvenient Truths: The Errors in Al Gore's Movie* by Christopher Monckton of Brenchley, October 18, 2007. Issued by the Scientific and Public Policy Institute, Washington, D.C. Third Viscount Monckton of Brenchley was former policy advisor to Margaret Thatcher during her years as prime minister of the United Kingdom.

LETTERS TO THE EDITOR

Arnold's letter to Murray on target

Editor:

It was gratifying to read Jim Arnold's open letter to Bob Murray in the October issue. (ME, Oct. pp. 6). What Arnold wrote was on the mark.

As a retired mine manager and mining engineer of 49 years, I admired the way Bob Murray handled the worst of situations and did not hide from the unsavory responsibilities at that time. In spite of my personal visits to their workplaces

and discussing the potential hazards that subsequently took their lives, I consider the two fatalities that I experienced as blemishes on my career. On a much smaller scale and without as much publicity, it was a very devastating experience. The media intrudes and second guesses in a situation that it has a hard time understanding, but Murray handled the facet about as good as anyone could under very difficult circumstances.

He set a fine example for future managers to follow when another one of these episodes occurs, And, unfortunately, it most likely will.

I hope that Bob Murray and the families of the lost miners can carry on with the style and courage they showed in the time following the incident. ■

George E. Erdman, member SME, Brevard, NC



Presidents 1997-2006
VOL. 49 – VOL. 58

2006 SME President Brij M. Moudgil

March 2006: VOL. 58 NO. 3 – Brij Moudgil: an interview with the 2006 SME President

2005 SME President Barbara A. Filas

2005 SME President Barbara A. Filas

March 2005: VOL. 57 NO. 3 – Barbara A. Filas: an interview with the 2005 SME President

August 2005: VOL. 57 NO. 8 – Filas updates strategic plan, qualified person

October 2006: VOL. 58 NO. 10 – The ballad of Jan and Tim

2004 SME President Art Schweizer

March 2004: VOL. 56 NO. 3 – Art Schweizer: an interview with the 2004 SME President

2003 SME President Tom O’Neil (Editor)

March 2003: VOL. 55 NO. 3 - Tom O’Neil: an interview with the 2003 SME President

The Drift of Things (March 2003-February 2004) written by Tim O’Neil, Editor

2002 SME President Michael Karmis

March 2002: VOL. 54 NO. 3 - Michael Karmis: an interview with the 2002 SME President

2001 SME President Ta M. Li

March 2001: VOL. 53 NO. 3 - Ta M. Li: an interview with the 2001 SME President

2000 SME President Donald E. Ranta

March 2000: VOL. 52 NO. 3 - Donald E. Ranta: an interview with the 2000 SME President

1999 SME President Jim Boyd

March 1999: VOL. 51 NO. 3 - Jim Boyd: an interview with the 1999 SME President

1998 SME President Ihor Kunasz

March 1998: VOL. 50 NO. 3 - Ihor Kunasz: an interview with the 1998 SME President

1997 SME President Dick Klimpel

March 1997: VOL. 49 NO. 3 - Dick Klimpel: an interview with the 1997 SME President



MARCH 2006

Mining

ENGINEERING

A PUBLICATION OF SME



Brij M. Moudgil
2006 SME President

Brij Moudgil: an interview with the 2006 SME President

Your assessment of the minerals business.

I would first like to express our profound sadness and sincere condolences to the families of the miners who lost their lives in recent mine mishaps particularly in West Virginia, and other locations. Any loss is unacceptable. It is time to review and, if required, re-establish a rigorous health and safety agenda in the mines. It must involve a review of health and safety regulations. And innovative training methods for sensing, awareness and mitigation of health and safety hazards must be developed.

As far as the minerals business is concerned, I am excited about the outlook for mining. Over the last 20 years, global demand for minerals has closely mirrored the growth of the gross domestic product. Minerals remain a major part of the world's economic foundation. And that will continue to be the case. It is no surprise that the fortunes of the mining industry rise and fall with

general economic trends. Globally, mining has been strong — thanks to the explosive economic growth in Asia. The U.S. mining industry has performed reasonably well, with notable strength in the metals, coal and construction and aggregate areas and with some softness in the industrial minerals sector.

How about the future of the minerals industry — near term, longer term? Do you think the current uptick is sustainable?

New wealth creation is leading the improvements in the quality of life in China, India and other developing countries. Obviously, natural resources are needed to promote and to support these new lifestyles. Similar growth is noted in other parts of the world, with increasing demand for natural resources. So it is no surprise that the minerals resources industry continues to gain importance in the developing economies. At the same time, the contributions of the minerals industry are no less important in developed economies such as in the United States, though they tend to be obscured by other factors. Economic projections indicate a healthy outlook for the minerals industry in the U.S. and abroad. Overall, despite the challenges facing mining industry, mining is recognized as an essential business with great global opportunity.

You have a quarter century of academic experience. What are your thoughts about minerals education?

Producing the next generation of engineers to support the minerals industry is among our most significant challenges. Unfortunately, with a few notable exceptions, minerals engineering education is in a much weakened condition nationally and internationally. The enrollments and the faculty sizes of a number of mining programs have fallen below sustainable levels. University courses are shrinking or closing around the world.

Over the past 20 years, at least 20 mining engineering programs have closed. This represents 30 percent of the total courses available in the countries from which the mining industry typically recruits. Mineral processing and metallurgy courses have followed a similar trend, although geology courses have been less affected.

Does that mean we are likely to see more mining schools close?

There is an extreme shortage of mining engineering academics for the English-speaking world. This situation is going to get worse. This poses serious threats to the long-term viability of current academic institutions — both for teaching and research. A critical shortage



Photo by David Blankenship.

of faculty could soon force further consolidation of mining related programs. Of the 69 tenured or tenure-track faculty members, about half are expected to retire in the next 10 years. A quarter of them plan to retire in the next five years. At the same time, industry has identified a need for three times the number of current mining graduates and at least 10 Ph.D.s in mining alone. As a result, there is a greater willingness to recruit and move personnel on an international level.

Community perception of the global mining industry continues to be one of “old world,” “dirty,” “unsafe,” “low technology,” “sunset industry,” etc. This makes it harder to recruit talented students to mining- and minerals-related academic programs. “Mining” simply is not that attractive to the young people in the U.S. as compared with other seemingly more glamorous disciplines.

Any ideas about how to improve the situation?

SME has established a sustainability task force to address this critical human resources issue facing the industry. Their charge is to develop strategies for promoting the sustainability of minerals education in North America through improved collaboration between industry, aca-

demia and government. The minerals education tracks include economic geologists, geological engineers and mining, metallurgical and mineral processing engineers.

The committee’s recommendations in the near term are to choose one or more mining schools, to support and work with them to structure annual donations that address sustainability issues. Additionally, companies need to provide senior employees to school “advisory boards,” to offer scholarships to students who are interested in mining-related degrees and to offer internships or work-study programs to students. Lobby your state and federal legislators, regents and university administration about the importance of keeping the remaining mining schools funded. And explore federal funding for mining schools as “strategic” to U.S. security.

In the longer term?

With information technology advances, it may be attractive to develop joint mining-related education programs involving a consortium of universities. An example is the Web-based Master of Engineering program, which is being developed by a tri-university partnership in Arizona (University of Arizona, Arizona State University

Hard work is what Brij Moudgil needs

Brij M. Moudgil is a distinguished professor of materials science and engineering, director of the National Science Foundation’s Particle Engineering Research Center and director of the Mineral Resources Research Center at the University of Florida, Gainesville. He has a B.S. in metallurgy from the Indian Institute of Science in Bangalore and holds an M.S. and Eng.Sc.D. in mineral engineering from Columbia University. Prior to joining the University of Florida in 1981, Moudgil was a research engineer with Occidental Research in California.

Moudgil is a member of several professional societies, including the American Institute of Chemical Engineers (AIChE) and the American Ceramic Society. He has served as a member of the SME Board of Directors and chair of the Mineral and Metallurgical Processing Division. He has been involved in the Particle Technology Forum (PTF) of the AIChE and has served as chair of the PTF subgroup on dispersions and interfacial phenomena. He was elected to the PTF board in 2002.

In 2003, Moudgil was appointed by Gov. Jeb Bush to the board of directors of the Florida Institute of Phosphate Research (FIPR). He was elected FIPR board chair from 2003 to the present. He was elected to the National Academy of Engineering in 2002. He has received the Antoine M. Gaudin Award from SME, the Robert H. Richards Award from AIME, the Frank F. Aplan Award from the Engineering Foundation and an SME Presidential Citation for his outstanding service to SME.

Moudgil has been awarded 14 patents. He has edited nine books, published more than 200 technical papers and has presented more than 400 papers at scientific meetings and seminars. He has served on 30 research and education panels and site-visit teams and chaired nine international conferences/workshops. He currently serves as chair of the KONA North American Editorial Board.

“Hard work is what I need,” Moudgil tells his students. “Show me an obituary where the cause of death was hard work and I’ll give you a quarter.”

So far, he has not had to part with any of his pocket change. However, his zest for hard work has led him to the highest honor a professor and scientist can garner in the United States — election to the National Academy of Engineering.

Moudgil is especially grateful for his mentors and repays their kindness by passing it on. “I have been very fortunate in having mentors, and I do my darndest best to share with the younger professionals. I am not doing any favors for anyone, I am just giving back what I got from some of these other folks who were very accomplished, sincere, honest and loyal and continue to be that way,” he said.

In between pursuing academic degrees, Moudgil established a firm foundation in industry. He is a former research engineer for Occidental Research Corp. in Irvine, CA, former project engineer at UP’s Center for Research in Mining and Mineral Resources and a former production engineer with a steel company in India.

While intellect, persistence and hard work have brought Moudgil to where he is, he also thanks his family for their backing and encouragement. “If you do not have a supportive family, you cannot accomplish much,” he said.

Indeed, support for UF is a family affair. Moudgil’s wife, Sheela, is an assistant controller at the university. Their oldest daughter, Suniti, is pursuing a doctorate in chemical engineering at the Massachusetts Institute of Technology after graduating from UF. Sarika, their middle daughter, is an alumna of UF’s business college and works as an information systems analyst for Exxon Mobil. Their son, Bharat, likely to be a future Gator, is a 10th grader at Eastside High School in the International Baccalaureate program.

and Northern Arizona University). The European Mining Course (1996), a joint program developed by Delft (Netherlands), Imperial College/CSM (England), Helsinki (Finland) and Aachen (Germany), has been running for more than 10 years. A new course in European geotechnical and environmental science by Kosice (Slovakia), Miskolc (Hungary), Wroclaw (Poland) and Berlin and Freiberg (Germany) universities was launched in 2004.

You are a big believer in continuing education, aren't you?

Yes I am. Information technology, globalization and outsourcing are demanding a radical restructuring of the learning business. Lifelong learning has become an important trait for successful industry leaders and practitioners. Continuing education delivered through distance learning will prove to be most beneficial especially in the minerals industry since mines often operate in remote locations and where distance learning may be the only feasible means of updating individual professional skills.

Globalization and outsourcing are inspiring curricular changes that will emphasize individual as well as interdisciplinary learning and will promote an understanding of the ethical, social and business aspects of the profession along with a geopolitical understanding of the industry. Innovations in education are motivating students and instilling a desire to pursue lifelong learning. New customized courses will enable periodic skill upgrading.

With advanced understanding of "how people learn," developments of new tools and protocols are on the horizon. They will improve specific skills necessary for job success and will also ensure that employees remain at the forefront of technological developments.

SME is involved in some of this educational reorientation.

Overall, I believe it is a time of unique opportunity for revitalizing, if not reinventing, the old paradigm of minerals education. In cooperation with other organizations, SME is ready to pursue a new initiative, to ensure sustainability of university-based minerals education. Diverse international partnership opportunities in research and education are needed for sustainability. The Society can provide a vital link for establishing and implementing these global partnerships in the minerals field.

Perspectives on the metals and coal sectors. You have had experience in both areas.

Global demand for natural resources and conflicts in the Middle East continue to have a major influence on the metals and coal business, respectively. In my opinion, coal will be our strategic energy source in the foreseeable future. In order to stay competitive, we must improve our clean coal technologies, recycle the combustion byproducts, provide safe and stable storage of coal refuse, and improve the health and safety practices associated with underground mining.

The cost of domestic coal production and transportation limits U.S. participation in the international marketplace. Our domestic coal business mostly supplies local markets while competing with oil, gas and other energy sources. In my opinion, coal is our most reliable source for a steady energy supply in the United States. As long as conflicts in the Middle East continue to destabilize oil

prices and supplies, coal will continue to be our "go to" resource.

You have metallurgical and mineral engineering degrees. And you have international experience. Any thoughts about the changes in technology you have seen over the years? Changes to come?

Automation and large-scale equipment constitute the major technological advances in the minerals industry. Only a few conceptual changes have been made in the way we mine and process mineral deposits. At the same time, the mining industry is increasingly facing new environmental as well as health and safety regulations, lower and complex ore grades and difficult geologic and mining conditions. The industry must make major technological strides in developing new, low-cost, high-efficiency mining and processing systems. These changes have to be revolutionary. They must go beyond the advances in equipment design and the integration of mechanization and automation.

Innovative changes are required in the way that deposits are developed, mined and processed, especially with regard to energy and water usage efficiencies. Yet, the research and development investments, particularly in the academic sector, are negligible at best. And most of the minerals industry research and development departments within the companies have closed.

Global competition and low return on investments due to the commodity nature of its products are two of the reasons cited for the dismal state of research and development in the minerals industry. For the past several decades, industry support for academic research has been nonexistent. The federal government has shied away from research funding as well, since mining is a "mature" industry and must fund research innovations on its own. Faculty devoted to minerals research have been forced to apply their talents to other emerging technologies. Advanced degree graduates have been lured by higher salaries and more comfortable working environments with companies in other growth economies. This has largely contributed to critical faculty shortages in most mining and minerals-related disciplines.

Any suggestions?

Lately, there has been industry focus on sustainability of academic programs producing students in mining industry related disciplines. These disciplines include economic geologists, geological engineers and mining, metallurgical and mineral processing engineers. A handful of major companies have made significant financial contributions to sustain existing programs. This is a good start. I hope it will be emulated also by other companies.

In addition to the welcome change in the industry interest and investments in the remaining academic programs, developing jointly sponsored academic programs by university consortia, as well as interdisciplinary research teams to conduct pre-competitive research, must be seriously explored. This must be done to meet the advanced research and curricular sustainability needs of the industry. A recent model in this regard is the newly established Australian Mineral Science Research Institute (AMSRI) program — a government-industry-academe joint venture.

AMSRI is funded for an initial five-year period at a

\$22.6-million dollar (Australian) level and will be carried out at four Australian universities. The Institute headquarters will be based at the Ion Wark Research Institute in Adelaide. Close collaboration will be maintained with the Particulate Fluids Processing Centre at Melbourne University, the Centre for Multiphase Processes at University of Newcastle and the Julius Kruttschnitt Mineral Research Centre at the University of Queensland.

Last but not the least is the innovation in evolutionary changes from the “commodity” business to “value-added product” mindset within selected sectors of the minerals industry. For example, there could be increased delivery of plant nutrients such as phosphorus by “smart” fertilizers. This has the potential to reduce mining acreage because of higher product efficiency and could result in lesser environmental impact and higher profitability. The “smart” fertilizer concept is based on the “engineered particle” concept. This involves producing multifunctional aggregates of nano/smaller particles. Functional fillers and self-regulating and repairing cement structures are other examples of value added products.

What about the government's role?

Environmental and social issues have an ever-increasing influence on our industry, either through legislation or public policy. The mining industry can gain higher credibility with the general public by demonstrating continuous improvements in environmental performance and by implementing sound operational practices, from exploration to closure.

However, successful environmental management will require new, innovative technologies. Public attitudes and values need changing along with a shift in the short-term performance focus of the industry leaders. Companies have to learn how to gain a strategic advantage through environmentally and socially responsible practices and a meaningful public dialogue about them.

And internationally?

Years ago, government regulatory requirements drove the actions and expectations for the industry. More recently, primarily due to the globalization of the industry, the larger international companies are establishing their own criteria for measuring environmental, social, health and safety performance expectations. For the most part, these criteria are well established in the developed economies. However, benchmarking of the criteria, especially in the developing world, mostly depends on the local regulatory requirements.

Self regulation by major companies is mostly driven by the desire to meet their “corporate standard.” Additionally, the international lenders are taking on a more proactive role in developing countries. The banks now recognize the risk of socially or environmentally risky projects. A number of international lenders subscribe to the Equator Principles — a voluntary set of guidelines for assessing and managing social and environmental risks in project financing. This could have a far more significant effect on the global business operations of a company than any single government entity.

Okay, time for SME.

We are at a threshold where a few well thought out, bold initiatives, implementation of strategic plan elements

and a bit of luck could have a significantly positive impact on SME. My observations are based on a number of elements, which are currently in progress at the Society. First and foremost, SME has a talented and dedicated staff and a highly professional and forward looking executive director. Secondly, SME has had visionary leaders who have had the privilege to serve as the SME presidents. My most recent predecessors, Barb Filas, SME President – 2005 and Art Schweizer, SME President – 2004 have done a remarkable job in putting SME on sound financial footing and giving the society a strategic direction. These have the potential of growing the society in all of its mission activities.

My challenge as SME president is to ensure a successful and timely implementation of the SME strategic plan. I also want to formalize the strategy for building partnerships and alliances with like-minded domestic and international minerals industry organizations and professional societies.

What about SME governance?

Past surveys of current as well as of nonrenewing members have revealed that they consider the existing SME governance structure to be a major barrier to delivering quality, relevant and timely technical programming — a key value to them. Membership in SME must add value for individuals and organizations in terms of new revenues or cost savings, in addition to new knowledge and networking opportunities.

The current SME organizational structure has served the society well over the past 50 years. But it must be changed to make the decision-making process more efficient in meeting the current and future aspirations of the minerals industry professionals. In this regard, my predecessor, Barb Filas, organized two ad-hoc committees. One committee reviewed and recommended a new governance structure. The second committee developed strategies for better marketing the society to our existing and future industry and academic members.

Jim Arnold, SME President – 2007, is the chair of the SME organization task force. Members of his team are recommending a major overhaul of the SME governance structure that, upon approval by the Board of Directors, is planned to be implemented this year. This is a major task for the society and demands patience and dedication from everyone to be successful. These changes will streamline strategic and operational decision making at SME and render the society more responsive to its members' needs.

And the marketing taskforce, of which you were the chair?

The marketing task force is recommending that a larger segment of the society programming be focused on issues faced by the industry practitioners. Technical programming must be attractive to plant operators as well as academic and industry researchers. Additionally, plans for delivery of customized quality, relevant and timely programming on regional and national levels must be undertaken to meet the needs of the members who are unable to participate in the national meetings. Opportunities exist to recruit mid- to upper- level plant operations and management professionals, especially those who so far have not been much aware of the SME. The society must

aggressively pursue recruitment of such members.

How about your goals as SME's president, the areas on which you plan to focus.

My first priority is to monitor the financial health of the society within the context of the implementation and evaluation of the strategic plan. I expect that considerable effort will have to be devoted in the coming year to implementing the recommendations of the governance and marketing committees.

I would also like to explore the possibility of establishing a Construction Materials and Aggregates Division within the new structure of the society. Additionally, a new entity, the Underground Construction Association is likely to be created within the SME organizational framework (UCA of SME) with the potential of adding a significant number of new SME members. I believe we are approaching a stage where it will be prudent to establish guidelines for ourselves about the groups we might approach for closer interaction with and also to outline the protocol for doing so.

Closer interaction with like-minded sister societies, nationally and internationally, needs to be emphasized especially from the regions where U.S.-based mineral companies have a significant presence. Availability of e-memberships to overseas students and practitioners, electronic publishing and information exchange would continue to remain critical aspects of international membership development.

I would work for stronger corporate support and participation from the minerals industry in education and training matters as well as in technical programming at society meetings. It will also involve developing competitive research initiatives, sponsoring research and convincing funding agencies about mining's research priorities both at the state and federal levels.

Any final comments?

I have been fortunate to work with a number of extraordinarily talented people with a remarkable record of accomplishments — most of them from the SME family. I have enjoyed my participation in SME. I invite all SME members, particularly the younger professionals, to actively engage with the society and have fun. We have exciting challenges ahead of us as we embark on the journey to reinvent SME to ensure a vibrant and viable society for the future. Reinventing SME has already begun. It will take a committed effort from a lot of people. I am looking forward to working with every one of you to make SME the pre-eminent minerals society it deserves to be.

SME members in increasing numbers are participating in public education thorough the GEM program, which is now mostly funded by the SME Foundation. I salute them and countless other volunteers who dedicate themselves to causes of greater good to our communities. I encourage everyone to keep the SME Foundation in their thoughts when they think of making charitable contributions. No gift is more significant than the gift of education. ■

Larox to supply ceramic filters to three operations

Larox said it has secured three new contracts worth more than a combined 10 million euros (about US\$11.9 million) to supply filters to mining and chemical companies in India, South Africa and Chile. Orders were booked for the fourth quarter end of 2005. Deliveries from Finland will take place this year.

Tata Chemicals' Mithapur plant in Gujarat State in India has placed a repeat order for two units of automatic vertical pressure filters. The company placed a similar order for the plant in September 2005.

Larox is to supply several of its ceramic filters to three mining and chemical operations in South Africa, Chile and India.

Mithapur is the largest and most integrated inorganic chemicals complex in India. It has four main product groups: soda ash, chloro-caustic group, marine chemicals and salt, and cement. This will be the fourth filter delivery from Larox to Tata's Mithapur plant.

The second order was placed by Outokumpu Technology, of Finland. Larox is to deliver six ceramic disc filters for Outokumpu's Xstrata's Wonderkop ferrochrome plant extension in South Africa. Outokumpu Technology will supply the core pelletizing and sintering technology

including the license, basic engineering and key equipment. The scope also covers supervising the installation and startup of the plant as well as operator training. The plant's the gross annual production will be 1.2 Mt (1.3 million st) of chromite pellets. Once operational, it will be the largest in the world. The plant is expected to reach capacity by the end of 2007.

The third order came from Compania Minera del Pacifico S.A. (CMP) in Chile. It ordered three units of ceramic disc filters for iron concentrate filtration and a polishing filter for purification. CMP retreats tailings from Phelps Dodge's El Candelaria copper concentrator to recover magnetite. The filters will be installed in the new port facility of Punta Totoralillo, where the filtration plant is located. Web site www.larox.com. ■



MARCH 2005



Mining

ENGINEERING

A PUBLICATION OF SME



Barbara A. Filas
2005 SME President

Barb Filas: an interview with the 2005 SME President

Start with your assessment of the minerals business — domestic mining as well as operational and consulting perspectives.

As a third generation miner, I have been living the mining business for as long as I can remember. I have watched commodity prices produce boom and bust cycles in places like Price, Utah (coal), Douglas, Arizona (copper) and Eureka, Nevada (gold). It is unsettling to see how our industry has fluctuated, but it always seems to rebound if you can stick out the down cycles. However, our most recent dip in the cycle was, in my opinion, characteristically and permanently different.

In the past, when prices went south, people hunkered down and waited out the cycle until things came back, much the same as they had every other time. Not this time. This time, we saw a consolidation of the industry in proportions never seen before. Mega-mergers like Exxon-Mobil, Phelps Dodge-Cyprus and Newmont-Normandy have changed the complexion of our industry forever. And that is true not just of the mining companies; it happened across the supporting business lines as well. As a mid-sized niche engineering and environmental service provider to the mining industry, companies like mine are few and far between these days. The lean cycle saw many of the small and mid-sized providers get gobbled up by consulting giants like URS and TetraTech. The mentality of a mega-company, whether a commodity producer or a goods or service provider, is different than that of their small- and medium-sized counterparts.

The mining industry now seems to be on one of its periodic rebounds.

After such a huge consolidation of the industry, we now are seeing the juniors springing up again, whether it is a new exploration or mining company, a startup consulting firm or equipment sales and service business, it is happening across the board. I think we are seeing the birth of a new minerals industry. Yes, it is different from commodity to commodity. But in each sector, the mentality has changed, permanently changed, and I like to think for the better.

How about the future of the minerals industry — near term, longer term. Do you think the current uptick is sustainable?

I am excited about the outlook for mining, in all commodities, particularly in the short term. Unfortunately, mining has always been a cyclic business. We have all seen the effects of the swings in commodity prices. Once again, I think this time is different though. Just like we have seen some permanent changes in what our business looks like, we are also seeing some pretty significant changes in our marketplace as well. Never before has the global economy seen such raw material demand as we are now seeing, particularly from places like China



and India. These are extremely fast-growing economies that demand natural resources to support their improving ways of life. I suspect that many places around the world will follow suit with time. These may be the first steps in what hopefully will be the advent of industrialization for many growing nations worldwide.

Major challenges for the mining industry — engineering, environmental and regulatory.

I think that producing our next generation of engineers to support our future minerals industry will be among our most significant challenges. Sure, we can train a civil engineer to be a mining engineer, a chemical engineer to be a metallurgical engineer, but this takes time and money. In a competitive global economy, we have to look for ways to reduce cost, not increase it, in order to stay in the race over the long term. Years ago, graduating mining and metallurgical engineers were filling entry-level positions at the mines. Fundamental

backgrounds were in disciplines like ore reserve analysis and mineral processing techniques. Now, we have literally half the number of universities even offering those degrees. And many of the remaining programs are in jeopardy due to smaller student enrollments. "Mining" simply is not that glamorous to the young people here in the first world who are choosing their professions. Fortunately, it gets better marks with students in developing countries. I have seen some very good engineers coming from other countries. But I do not think that relying on them to produce the bulk of our future leaders is going to be the long-term answer.

Our educators are keenly aware of this. They are replacing connotative terms like "mining" with socially benign terms like "extractive natural resources" and inserting fashionable terms like "environmental, social, and sustainable development" into their sales pitch.

We have a reasonably good technical handle on the environmental and regulatory aspects of mining. I think the bigger challenge is more along socio-political lines. Let's face it. Public perception of mining is generally pretty dismal. From a political perspective, we are a very small industry. The public most likely sees only the headlines about mining when something goes wrong. Antimineral groups are quick to highlight mining accidents or the impacts associated with historic and abandoned mines. While we must do everything we can to avoid the accidents, I doubt that our industry will ever truly get past the negative perception until we can adequately address the abandoned mine issue. Good Samaritan laws allowing for voluntary cleanups without assumption of liability make sense in this regard. We just need to convince our legislators how much sense it makes.

The internet has also had a huge impact on how our industry deals with its environmental and social responsibilities. Never before has information been so easy to

obtain, about anything, anytime, anywhere in the world. And never before have the special interest groups been so connected and armed with information. It has certainly introduced some new challenges from a transparency perspective to the way we as an industry conduct our business.

Perspectives on the metals and coal sectors. You have had experience in both areas.

My earlier comments about global demand for natural resources being influenced by growing mega-economies are probably more relevant to the metals business than to coal. The cost of domestic coal production and (especially) transportation largely limits US participation in the international marketplace. Our domestic coal business mostly supplies local markets, and competes with oil, gas and other energy sources. In my opinion, coal is our most reliable hedge bet for energy supply in the United States. As long as conflicts in the Middle East continue to destabilize oil prices and supplies, coal will be our "go to" resource. To stay competitive, our focus must be on continuing to improve clean coal technologies, combustion byproduct utilization, safe and stable storage of coal refuse, and health and safety issues associated with underground mining.

Your degree is in engineering. Your experience is international in scope. Any thoughts about the changes in technology you have seen over the years? Changes to come?

That is a loaded question. When I graduated from high school, my dad bought me one of the earlier hand calculators ever made. He then gave me his slide rule just in case I could not rely on that new and unproven technology. I still have that slide rule in my antique case.

The environmental side of the business was the cut-

Barbara Filas — varied professional background, longtime SME involvement

Filas earned a B.S. degree in mining engineering from the University of Arizona. She is a registered professional engineer, a certified environmental professional and a qualified mine-safety instructor. Since 1989, she has held increasingly responsible positions with Knight Piésold and several mining companies. She is currently president of mining and environment for Knight Piésold's global operations. Her consulting experience has taken her to a variety of projects in North and South America, Europe, Asia and Africa.

Filas has been involved with many SME committees and divisions. She represented the Coal and Energy Division as a member and chair of the Professional Registration Committee, was on its Executive Committee and was a member and chair of its Environmental Unit Committee. She represented the Mining and Exploration Division on its Environment and Reclamation Committee, its Executive Committee and as a standby alternate to the SME Board of

Directors. Filas was among a group of promoters for the creation of the SME's Environmental Division, which was established in 1997. She served as division chair in its inaugural year. Filas represented the Environmental Division on its Executive Committee, its Planning and Nominating Committee, as a member of the SME Board of Directors and as the Environmental Division representative on the SME Executive Committee and the Nominating Committee.

Filas is, perhaps, the only person in SME history to sit on the executive committees of three divisions and to represent two divisions on the SME Board of Directors.

SME's President is an avid supporter of student activities and career development. She was instrumental in founding the SME Student Mentor Program. And she currently serves as a program evaluator for the Accreditation Board for Engineering and Technology. ■

ting edge early in my career. Even so, we put the environmental-permit documentation together using typewriters and hand-cranked mimeograph machines. We did the drafting with Rapidograph pens and Leroy sets and copied the drawings using ammonia blue-line machines. Now, computers do everything. Drafting, word processing, mine planning, optimization; we do almost nothing by hand anymore. Our industry now uses some of the most technologically advanced systems and complex equipment available to modern industry. We miners probably know more about site remediation and reclamation than all of our industrial counterparts combined. My, how things have changed!

So my personal situation has been transformed by the technologies available over the years. But there are still plenty of places in this world where that calculator or mimeograph would be considered amazing technology to local residents. Many places I have worked in Africa and Latin America lack the fundamentals that we take for granted — like access to clean drinking water, adequate food supplies, educational opportunities and medical care. In-home luxuries like running water and electricity are cost prohibitive and likely to remain so.

That is why I support the opportunities that major mining investments bring to developing countries. Many special interest groups continue to challenge the World Bank Group and other development bank investments in the minerals and energy sectors. From what I have seen, though, those investments are essential to facilitating productive societal development. I have been to places where the local people had almost no potential to ever realize those taken-for-granted fundamentals of life that we enjoy every day. That will only change with the infusion of a significant economic engine in the region. A mining project can be a tremendous economic engine. I have seen the transformations that mining has brought to communities. Like everything we do, however, we can have very good results and sometimes not so good results. It takes effective planning, management and follow through to ensure success and, if successful, those people realize permanent, life-changing results.

Your thoughts on governmental impacts on mining; and the regulatory, environmental and safety impacts on operations.

As an engineering and environmental consultant, with clients who operate all around the world, I see applications of our industry in every imaginable setting. The only thing that I can consistently rely on is that every country is unique. Every regulatory regime is unique. Every company is unique. Every mine site is unique. Every mine plan is unique. Every mineral process is unique. Every environmental setting is unique. Every social culture is unique. And every local community is unique.

I find that the mega-companies tend to set their own

bar for measuring environmental, social, health and safety performance expectations in the countries in which they operate. In the first world, I think government requirements drove the actions and expectations for the industry, but that was done years ago. Those expectations are well established. That is not the case in the developing world. Government agencies are often not well organized or sufficiently funded to effectively set standards and enforce compliance.

So who steps in? Who takes responsibility?

Most major companies are, for practical purposes, self-regulating, having their “corporate standard” to meet at each project location. Also, more and more, I see the international lenders taking on the role in developing countries that government has played in the first world. The banks now recognize the risk they undertake when they invest in a project that does not conduct itself in an environmentally or socially responsible manner. I think that lenders, through their subscription to the Equator Principles, will have a far more significant effect on how our industry does business globally than any single government entity. Some 28 of some of the world’s largest international lenders now subscribe to the Equator Principles. These principles incorporate World Bank Group policies and guidelines for environmental and social responsibility into the signatory lender’s investment decisions.

The global bar for environmental, social, health and safety performance is already established. And instead of driving the process, many governments around the world will find themselves tailoring their programs along Equator Principle lines.

Okay, time for SME.

SME does a lot of things right. It also does a lot of things that can be improved upon. I could make a huge list of strengths and weaknesses. Instead, I think I will go for the alpha and the omega. Our strongest strength: Our books are without a doubt the best mining reference texts available in the world. Our weakest weakness: As an organization, SME does not appeal to the majority of our next generation of industry professionals.

I think SME will very pleasantly fade into the sunset if we cannot address our weakest weakness.

For many years, I have been hearing rumblings from both members and nonmembers that SME is in need of change, both in policy and structure, in order to maintain its current position and facilitate sustainable growth. SME’s financial condition and membership statistics are painful testimony that we cannot continue to do things as we have done them in the past and expect to survive as a member service society in the future. The mining industry is global. It extracts all types of commodities. It employs people in many professional disciplines. The industry is consolidating, to be more efficient. And it is

“If SME intends to maintain or grow its position in this marketplace, we must learn from what our industry is doing. SME must become as agile and efficient as our industry is, to serve the mining professionals of the future.”

using various media platforms to communicate information to its participants.

If SME intends to maintain or grow its position in this marketplace, we must learn from what our industry is doing. SME must become as agile and efficient as our industry is, to serve the mining professionals of the future.

Goals as president, areas on which you plan to focus.

Change is not easily facilitated through the existing SME organization and structure. So, over the past year I have been working with a group of high-energy individuals to consider "reinventing SME." We are facilitating this through an update to our existing Strategic Plan. In forming this group, I thought it would be critically important to get solid input from our younger members. We need to focus the strategic goals for the Society along a line that will attract and retain younger and older members alike.

A survey done a few years ago found that 51 was the average age of an SME member. That average age combines with our consistent decline in membership over the past 20 years. We must refocus our efforts toward better attracting and servicing our younger members. At the same time, we must not compromise the service we provide to all our members.

Our Strategic Planning Committee includes two recent-past student chapter presidents, a Young Leader, and several individuals in key SME leadership positions. Their average age is well below 51. The committee has been working together for a year to recommend some tactical changes to the SME Strategic Plan. These changes will catalyze some rather significant changes in SME. We will seek and expect to gain approval of the Strategic Plan modifications at the final meeting of the 2004 SME Board of Directors. The tentative implementation framework will then be posted on http://www.smenet.org/about/board_of_directors/smepresident.cfm

I know, this is a pretty tall task; one that some have questioned as being too much to bite off in just one year as President. I agree. But we have to start somewhere. I am prepared to jump in with both feet. And our 2006 SME President, Brij Moudgil, is jumping in right with me. As soon as our 2007 President is identified, he or she can prepare to get wet too! I cannot and will not do it all. My goal for 2005 is to establish the framework and build the momentum. Brij and others are more than capable of following through.

So how does SME's Strategic Plan tie into the industry?

The idea of a Strategic Plan for SME is to define the role of the Society in addressing the industry's challenges and problems. If our Vision, Mission and Goals do not establish a clear target of the role we will play, we will have missed the boat, and it will not get past the Board. Here is what we are recommending:

VISION (Recommended for Board Action): SME will be the premier professional society for the worldwide mining and mineral community.

MISSION (Recommended for Board Action): SME will aggressively provide value to our members and improve the image of our industry by:

- Supporting every industry professional and student by the technical and professional development products and services we offer;
- Strengthening the networks among global industry professionals;
- Enabling the exchange of information and ideas for the advancement of the industry; and
- Engaging in proactive collaboration among industry, associations, government and academia.

GOALS (Recommended for Board Action):

Goal A: Establish an operationally efficient and financially profitable organization.

Goal B: Develop and sustain a quality membership base.

Goal C: Provide timely, relevant and high quality products and services to SME members and industry professionals.

Goal D: Provide a forum for strengthening the personal and organizational networks among industry professionals all around the world.

Goal E: Provide the tools for information exchange within and outside the Society.

Goal F: Create a platform where the global mining community professionals can speak with one united voice through the proactive collaboration with other like-minded societies and organizations.

Assuming Board approval, our updated Strategic Plan will form the basis for SME business activities and decisions beginning with the March 3, 2005 Board meeting. We will use the Goals as our agenda outline for Board meetings. This will be done to focus our discussions and decisions in ways that always get us closer to achieving our Goals. We will rely on the SME leadership at all locations to champion this new culture throughout the organization, where every division, committee, region, local section, and staff member also uses these Goals as their template for decisionmaking.

I was pleased to see the article in the January issue of *Mining Engineering* (page 65) in which the Mineral and Metallurgical Processing Division leaders have already taken some impressive steps toward reorganizing and revitalizing their division. SME can be whatever our members want it to be. We can and will change. The momentum is already started, but there is still a lot of work to do.

Comments to members – areas and activities you think are important.

SME is your society. We are all volunteers. It is not enough to sit back and complain that "they" are not doing things right at SME. "They" are you, and "we" need to make this happen. If you do not like something; if you have ideas to make something better; if you have new ideas; if you want to get involved; please, let us know. Come to a meeting, send a letter or an e-mail, post something on the "Ask the President" page on the SME website (I will respond).

Reinventing SME will take a huge and committed effort from a lot of people. We do not have all the answers. We need fresh ideas, out of the box thinking and young member engagement. We cannot, and will not, continue to be your grandfather's SME. ■

Filas updates strategic plan, qualified person

Now, it has been one big blur since the SME Annual Meeting in February and the March issue of *Mining Engineering* when I last provided an update on what is happening at SME. So, in addition to all the things that SME normally does — like accreditation of university minerals engineering programs, professional registration for minerals engineering disciplines, providing useful and accurate information on mining to science teachers, publishing the best mining reference books and magazines in the world, and organizing and participating in the highest quality trade shows and short courses — here is an update on some of the other things we are doing that are unique to SME 2005.

Reinventing SME

My interview in the March issue of *Mining Engineering* gave some background on the new Strategic Plan that was presented to the SME Board of Directors at its February meeting. The plan has now been approved by the board and the implementation process is under way.

I will not repeat what I said in March. But, by way of background, I spent last year working with a great group of individuals to consider “Reinventing SME,” facilitated through the Strategic Planning process. Our membership numbers, especially for the under 40 crowd, are painful testimony that we have no choice but to do something different if we intend to be in business a decade from now. Our focus was to look at what SME must do as a professional organization to better service its younger members. At the same time, we must not compromise the overall services provided to all members.

Reinventing SME is a tall task. It is also a pretty intimidating one, considering that we all have day jobs to juggle amidst our SME



Barbara A. Filas,
President, Mining and Environment,
Knight Piesold.

volunteer activities. But I believe that we have no choice. To me, SME looks a lot like Social Security. We have a system that has served us well in the past. But, given our current statistics and trends, will not be sustainable in the future.

We have to do something different. The challenge is to get the majority of our membership, the old folks like me, to accept that it really does not matter how comfortable we are with the old system. The old system is just that — old. We must reinvent ourselves to be sustainable for the next 50 years and beyond.

So in 2005, SME is taking the 10,000 foot look at the society in the context of its new Strategic Plan. Brij Moudgil, 2006 SME President, has organized a committee to look at how we market SME. As a technical society, we have to do something valuable for the industry. We also have to be highly effective in getting it out to the broadest range of industry professionals all over the world. That means how we provide value to new members of all ages and how we disseminate our products and

services. And the focus needs to be on attracting that next generation of industry professionals. That is a big gap in our current membership base.

So Moudgil is looking at how SME is marketed to the next generation. And Jim Arnold, 2007 SME President, is making sure that we have the best organizational structure to facilitate Moudgil's marketing efforts. Arnold's governance group will make recommendations on how we can streamline the organization and be more efficient. This will challenge the current structure of SME and add and subtract committees and divisions to best serve the future SME member.

Both of these committees, marketing and governance, are organized and working hard. We are early in the process, but I am very encouraged by the ideas that are coming out of both groups. More to come on this as the committees come in with their preliminary findings and recommendations at the midyear board of directors meeting in September.

Mineral valuation and reporting

One of the most useful things that SME is doing right now for the benefit of the mining industry is facilitating the establishment of consistent methods for the estimation and reporting of mineral resources and mineral reserves with the U.S. Securities and Exchange Commission (SEC). Under the leadership of J.M. Rendu, the SEC Reserves Working Group and the SME Resources and Reserves Committee (the Working Group) have been working to establish a broad representation of the mining industry's position concerning issues related to the public reporting of mineral resources and mineral reserves.

SME is the leading U.S. and

international mining engineering professional society. SME recognized that it should play a key role in assisting the mining industry in resolving some widely recognized issues while taking into account the SEC reporting requirements for mineral reserves and other international reporting guidelines. Along with other members of SME, Rendu met with SEC staff in April 2003 to determine what that role should be. It was concluded that an industry position should be developed and submitted to the SEC staff for its consideration. The Working Group was formed in March 2004 to develop industry recommendations while taking into account the mission of the SEC to protect investors and to maintain the integrity of the securities markets. The Working Group is composed of members of prominent mining, consulting and accounting organizations. Its recommendations were submitted to a large number of reviewers. Their views and recommendations are also integrated into the final recommendations.

SME submitted those recommendations to SEC on April 30, 2005. We expect to schedule a meeting to discuss the recommendations and determine how best to move forward from here.

Along with the estimation and reporting guidelines, there is the need to meet SEC expectations for "qualified persons" who prepare those resource and reserve estimates. To that end, at the Annual Meeting in Salt Lake City, the SME Board of Directors approved the development of a new membership category within SME that will accommodate the qualified person. In addition to the member categories we have today, a membership category will be added. It will be subject to specific admission criteria, an enforceable code of ethics and a process for disciplinary action. All of these are required to meet SEC expectations. SME is proceeding with the development

of this new category of membership under Dan Eyde's leadership. It will be in place by the end of calendar year 2005.

Minerals education sustainability

I mentioned that SME looks a bit like Social Security in terms of its aging membership. Many of the major mining companies also look quite similar in terms of the age distribution of their staff. A number of major mineral producers are looking at their current executive management team and realizing that most will retire within the next decade. And very few are standing in line to take over the leadership roles when the current team retires.

Traditional economic theory would tell us that the law of supply and demand will kick in. As the industry demands more professionals, the universities will supply them with plenty of qualified graduates. It sounds good, but the reality is that the boom-bust cycles that have plagued the mining industry really took a toll this last time around. During the last decade, the number of universities that offer minerals engineering programs was cut literally in half. There are only 13 schools left offering engineering programs tailored for the minerals industry needs.

The dilemma is that students these days are not interested in going into "mining" or "mineral processing." This might be because they are not familiar with the opportunities. More probably, however, mining is perceived as a "dirty" business. The demand is there. But our universities cannot provide the supply of new engineers needed because we do not attract the students at the university level. And universities make business decisions every day on which programs are worth keeping and which ones are not. The programs with the fewest students are clearly most vulnerable.

One of SME's core programs is the accreditation of minerals engi-

neering programs at the universities. SME works with the Accreditation Board for Engineering and Technology (ABET) to ensure that the curriculum offered at the remaining universities is adequate to meet the criteria for program accreditation. This is important. Most state licensure boards require that a candidate for a professional license have a certain number of years of experience. And the person must have graduated from an accredited university in order to qualify to take the examination. If the degree is from a non-accredited university, the number of years of experience required to qualify is increased. That detracts from the program.

Every year, there are fewer and fewer organizations focusing research on minerals industry challenges. We simply cannot let our minerals engineering programs go away. They are our best opportunity for keeping our industry on the cutting edge. Without ABET accreditation of those programs, we are very much at risk of losing the remaining few.

We need to have at least 10 accredited minerals engineering programs in the United States to maintain the accreditation process. We are down to 13 now. And those programs continue to struggle with the campus politics of lower enrollments than some of the other engineering curricula.

We all need to be on the same page on this. I have heard some people say that perhaps we should consolidate our minerals engineering programs into a single school in the east and one in the west. This would make enrollment numbers more acceptable to university decision-makers. Now, if we need 10 to maintain ABET accreditation, that idea leaves us about eight short of where we need to be.

Recognizing this, SME formed the Minerals Education Sustainability Task Force. Its job is to determine what the industry can do to ensure the sustainability of the

minerals education programs in our universities. At the Annual Meeting in Salt Lake City, the Task Force held a roundtable session to discuss the issues, trends and best practices in engineering education. The session was well attended. There was some good dialogue. A followup Solutions Workshop is in the planning stages.

The core leadership of the committee met in June. They discussed the format, goals and responsibilities for the Workshop, which is tentatively scheduled for June 2006. The title will be something like "A Leadership Forum: Shaping the Professional Mining Industry Workforce of the Future." The committee is looking into co-sponsorship and organizing details. It has tentatively selected Park City, UT as the venue. The forum will be by invitation only to select members of industry, academia and industry (mining companies and service support companies). The goal is to build champions for the Minerals Education initiative.

Concurrent with this, the presentation summarizing the facts

about the education situation as presented by Newmont's Rich Perry at the roundtable in Salt Lake City was provided to Jack Gerard and Bruce Watzman of the National Mining Association (NMA). The information was subsequently presented to the NMA Board of Directors at its March meeting in Phoenix, AZ. A coordination meeting among SME and NMA is being arranged. Strategies, review current initiatives and roles and responsibilities between the two organizations will be discussed.

2006 SME Annual Meeting in St. Louis

The Annual Meeting is something SME does every year. But the 2006 Meeting in St. Louis, MO will be something special. Alongside the regular meeting, SME is also hosting the Seventh International Conference on Acid Rock Drainage. Several other like-minded organizations are also co-locating their annual meetings concurrent with the SME Annual Meeting. We will be hosting perhaps the most integrated mix of

mining professionals and professional development opportunities that can be found anywhere.

We have a lot of work to do at SME. My day job sometimes affords me the ability to take the process and implementation into my own hands. But I am constantly (and sometimes painfully) reminded that SME work can never be micromanaged by one. Instead, it is always the concerted effort of many. I will only be SME president for one short year. My goal is to get things started, keep things moving and rely on my successors to continue to move us on wherever we need to go. These are exciting times for SME. We are facilitating real change; in mineral reserves and reporting, in minerals education, and in our own organization as a whole. It is a great time to be an involved member of SME.

One last thing: my thanks to Rendu and Marc Le Vier for keeping me honest on some of the content of this article and also for their tireless efforts (and that of many others) on mineral valuation and education issues. ■

RESERVES AND RESOURCES REPORTING

SME submits reserves, resources reporting recommendations to SEC

J.M. Rendu

In the United States, public reporting of mineral reserves is subject to rules specified by the U.S. Securities and Exchange Commission (SEC), including those contained in the U.S. SEC Industry

Guide 7. For several years, the mining industry has recognized a need to clarify these rules.

In 2003, the Society for Mining, Metallurgy, and Exploration, Inc. (SME) met with SEC staff in Washington, D.C. to determine how SME could best assist the mining industry in reaching this objective. Also in 2003, the SME organized an international conference in Reston, VA, to discuss issues related to the public reporting of mineral resources and mineral reserves. It was established that

SME should develop industry recommendations and submit them to the SEC for its consideration.

In March 2004, the SME formed the SEC Reserves Working Group/SME Resources and Reserves Committee (the Working Group) to achieve the following objectives:

- Develop an industry position with respect to the following five issues concerning the public reporting of mineral resources and mineral reserves:

J.M. Rendu, member SME, is chairman of the SEC Reserves Working Group/SME Resources and Reserves Committee.

Top 10 great things about Jan Nichols

grows all the plants that cats love.

7. She's an appreciator of fine art and graphic art — especially cat art.

6. Her favorite holiday is Halloween because — of course — she loves cats! See #8 for the amazing costumes she has made for her daughters and granddaughters.

5. She is a very generous and giving person — and always shares her books on cats.

4. She raised a daughter who rescued a very special member of my family, a totally black, male cat named Ninja.

3. She loves good classical music and soft jazz, which she

shares with her cats.

2. She is a fountain of interesting stories about the most usual and unusual people — and cats.

1. No matter what the problem — she is always willing, even anxious, to help (especially if it involves a cat.)

Georgene Renner

The ballad of Jan and Tim

Barbara Filas, 2005 SME President

Here's to a special twosome,
their names are Jan and Tim.
They worked for us at SME
and not for CIM.

For many years they helped us.
Our products they inspired.
And after all their years with us
they both up and retired.

One day in late September
they both made true their fate.
They said no parties, gifts or
songs we might facilitate.
But we can't just send them packing,
we can't just let them leave
without recalling just a few
fond special memories.

Jan was the main assistant to
the Executive Director.
I guess that means she ran the place
and helped the staff and Board.
She served for five Directors
and would always deftly bring
the work to a sound end, no doubt
a "herding cats"-like thing.

Now Mining Engineering
is the legacy of Tim.
The quality and content is a
great tribute to him.
He constantly improved the rag.
His deadlines he'd get done.
And in all those years he's not let in
a single contraction.

Now one's the staunchest
Democrat,
a big Bill Clinton fan,
who'll argue with Republicans.
That's obviously Jan.
She'll always use great poise and
tact and never tries to push
her bizarre politics on us

unless the subject's Bush!

Tim always seems a quiet guy
in his years at SME.
He's a wealth of information
on Societal history.
He's always willing to pitch in
I guess that's how it goes
'cause he always has the answers to
those questions. Right "Kiddo"?

Jan's not big on technology.
It makes her go berserk.
She hates those radios we use
to make Annual Meetings work.
One time by chance she turned hers
on and chirped just like a bird
until she finally realized
that everybody heard!

Tim always seems so serious,
but it really comes and goes.
He's not above a joke or two
to keep folks on their toes.
There's always some poor victim
who inside his desk would reach.
And then we'd hear that well-
known sound,
the rubber spider screech.

Jan always helps an animal.
She's on top of the Xerox
saving mice trapped in the ceiling
tile with that big old cardboard box.
Sometimes she's in the driveway
laying flat on her belly
saving ducks that'd fallen through
the grate
and setting them all free.

Tim knows we all are getting old.
When he writes his articles
for Mining Engineering,
he wears his spectacles.
I guess it's just expected when
we read with these old eyes,
we appreciate the Editor

with a "thing" about font size.
You can see they both are gifted
with those "people" qualities
we all aspire to be more like
but few will ever be.
We're lucky to be able to
call Tim and Jan our friends.
They give so much and then expect
So little back again.

They both have strong foundations
with the ones who wear their rings.
For Jan it's Doug, for Tim it's Gail,
the winds beneath their wings.
They're always at their very best
in everything they've done
because they've had the full support
of Doug and Gail back home.

We all shed tears for Gary;
it was a tragic day.
A shock to loose both boss and
friend
watching an Avalanche game.
But knowing him was better
than never having met.
It's a shame we said his last goodbye
by paying last respects.

So to say goodbye to Tim and Jan
our hopes and cards seem spare
to compensate for all they did
and the loyalty they shared.
They've been an institution,
combined forty-one years.
We cannot thank them both
enough. They gave us their careers!

So here we end our ballad,
the Jan and Tim story
They're at the very heart and soul
of our Society.
So toast our good friends Tim and
Jan; a cut above the rest.
It's an honor to have known them
and we wish them all our best. ■

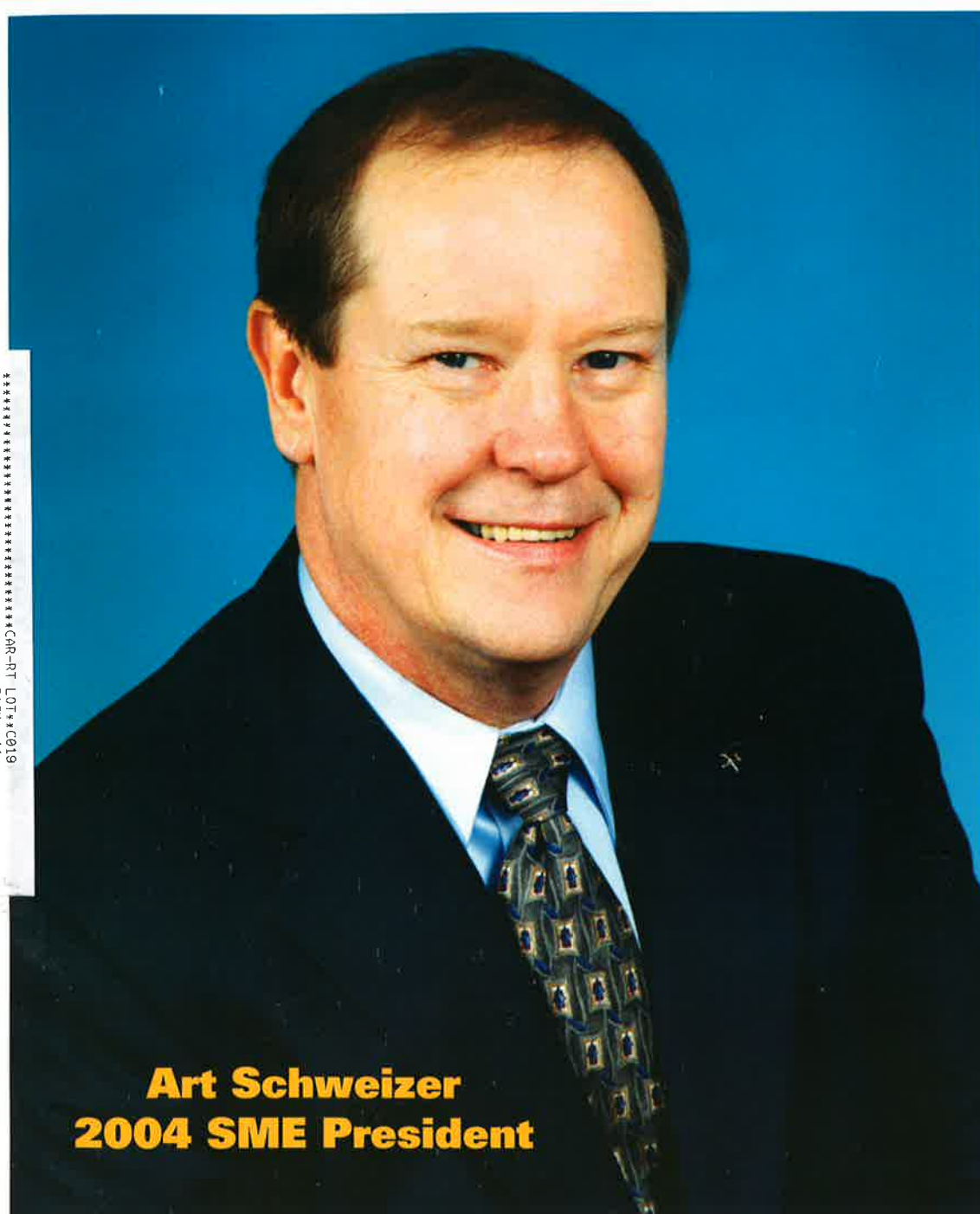


MARCH 2004

Mining

ENGINEERING

A PUBLICATION OF SME



Art Schweizer
2004 SME President

110976
J Steven Gardner
MINING CONSULTG SVCS INC
340 S BROADWAY STE 200
LEXINGTON KY 40508-2553
*****CAR-RT LOT*0019
SACK: 11
PAL: 0
PACK: 1

Art Schweizer: an interview with the 2004 SME President

Let's start off with your assessment of the mining industry.

Today, the status of the mining industry is stronger than it has been over the previous few years. While mining continues to be a major part of the world's economic foundation, the industry is gaining strength due to rebounding metals and minerals prices. And now, with these rising prices and the changes the industry instituted during the years when mining-related commodities were selling at low prices, our stronger, more productive and internationally competitive industry should flourish.

Mining remains an essential business and the industry is far ahead of the game when it comes to the trend of globalization as a key to sustained growth. Also, the industry continues to realize increased productivity through technological innovations. And an increasing number of countries are moving towards capitalism, which opens doors for exploration and mining within their borders. After looking at all of these factors, I believe that the mining industry will only continue to gain momentum in the future.

Changes you have seen in mining.

Mining has changed considerably over the last several decades, and these changes will have a decided impact on the future of the industry. As far as I am concerned, the biggest of these changes is the fact that the United States has not maintained its status as being a safe and economic haven for mining industry investments. Mining operations in the United States have suffered significant costs from regulations and obstacles presented to them by communities that have potential metal and mineral deposits. Due to these environmental regulations, it is difficult to develop new mines in the United States. As a result, companies are turning their efforts towards international operations.

Internationally, environmental regulations do not exist to the degree that they do in the United States. In most countries, a new mining venture is welcomed and embraced as an opportunity to raise the standard of living for that locality. So I see the mining industry continuing with its focus on international development. The United States will be left with only its existing mines and a reliance on importation for its metal and mineral necessities.

The results of this international focus?

The mining industry faces several challenges with this move toward international business. To begin with, the Chinese and the countries from the former Soviet Union are starting to develop into industrial powers. This development means that their focus will continue to move from exporting their metals and minerals to consuming them. Furthermore, this international movement will dramatically affect the mining industry in the United



States with these substantial consumption demands. The U.S. mining industry will be forced to focus its efforts on technological advancements in order to increase production at lower costs from deposits of lower grade.

In comparison, the development of new deposits in foreign countries seems to focus on sustained growth rather than technology, due to their higher grade deposits. All in all, I see this trend of international development continuing and forcing the United States to compete for its metal and mineral resources.

How do you differentiate here between the metals and industrial minerals?

There are several differences between the industrial mineral and metal sectors of mining. First, the metals side is controlled by global marketing, international economics and worldwide pricing set forth by the London

Metal Exchange. Industrial minerals tend to be local-market commodities that depend on transportation and availability for their pricing structure. Having been involved in both sectors, I find that it requires a different focus. The metals sector emphasizes cost of production, transportation to market and international competition. On the other hand, the industrial minerals business stresses marketing, product development and local consumer demand.

I have also experienced differences in both sectors regarding the environmental regulations governing them. For years, the metals side of mining has taken the brunt of the regulations. And although recent years have brought many of these regulations to the industrial minerals sector as well, my familiarity with both sectors has been that an industrial minerals operation is far less scrutinized. Even though both sectors have big differences and require different focus, I have thoroughly enjoyed the challenges of both.

What about the government's role in mining?

In my experience, the role of government in mining continues to make mining in the United States more and more difficult. Government regulations usually come about as a result of public outcry. The public develops false perceptions of mining due to a lack of education or as a result of some impact that mining has had on the environment of their community. In most instances, people tend to favor mining once they understand the impact that it has on their quality of everyday life. Therefore, it is the mining industry's responsibility to

educate people about the necessity of mining.

The industry must not ignore its critics. Some environmental groups and organizations, formed for the good of society, have now become platforms for those who think their point of view should be acted upon as long as there is an economic gain enabling them to justify their position and keep their job. Instead, the mining industry must communicate more effectively than its critics. With such education, I believe that the industry will receive far less bashing and fewer environmental regulations.

Your thoughts about the current state of SME.

Over the past few years, the financial condition of SME has slowly deteriorated as a result of declining membership. Each year, we try to present budgets that do not accurately reflect the practical aspects of the business of SME. In fact, we have been relying on the investment income from our endowment for too many years. When the stock market declined, it became evident that SME must implement changes and focus on developing a new financial plan or face financial hardship.

The new financial plan will produce a balanced budget that does not depend on gains from our investments. In order to do this, we will have to decrease the services that we provide or increase their revenues. Presently, the cost of registration for SME's meetings and the SME membership dues are among the lowest of all similar professional societies. We are subsidizing these low fees through our investment income. In order to move away from this poor business practice, we must eliminate

Art Schweizer — varied metals and industrial minerals experience

As a child growing up in New York, Schweizer never thought that he would someday be working in the mining industry. It was through a stroke of fate that while working one summer in Montana as a teenager, he was struck with gold fever. That created a desire to know more about how to extract precious metals out of rocks. In turn, this aspiration influenced his future plans to go to college, to pursue this field of study.

Schweizer is a 1970 graduate of the University of Missouri-Rolla with a B.S. degree in metallurgical engineering. In 2000, he was selected to receive a professional degree from Missouri-Rolla's Metallurgical Department in recognition of his professional accomplishments. During his 30-year career in mining, he worked for Phelps Dodge and Carlin Gold Mining Co. before settling in with Cominco American. Over his 20 years with Cominco, he lent his talents to the study of copper, lead, zinc, garnet, gold and silver processing techniques. After many years in operations, he advanced to become the senior operating manager for Cominco in the United States and consulted for several other Cominco operations around the world, for startup and operating procedures.

In addition to having the experience of starting up three operations, Schweizer was responsible for the closure and reclamation of several operations in

the United States. With this unique experience history, going from startup to closure to reclamation, Schweizer has a good understanding of issues relating to the mining industry.

In 1998, Schweizer retired from Cominco American to go into business for himself. He purchased Green Diamond Sand Products, an industrial minerals operation located in Riddle, OR. He focused his efforts on developing and growing this unique sand business. During his five years as owner of Green Diamond, the company has grown and expanded at a rapid rate through new market strategies, new product lines, and the acquisition and startup of a new distribution and recycling plant in Portland, OR. Drawing from his experience working for large mining companies, Schweizer is responsible for taking Green Diamond to a higher level. He looks forward to the company's continued success.

Schweizer has been involved with SME both locally and nationally for more than 30 years and has advanced through the Mineral Processing Division (MPD). Prior to becoming involved in the MPD, Schweizer served as an officer in local sections in Arizona, Nevada and Missouri. Recently, he has served several years on the SME Board of Directors, on the SME Investment Committee and as the SME Vice President of Finance from 1998-2001. ■

waste, reorganize the society, eliminate dormant committees, and find new ways to perform SME business at a reduced cost.

We are already doing some of this.

By reviewing all the services that SME provides, trying to project the needs to perform them, and developing new services that will generate income and attract new members, we have already started exploring a new financial plan for SME. However, we still have a long way to go. We must continue to emphasize this area so SME can thrive in the future.

Membership is the critical element here.

As I already discussed, a solid financial plan requires the expansion of SME's membership base. We need to look into new ways of attracting more people to this organization. To do this, we need to change the requirements for membership in our society. Right now, SME is a society comprised of professional people. In my eyes, we should not limit ourselves to this designation. I feel that we could benefit greatly by becoming a society of the mining industry. This idea would open membership to people at all levels of mining. These people are already attending our local-section meetings, to better educate themselves about the industry. Even though many do not hold engineering degrees, they have on-the-job experience that could benefit the society. Expanding our membership will not only help us financially but can make us a more knowledgeable society, as well.

Where would you like to see SME in 5-10 years?

In the future, I think SME needs to accomplish several things to enhance its standing. Obviously, we must first become financially sound in order to run the business side of SME properly. Then, we need to focus on expanding memberships to help us financially and to build our voice and exposure in the community. Next, a more active role in joining with other international mining societies is necessary.

A global mining society that can pool its resources together to educate people about mining will benefit this industry by providing a strong, educated voice against its opponents. And finally, I would like to see stronger corporate support from mining companies, to highlight the importance of SME. As with all business, a solid, future plan is required for this organization. During my year as President, I plan to implement ideas that will help us achieve it.

What, then, are the goals for your presidency?

As SME president, my first goal will be to work with the new Executive Director for the society. I am grateful to John Orologio for postponing his retirement to assist the society as acting Executive Director. With Orologio's assistance, I hope to be able to educate and bring up to date our new Executive Director as soon as possible. With our new Executive Director, we can move forward with our future plans for the society. I also want to thank the SME Search Committee for its quick efforts in completing the unenviable task of finding a new director.

Secondly, I would like to put together a solid business plan for the society. This plan will undoubtedly help us become more financially sound by guiding our efforts

for operating balanced budgets, providing services sought by membership, eliminating unnecessary services and committees to reduce the workload of the staff, and providing direction to our new Executive Director. As everyone knows, a solid business plan provides a blueprint for how an organization is run. Therefore, it is time that SME begin doing business in the same manner as all other businesses.

In addition to finding a new director and developing a business plan, I look forward to continuing the initiatives developed by our past presidents. Former SME presidents Tom O'Neil and Ta Li stressed the idea of developing relationships with the other prominent international mining organizations with the hope of someday forming a global mining society. I plan to continue this initiative through further development of these relationships and by increasing opportunities for our international friends to meet with us. By pulling the resources of all mining societies together into one global mining society, I believe that we can only strengthen our entire industry.

What else?

Next, I plan to continue the work of past SME president Mike Karmis and expand our membership within the aggregates industry. In order to appeal to the many mining engineers now associated with this industry, I feel that it is of the utmost importance to continue growing our aggregates committee. We need to let the people involved in the aggregates industry know that SME is focused not just on hard-rock and coal mining. By providing professional development services to the aggregates industry, SME can only benefit from this by bringing in new members and retaining members who have moved into the aggregates business.

Finally, I plan to increase the use of the Internet and electronic publishing. Former SME Executive Director Gary Howell and past SME President Don Ranta started the society in this direction, and it has proven very beneficial. As far as I am concerned, I would like to see us use it even more. The Internet has already proven itself as a great tool for communication and as a popular source for mining information. I feel that we can further the success of the Internet by expanding the services we provide on it. As we move toward a paperless society, SME can move more of our services online, as well. My ideas include things such as electronic voting, listing of committee activity reports online, and providing a place to share technical information. Considering that providing these services over the Internet would eliminate the time consumption of paper distribution, the result will be reduced administrative costs. Therefore, in sticking with my goal to be a financially sound organization, the Internet will be a key tool.

Any final comments?

In closing, I would like to thank the members of SME for their continued support of our organization. SME and mining have afforded me many great opportunities and relationships. Truth is, I cannot even imagine my life without them. As President, I look forward to helping this great society give many others these same opportunities. Through hard work and determination, I know that the extraordinary people in all aspects of the mining industry will thrive and strengthen SME. ■



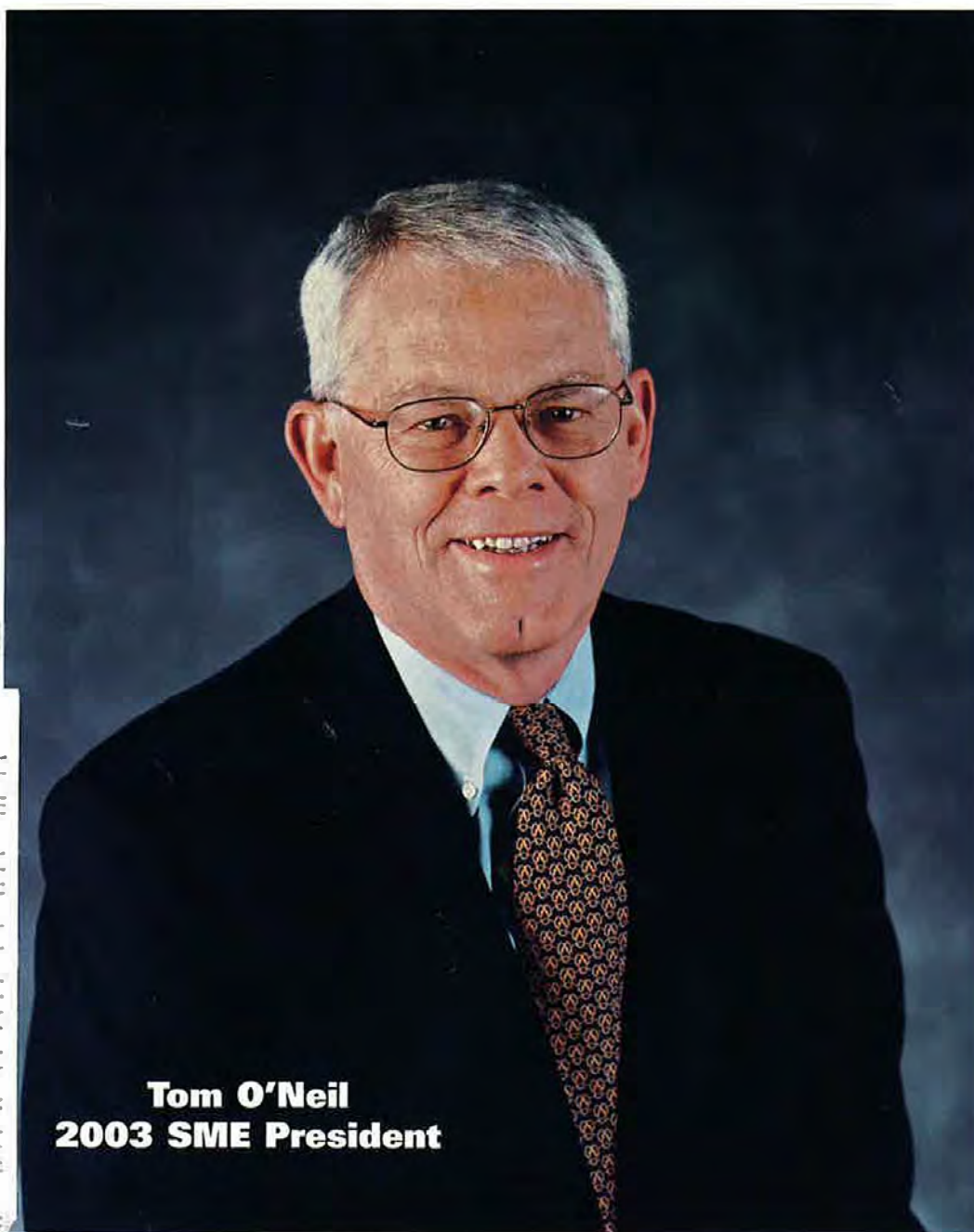
WEBSITE:
www.smenet.org

MARCH 2003

Minning

ENGINEERING

A PUBLICATION OF SME



Tom O'Neil
2003 SME President

1110970
J STEVEN GARDNER
MINING CONSULTING SVCS, INC
340 S BROADWAY ST STE 200
LEXINGTON, KY 40508-2533

Tom O'Neil: an interview with the 2003 SME president

The status and outlook for mining, in your view.

Minerals remain a major part of the world's economic foundation. The fortunes of the mining industry rise and fall with general economic trends, but mining is no less important today on a global basis than it has been historically. Certainly, portions of the industry are critically depressed — domestic copper to name one area — but other sectors are prospering. Mineral consumption, both worldwide and in the United States, has increased steadily since the Great Depression, hitting all-time highs in 2000, the last year for which I have seen data.

The highly developed economy in the United States tends to obscure the continuing importance of minerals here. But in less developed nations the critical nature of minerals is obvious and well accepted. In short, although there is no shortage of problems or challenges facing mining — there never has been — mining remains an essential business with great global opportunity.

You distinguish between the United States and the rest of the world?

There is no question that every sector of our economy is affected by world events more than ever before. This is certainly true in mining. Falling trade barriers have aided mineral development around the world. Meanwhile, American producers have been burdened by a highly valued currency.

For commodities traded in U.S. dollars, like iron ore, having production costs in local currencies rather than U.S. dollars has been an advantage. Even if the levels of performance and service in such areas as environmental and health care are similar — and they often are not — the U.S. dollar costs of such items have placed our domestic industry at a major disadvantage. To survive in such a competitive environment requires leadership in technology and productivity, areas where SME is a significant player.

In my view, globalization is an irresistible force. Overall, it is good and will raise living standards worldwide. Certain industries at certain times have been severely and, sometimes, unfairly impacted. But, on balance, we are all richer for declining trade barriers.

In mining, this means that minerals with high intrinsic values can and will be transported long distances to market, unfettered by trade or other political distortions. Certainly, a partial result of globalization has been the continued long-term decline in real prices for minerals and the consumer products derived from them. This worldwide marketplace has sometimes forced unpleasant discipline on producers, but it certainly has been good for consumers.

This minerals globalization means the United States will no longer be a major supplier of certain minerals.

I would have to say that this is probably true. There are three conditions needed for a thriving, prosperous



mining industry. First is the mineral endowment. Mines only exist where there is a natural occurrence of valuable minerals. It is odd how many educated people miss this obvious point. For many commodities, the United States still ranks high on mineral endowment.

Second, there must be economics — pricing and production costs — to support the often substantial investment necessary to produce the minerals. This includes the minimum risk-adjusted return on capital acceptable to the investor. For many commodities, the United States still ranks high on mineral endowment.

The final need is a fair and stable system of laws and regulations that enable development to proceed. Here is where the United States is perceived by many investors to be politically risky. It ranges from difficult to impossible to build a large, new mine in the United States. This is due to the ever-shifting sea of regulations, political pressures and Americans' regrettable tendency to litigate almost everything.

As a result, many firms consider it excessively risky to spend significant capital on minerals exploration or mining-project development in the United States. This, coupled with higher geologic risk, is adversely impacting the production of many minerals in the United States. I

say this not in a pejorative sense, but simply as a statement of fact. Fortunately, the United States is wealthy enough to afford such choices, because we still have a voracious appetite for minerals.

What about the area of minerals education?

SME has a long history of support for minerals education in the United States. This is a commitment that I intend to renew and strengthen. Unfortunately, with a few notable exceptions, minerals engineering education is in a weakened condition nationally. The enrollments and the faculty sizes of a number of mining programs have fallen below sustainable levels. These programs have become very vulnerable, particularly in light of the financial crises being experienced by nearly every state.

What is the solution?

I don't know. But I can tell you the mining profession has changed more rapidly than some of our academic programs. In a trend that is affecting many other engineering disciplines, information technology has made us much more productive. So mining engineering departments are just not as large as they once were. And operating organizations are flatter and leaner.

On the other hand, the biggest employer of new mining engineering graduates in recent years has been the booming stone and aggregate business. Better technology and professional management are becoming more important here as competition becomes more intense.

Some new thinking is needed to redefine higher education in the minerals area. This includes mining engineering, minerals processing, extractive metallurgy and geological engineering. We need to address the unique sciences and technologies that comprise these fields, to demonstrate the vitality of our professions. This must be reflected in accreditation standards, which sometimes lag behind industrial trends.

The last couple of years, sustainable development has been much talked about.

Sustainable development is a concept that has resonated with activist groups throughout the world, but particularly with respect to developing nations. These nations are often natural-resource rich, but stuck in poverty and victimized by weak leadership and poor policies. It is the vulnerability of such nations to environmental and social abuses that has given rise to the triple-bottom line of sustainable development.

My predecessor, Mike Karmis, formed an ad hoc SME committee to make recommendations on how the Society should contribute to the sustainable development dialogue. We intend to highlight this topic at the 2004 Annual Meeting in Denver.

As it evolves, sustainable development will impact the way mining people approach development. On the other hand, it is important that we also expose political agendas that are riding the coattails of sustainable development. In particular, **responsible** mineral development still offers the greatest opportunity for economic growth and improving the human condition in many parts of the world.

In our eagerness to embrace the virtuous precepts of sustainable development, we must not forget that mining can create the commodity most urgently needed in vast parts of the world — wealth. Sustainable, responsible development — yes, but the **lack** of development is often the worst outcome.

What are the major issues facing SME in 2003?

You would have to say the financial condition of the Society is one of the most important issues.

As everyone knows, we have been experiencing a slow, long-term decline in membership (another important issue, by the way) and this has resulted in declining revenues. For several years, SME has tried to slow this membership loss by underpricing its services and making

Tom O'Neil — academic and operational excellence

Tom O'Neil received this year's AIME William Lawrence Saunders Gold Medal. O'Neil was cited for his outstanding contributions through strong leadership of Cleveland-Cliffs; extensive achievements in the ferrous and nonferrous metals industries; advancement of academic excellence; and service to the industry through communications, public relations and active participation in professional organizations.

O'Neil is president and chief operating officer of Cleveland-Cliffs Inc. He is also president of The Cleveland-Cliffs Iron Co. and Cliffs Mining Co. He joined Cliffs in 1991 as senior vice president-technical, with responsibility for Cliffs' research, engineering and technical support for business development. In 1994, he was named executive vice president-CCI operations and technology, with responsibility for Northshore Mining Co. in Minnesota and company-wide technical and related services.

Prior to joining Cliffs, O'Neil spent 10 years with Cyprus Minerals Co. and its previous owner, Amoco Minerals Co. While there, he served in various capaci-

ties, including vice president, engineering and development; vice president/general manager, Cyprus Sierrita Corp.; and vice president, South Pacific Operations, stationed in Sydney, Australia.

Before joining Amoco, O'Neil was professor and head of the Department of Mining and Geological Engineering at the University of Arizona, where he was a faculty member for 13 years.

O'Neil holds a B.S. degree in mining engineering from Lehigh University, a master's degree from the Pennsylvania State University, and a Ph.D. from the University of Arizona.

O'Neil is active in several professional societies, including SME, where he has been a director, vice president-finance and is now president. In February 1999, he was elected to the National Academy of Engineering. O'Neil was also a director and chairman of the American Iron Ore Association (1998, 2000 and 2002). He is also a director of the National Mining Hall of Fame and a director of the Mineral Information Institute. ■

up the shortfall with investment earnings from our modest endowment. I think you see where this is going. As nearly everyone with a 401(k) knows, “investment returns” has been an oxymoron for the past three years. So we have worn away some of the corpus to pay the bills.

This circumstance clearly cannot last forever. I am confident that we will see positive investment returns in the not-too-distant future. But they will likely not be as strong as they were in the 1990s. So prudence dictates that changes must be made. We will be considering a lot of different approaches. We must enhance the value of SME membership and, at the same time, place the Society on a sounder financial footing.

One of my goals is to leave the society better off financially than when I started and still have it be a “best buy” among professional societies.

You also mentioned SME’s membership decline.

I have been an SME member since my undergraduate days 40 years ago. It has been an enjoyable experience during which I have made some lifelong friends. And SME membership has helped me immensely in my career. Any minerals professional who is not an active SME member is doing himself or herself a disservice.

In fact, the importance of professional affiliation has, in my opinion, grown in recent years. A generation ago, our parents were often able to secure lifetime employment with major companies. For better or for worse, that is pretty uncommon today. The world is moving a lot faster, new skills are needed and new technologies regularly transform our businesses. What is your best employment protection in such an environment? Technical competence and networking with your peers. In mining, there is no better place for this than SME.

Another point I would make is that, as engineering professionals, we have a responsibility, not only to ourselves and our employers, but also to the public. On this subject, there is renewed interest in engineering ethics. It is now a required subject in ABET (Accreditation Board for Engineering and Technology)-approved undergraduate engineering programs. In discharging our ethical obligations to the public, most people think immediately about integrity. However, an equally important part of ethics for professionals is maintaining our competence. Where is one of the best places to maintain and extend your competency in minerals engineering? SME.

So as minerals professionals in the 21st century, we have an obligation as well as a strong self interest in SME membership. It is an absolute no brainer to me. Financially, it is almost a trivial amount to invest in one’s future.

What other objectives do you have?

First of all, I want to commend the two previous SME presidents, Ta Li and Mike Karmis, for focusing on two important areas, the international arena, and construction materials, respectively. I enthusiastically support their efforts and hope to make further progress in both areas.

In our goal of making SME the pre-eminent minerals professional society in the world, we need to pay particular attention to the international community. Through programming and other benefits of membership, we need to listen and respond to the needs of minerals professionals throughout the world. I intend to

continue the presidential ad hoc International Advisory Committee and hope to expand our capabilities in this area.

I should say the same about the construction materials and aggregate initiative started by Mike Karmis. I am totally supportive of this and stand ready to assist the new Construction Materials and Aggregates Committee in establishing itself as a permanent component of SME. I think SME has a lot to offer that branch of the minerals industry. But we need their input for guidance.

Any other goals?

Yes, I do.

- Work with the SME Foundation to develop a compelling vision that more contributors will find attractive. This has been a challenge for the Foundation so far, and the weak economy has not helped.
- Continue and expand the Presidential Advisory Committee that Mike Karmis started. We have made a good start here in identifying areas where SME and the mining industry can be mutually helpful. This is a good activity that must be continued.
- Work with SME’s Environmental Division to develop SME awards for individual and corporate meritorious environmental achievement. This is SME’s newest and fastest growing division. I believe there is a good opportunity here to showcase some of the worthwhile environmental projects in mining, rather than always being on the defensive.
- Establish SME as the authoritative, professional institution with respect to ore reserve estimation and reporting. Our sister societies in Australia, Canada and elsewhere have already taken on this obligation. And there is a need for a strong, professional voice on this topic in the United States.
- As one of SME’s key strategic goals, book publishing needs to be continually re-examined and enhanced, particularly in light of SME’s financial limitations. The goal here is to publish excellent books that will be in high demand and strengthen SME’s technical reputation.

I have already commented on membership, another key goal in 2003. It is my belief that we can build membership by a greater penetration of our existing market. There are simply too many mineral professionals in the United States who are not SME members.

You have been witnessing some pretty dramatic changes in the domestic steel business.

Yes, and it is fascinating to watch. There is no question that a strong steel industry is vital to the interests of our country. We are too big and our economy is too complex for us not to suffer a decline in our living standards and a threat to our security if our steel industry collapsed.

Yet, for many years the integrated (blast furnace-based) sector of the steel industry has been in a long-term decline. It has suffered from weak prices, mushrooming costs and outdated work practices. The minimills (electric furnace-based) sector of the industry, on the other hand, has done pretty well. But we obviously cannot make all of our steel from scrap.

The crisis came to a head about a year ago when the unthinkable happened. One of the several steel produc-

ers in bankruptcy, LTV Steel, was forced to liquidate. This resulted in employees losing their jobs and retirees having their pension and health care plans cut.

Any good come out of all that?

Out of this disaster, a model is emerging for a new, competitive steel industry. A private investment group purchased the LTV assets at auction and formed a new steel company, International Steel Group (ISG). Having eliminated LTV's legacy costs, ISG also reduced the staff by about 40%, with no reduction in steel production. In a rare demonstration of union-management cooperation, ISG was immediately profitable. It has gone on to acquire Acme Steel and seems on the verge of adding Bethlehem Steel.

In one year's time, ISG has gone from zero to being, after the Bethlehem deal, the nation's largest steel company and one of the largest in the world. ISG's management accomplished this by changing work practices and implementing a sustainable employment-cost model.

How has this affected the iron ore business?

While not so sweeping in scope, related, recent changes in North American iron ore have also been dramatic, mainly in regard to ownership. The old line, traditional steel companies were vertically integrated behemoths. They had their own coal mines, iron ore mines, limestone quarries, coke batteries, etc. That has largely ended. The demands on management and capital resources by their core steel businesses are too great for them to effectively manage the raw materials side of the business. They would rather "buy" than "make." So, my company, Cleveland-Cliffs, for example, has been acquiring equity interests from several of these companies. Mines where we had mainly just been the manager, we

now have majority ownership. This has significantly changed the nature of our business. Many of our former partners are now customers.

When these changes have run their course, the United States will likely have a modestly smaller, but much more competitive, integrated steel industry to go along with the country's efficient minimill sector.

Will we see more restructuring like this?

In my opinion, yes. There are many firms that have fundamentally good assets, but they have become overwhelmed by debt, fixed costs and labor costs that are no longer sustainable. Insolvencies always create unavoidable pain for employees, creditors and, sometimes, for retirees. But many of these businesses can again generate wealth, provide good jobs and contribute to the community. Bankruptcy, U.S. style, is a traumatic process, but it also may not be the end of the world. There are many happy employees and investors at ISG who can attest to that.

Any final comments?

In closing, I would simply like to salute miners and the mining engineering profession everywhere. It has provided me with an enjoyable and exciting career, one that I would do all over again if I had the chance.

Running big mining operations generally breeds humility. You are often about one misstep away from chaos, so you develop great respect for the men and women who keep the wheels turning around the clock. I have had the great good fortune of working with some extraordinarily fine people who have remarkable records of accomplishment. But I find there are a lot of people like that in mining. And most of them are SME members. ■

CFB preheater improves iron ore production



Outokumpu Technology received a turnkey contract to design and build a circulating fluidized bed (CFB) preheater for the A\$43-million commercial-scale HIs melt plant at Kwinana, Western Australia. The HIs melt technology maximizes the potential of lower grade iron ores. When combined with Outokumpu's preheater expertise, it offers a low investment, low running cost source of pig iron. And it is an alternative to traditional blast furnace and coke-oven plants in green and brown field situations.

Lower grade iron ore fines and ordinary steam coal are injected into a molten iron bath to produce high-quality pig iron. Outokumpu's CFB preheater is based on its proven Circored technology that is used in a 500-kt/a (550,000-stpy), direct-reduction plant in Trinidad, West Indies. The Kwinana project is expected to produce 800 kt/a (880,000 stpy) of pig iron suited to downstream processing. The project is the potential forerunner of a larger scale plant planned for the Pilbara region of Western Australia. Kwinana's preheater is due to be completed within 22 months. It plays a significant role in the HIs melt process because it increases productivity by preheating and prereducing the iron ore fines before injection into the smelt reduction vessel. This process saves energy and reduces emissions because it uses the hot off-gases from the direct smelting process. ■

Outokumpu Technology's CFB preheater is based on the company's Circored technology that is used at this 500-kt/a (550,000-stpy) direct-reduction plant in Trinidad.

MARCH 2002



Mining

ENGINEERING



Michael Karmis
2002 SME President

*****CART-BT LOT#8C019
111070
J. STEVEN GARDNER
MINING CONSULTANTS INC
340 S BRADWAY ST STE 200
LEXINGTON, KY 40506-2553

Michael Karmis: an interview with the 2002 SME president

Your thoughts on the current status of the global minerals industries?

The global economic, technological, social and political changes of the last two decades of the 20th century resulted in the emergence of a restructured minerals industry. This industry is now based on a new cost-cutting philosophy; utilization of modern technology; productivity gains rather than production tonnages; diversification of mineral markets; and globalization of exploration, mining and processing. Quantity and tons used to be the focus. The emphasis today is on remaining competitive in the marketplace by lowering per-unit production costs as much as possible.

What factors and trends will impact the minerals industries in this, the 21st century?

A number of parameters will impact minerals operations and shape the future sustainability and growth of the minerals industries. Increased demand for minerals will be accompanied by the demand for technical advancements. We will also see a continued emphasis on health and safety, environmental stewardship, and education and training. Let me elaborate.

Minerals demand.

Sustainable development studies show that the world's fundamental challenges remain the same. There will be continued population growth and a drive to improve the quality of life. World population scenarios call for at least a 50% population increase, possibly doubling the current population of six billion, over the next 50 years. This growth can only be sustained by the increased use of basic products, such as food, energy and materials. This is shown in the United States. The US Geological Survey noted recently that more than 50% of the aggregates produced during the 20th century were consumed in the last 25 years. And aggregates production of more than 36.3 Gt (40 billion st) is projected for the first 25 years of the 21st century. That amount equals the entire output of the 20th century.

What about growth and development in the world?

The United States currently uses more than 25 times more energy, per capita, than many countries of the developing world. This disparity clearly indicates the need for more resources, as nations attempt to reach a higher standard of living. In my opinion, reduced consumption, materials re-use or recycling and energy savings may offset some of the projected growth. However, these reductions and savings will not be sufficient. Mineral resources production is, and will remain, the basis of our future sustainability and growth.



Technical developments.

Mining must make major technological strides in developing new, low-cost, high-efficiency mining and processing systems. These changes need to extend beyond the advances in equipment design and the integration of mechanization and automation. Revolutionary changes are needed. There must be large-scale changes in the traditional way that deposits are developed, mined and processed.

Significant technical developments have contributed to the recovery of the minerals industries in the past 20 years. And these new technologies have been responsible for the outstanding productivity performance and the excellent health, safety and environmental record of the industry. Automation and large-scale equipment, in particular, have been major contributors to this success. However, despite these technical advances, few conceptual changes have been made in the way we mine mineral deposits. At the same time, the industry has been forced to cope with new environmental and health and safety regulations, eroding metal prices, and difficult geologic and mining conditions.

The successful implementation of advanced technology depends on each company's management and commitment to learning and adaptation. The natural resources sector has the potential to contribute further to wealth creation, quality of life and sustainable development. For this to happen, however, new technologies must be developed for natural resources and environmental management. Also, research and technology in the minerals sector today require interdisciplinary approaches and talents. Industry, academia and government must get together to take advantage of technological opportunities.

Health and safety.

Engineering and technical developments have been responsible during the last 40 years for tremendous progress in mine health and safety. In addition to technology, behavioral methods have also recently been explored and implemented. In contemporary mining practices, the operating system of any process encompasses all the health and safety implications, including its engineering and behavioral aspects, in completing a task.

So, are lower incident rates possible?

Any loss is unacceptable. A loss is defined as the result of the interruption of a practice or a procedure that can cause personal injury, property damage or a process disruption. Loss-control methods, through engineering solutions or behavioral approaches, require extensive training. And these loss-control methods must


incorporate innovative delivery, effectiveness measurement and performance audits.

The minerals industries cannot afford to relax health and safety vigilance regarding standards or performance. Nor can the industry reduce its alertness and monitoring of legislation, particularly now that the industry's focus is often directed to more visible environmental issues.

It is now time to re-establish a rigorous health and safety agenda. It must be based on evaluating regulatory threshold values, developing engineering controls, implementing behavioral solutions, establishing health and safety benchmarking, incorporating measurement techniques, improving health and safety hazard-recognition awareness and developing innovative training methods like virtual reality.

What about environmental stewardship?

Environmental and social issues have an increasing influence on the extractive industries, either through legislation or public policy. Mining and sustainable development can be compatible, but the participation and contribution of all stakeholders is necessary. Furthermore, successful environmental management requires new, innovative green technologies and long-term changes in attitudes and values, not just short-term remedies. The minerals industry has a central role in the transition to sustainable development. But for that case to be believed in the court of public opinion, the industry must dispel the negative beliefs that still hold sway. This will require the industry to demonstrate continuous

 leader in the academic community, Michael Karmis is the Stonie Barker Professor of the Mining and Minerals Engineering Department at Virginia Tech. He also serves as Director of the Virginia Center for Coal and Energy Research (VCCER). Established by the Virginia Legislature in 1977, the VCCER supports three missions: conducting research on interdisciplinary coal and energy issues; coordinating coal and energy research at Virginia Tech and statewide; and disseminating coal and energy research information to users in Virginia.

Karmis earned his B.S. and Ph.D. degrees in mining engineering from Strathclyde University, Scotland. He joined Virginia Tech in 1978 and served as department head for 12 years. Under his leadership, the department grew to one of the country's largest and most diverse programs in minerals engineering. Its active, ongoing initiatives in education, research and service have drawn international recognition.

Karmis' contributions to teaching and learning have earned numerous commendations from the department, the College of Engineering, and the university. He served for many years as the faculty advisor to the student chapter of SME. His efforts and encouragement helped the chapter rank among the top in the country and win multiple awards. He has also supported graduate education by serving as major advisor to 28 graduate students. In addition to teaching, Karmis has directed or co-directed 37 major research projects, supported by government agencies and pri-

vate companies. His research interests include rock mechanics and ground control, mine systems design, mine health and safety, and the sustainable development of energy and natural resources.

Karmis has authored more than 130 scientific papers and reports and served as editor for 21 *Proceedings* volumes and three textbooks published by SME. Most recently, Karmis coordinated and edited *Mine Health and Safety Management*, a textbook published by SME in 2001. He is also the co-author of software that is used in industry and government to predict surface ground movements due to mining.

Industry and community service

Karmis serves in many ways to help advance the mining industry and his community. He is a member of the board of directors of the Powell River Project. This cooperative research and education effort is dedicated to developing improved technologies for land use, environmental protection, economic development and quality of life in southwestern Virginia and central Appalachia.

Karmis also served for 20 years as chairman of the Annual Institute on Mining Health, Safety and Research. This national meeting is co-sponsored by the US Mine Safety and Health Administration, the National Institute for Occupational Safety and Health, National Mining Association, National Stone, Sand and Gravel Association and the Bituminous Coal Operators of America. Under Karmis' leadership, this meeting has grown in interest and diversity and is now recognized in-

Michael Karmis —

improvements in environmental performance and the implementation of sound operational practices at every stage, from exploration to closure. Companies must recognize that environmental and social responsibility — and an open information policy — can translate into competitive advantage and economic benefits.

You are involved in education. Certainly, education and training are factors here.

From incremental change to radical restructuring, the learning business is driven by information technology, near instant communication from anyplace to anywhere, virtual classrooms and customer-focus needs. Factors fueling this educational growth include employability, competition, for-profit providers and distance learning.

The engineering and science professionals required to lead the minerals industry into a competitive position in the 21st century's international resource markets will emerge from innovative educational and learning environments. Education will motivate students and instill a desire to pursue learning. It will emphasize individual as well as interdisciplinary learning. Education will promote an understanding of the ethical, social and business aspects of the profession. Education will introduce a global and a political understanding of the industry. And education will provide students with a desire for growth and leadership in the global minerals industries.

One additional educational component is post-graduate education. Continuous learning courses can

lead to or supplement a graduate degree; recognize mastery in a professional and technical field; or focus on specific skills within an industrial job. From supervisors to engineers, all minerals professionals require periodic skills upgrading.

Continuous education is a source of economic strength. The greatest opportunity for institutions, organizations, associations, government agencies and professional societies is continuous education delivered through distance learning. This form of learning is now considered the most pressing educational demand and presents the greatest potential market for these entities. This is particularly true in the extractive and mineral industries. These often operate in remote locations around the globe, where distance learning may be the only feasible means of receiving continuous education.

Finally, training is vital to improve specific skills necessary for job success, keeping a company competitive in the changing workplace and ensuring that employees remain at the forefront of technological developments in equipment and practices. Accepting that education is to develop conceptual skills for thinking beyond the prevailing paradigm, then training should aim to develop contextual skills to enhance immediate performance.

Your perception, then, of the successful mineral companies and organizations?

The successful members of the minerals community will be those that pursue and value innovation and community understanding and are populated by visionary

an academic and community leader

ternationally as one of the premier forums on these topics.

Karmis has chaired or co-chaired technical sessions for some 70 national or international meetings. He is a director of the Virginia Coal Council. It is comprised of all major Virginia coal companies as well as community groups and state agencies. He has been invited by the State of Virginia, the US Department of the Interior and federal agencies to provide technical expertise to many joint industry-state/federal committees in his areas of expertise. He has participated in a number of public hearings concerning zoning, re-zoning and development of ordinances related to quarrying operations. And he has worked with the major mining-related trade associations on academic, technical and professional issues.

Distinguished professional career

Karmis is a professional engineer in the United States, a chartered engineer in Britain and a licensed engineer in Europe. He has been active in consulting with the mining industry, government agencies, engineering companies and legal firms. These include CONSOL, Pittston, English China Clay, Westmoreland, Pickands Mather, USX Corp., Mapco, VICCC, Island Creek, Amvest, Blue Diamond, Beckley Coal Co., BHP-Australia, Freeport Sulphur Co., Penn Virginia Resources Corp., Drummond Co., British Mining Consultants, Arch Mineral, A.T. Massey Coal Co., Maryland Department of Transportation, Hopewell Township, Baltimore County-MD, Genstar Stone Products Co., Vulcan Materials Co.,

US Office of Surface Mining, Reclamation and Enforcement, JCI-South Africa, Mingo Logan Coal Co. and the John T. Boyd Co. Karmis has given numerous lectures and presentations to universities, organizations and professional meetings in the United States and overseas.

23-year SME member

In addition to his work with the SME student chapter, Karmis has been active on numerous SME committees. And he has served seven consecutive years on the SME board of directors. He also participates in his local SME chapter, the Central Appalachian Section. He is a Distinguished Member of the SME, a Fellow of the Institute of Quarrying and a Fellow of the Institute of Mining and Metallurgy.

Karmis has received many national awards. These included the 1982 Publications Award of the SME, the 1987 Educational Excellence Award of the Pittsburgh Coal Mining Institute of America, the 1988 Distinguished Service Award of the Mining and Exploration Division of the SME and the 1995 SME Rock Mechanics Award. In 1997, Karmis was selected as the National Stone Association Professor of the Year for his contributions to his profession. In 1998, he was presented with the Outstanding Faculty Award from the Old Timers Club for his contributions to mining education. And in 2000, he was awarded the Health and Safety Award from the Institute on Mining Health, Safety and Research. ■

leaders. Let me address each of these characteristics.

Innovation.

Cutting staff and mining higher grades are the typical responses of the minerals industry to low metal prices. A continuous improvement initiative, however, may not be sufficient. A fundamental redesign — a paradigm shift — is then needed. Only then will companies realize significant, innovative, performance breakthroughs that can reduce capital requirements, cut operating costs and improve recoveries.

The minerals community — industry, academia, research organizations and government — must develop an aggressive, innovative and sustainable research plan, to avoid technological stagnation. Otherwise, the industry will not be able to exploit deposits and seams that are uneconomical or impossible to mine with current technology. In addition, the minerals industry must play a prominent role in establishing national research agendas and infrastructures.

Community relations.

Most companies realize that a license from society to operate is as essential as official authorization. Success lies in partnership, not in ownership. Providing education, environmental responsibility, community and infrastructure development, employment and good communications are just some of the requirements of good-neighbor partnerships between mining companies and communities, both regional and national, in which they operate. This new attitude is exemplified in the slogan used by Rio Tinto: “*Global partner – Local neighbor.*”

A number of major efforts to embrace the local community have been initiated by the US minerals industry. The Rocks Gallery and the Mining Gallery, established at the Smithsonian Museum of Natural Science, are examples. So is the Coal Education for Teachers initiative. However, if the benefits of mining fail to enter the community’s mind, the same cannot be said of its opponents. Recent publications by extreme environmental groups, articles by the proponents of the weightless economy theory, and rhetoric from the supporters of smart growth all present serious threats to the future of the extractive industries. The extractive industries need innovative and aggressive community, public relations and education programs, similar in intensity and effort to those exhibited by the major oil companies.

Leaders vs. people.

Mining must learn to deal with all stakeholders. And mining’s leaders must be visionary and strong proponents of sustainable development. In fact, industry acceptance will be measured by sustainable development standards. Profitable mining is compatible with social and environmental advances. Leadership is key. And leadership is about forming partnerships to develop and disseminate technology in the minerals industries. This means accelerating research and technology applications. It means developing research initiatives, technology coordination and funding priorities. And it means providing interaction and networking between industry, academia and government aimed at sustainable development. The successful company within the minerals industries in this new millennium will be founded on people and attitudes. These companies will be capable of

embracing change and seeking creative ways to develop mineral resources.

Do you think we have the human resources to develop our mineral resources?

The mining community has a serious workforce crisis, at all levels and positions. Companies, agencies, institutions and states must be proactive by developing sustainable and aggressive recruitment and retention programs. New paradigms are needed in training, combining the behavioral learning process with advanced visualization technologies. Developing a new workforce requires significant resources from industry and government. Is there a choice?

From industry surveys and discussions with human resources groups of major mining companies, these industry trends must be noted. The industry is facing a declining and aging talent pool. There will be massive employee loss in the mining “community” in the next five to 10 years. There is currently “limited” interest by many companies to train, mentor and develop entry-level technical talent. Supervisory and management age in some companies and organizations has also reached the early- to mid-50s.

There are other noteworthy trends. New mining operations will have different technical challenges, different productivity expectations, new environmental and health and safety issues. All will demand a different technical workforce. The situation is approaching a “crisis” level in certain companies, agencies and academic institutions.

Has the mining industry made any gains?

The minerals industry has achieved significant operational and productivity improvements, while maintaining an outstanding health and safety and environmental performance. The top 10 US coal producers now produce 60% of the coal. However, industry restructuring by acquisitions and mergers as well as individual company restructuring has led to an emphasis on earnings and profits, rather than production levels.

At the same time, health and safety data show the relationship of miner experience with incidence. Miners with five or fewer years of experience are involved in a significant share of incidents. Inexperienced miners may not identify hazardous conditions or practices. These miners require experience and hazard-recognition training and skills. Can the industry maintain its current levels of productivity and safety assuming a significant infusion of a new, inexperienced workforce? Will a rapid and uncontrolled replacement of the workforce threaten productivity, safety and profitability? Is there a pool for this new workforce? Where? These are important questions that require serious consideration from the mining community.

The data also show the need of the community to devote time and funding to develop human resources. Companies will be forced to see the development of human resources as an asset, not a liability. SME can and must play an active role by partnering with industry on these human resources initiatives. In doing so, we must first improve the image of the industry as an employer that can offer development, a future and careers.

To follow up the human resources issue, what are the

major challenges facing mining engineering education?

Let me make a few comments on the supply of mining engineers, a topic that I am familiar with. According to the most recent statistics from 1999-2000, our current graduate output includes 141 B.S. degrees, 26 M.S. degrees and seven Ph.D. degrees.

Enrollment trends also indicate a possible decline of B.S. graduates of 15% a year in the next few years. All programs report immense problems in recruiting and motivating high school students and promoting mining as a career.

At the same time, the academic mining infrastructure includes 16 accredited programs and eight programs that have a faculty size of less than four. Seven programs do not have Ph.D. students. Three programs have no graduate students. Five programs graduated seven Ph.D. students. Demographics include 12 assistant professors, 26 associate professors and 43 professors.

The decline of mining research has left a void in developing mining technologies that can maximize coal and ore recovery and develop new resources, while improving health, safety and environmental performance. This continuous research decline has also decimated graduate education. And this research decline is reducing and depleting the expertise and knowledge in a number of mining disciplines. The nation cannot sustain the research and development necessary for developing mining technologies and supporting graduate education without a substantial infusion of public and private funds.

Let me also emphasize the connection between research, graduate programs and mining faculties. In the next five years, 26 positions are expected to be vacated due to faculty retirements. At the same time, we have failed to develop a pool of entering professionals who can replace the departing faculty. If the educational system is not creating and mentoring a faculty cadre, who will be teaching in the minerals schools in the 21st century?

Additionally, the survivors of the future will be those institutions that form global partnerships and understand the need to collaborate, share resources and develop cohort groups, irrespective of location. Such universities will be seeking multi-institutional efforts that can provide unbiased evaluations and new solutions for the global minerals industry.

Your views on SME membership development.

The purpose of a professional society is to encourage and foster the professional development and personal growth of its members. This is accomplished through well-conceived and properly executed programs and services. These functions and activities are also the most valuable recruiting tools for attracting new members.

The mission of SME, as first defined in the strategic plan (1993), is to advance *"the worldwide mining and minerals community through information exchange and professional development."* SME, over the years, has developed significant programs and services, particularly in technology dissemination. We must now focus our efforts and resources on the initiatives that best fulfill our mission and our members' needs. Future emphasis should be placed on the members and the mining community they represent. We must nurture a philosophy

that the members are SME. Our structure, programs and services should promote communication and responsiveness to the needs and involvement of members, while generating enthusiasm, pride of membership and a sense of belonging. In my view, areas of emphasis should include programs and services.

What programs?

Implement the latest electronic processes to achieve timely publishing and dissemination of technical literature and library services. Improve technical programming coordination between divisions, unit committees and local sections, to achieve state-of-the-art information dissemination, encompassing the needs of all members. Expand continuing education programs to include more management and professional development topics, which can complement the traditional technical areas. Offer needed programs, such as short courses, regionally in conjunction with local meetings. And develop new programs on emerging technical areas. These programs can establish SME as the leading authority in certain disciplines and professions that are vital to our growth, such as the construction materials community and the energy professionals.

And what services?

Aggressively pursue the opportunities of the information superhighway in communications, online services and the establishment of a functional SME home page. Expand SME services in career development and planning and provide a platform for disseminating employment and career opportunities to members. Develop increased opportunities for networking, particularly for the benefit of younger members. Develop services that can enhance the leadership and growth of members within their organizations and places of employment. And establish a process that allows for SME courses and seminars to award professional development hours. PDHs are now required by most states to renew professional registrations, as well as issue continuing education units where appropriate. Many of these initiatives achieve important milestones of the strategic plan.

Do you have a vision for expanding SME membership?

Declining membership has been identified for many years as the most serious threat to the society's future. However, we often disregard the fact that we are mining greater tonnages with fewer employees as a result of the productivity gains accomplished in the last decade. These gains in some of our industries have been awesome. This trend has led to bigger operations, increased equipment size and automation. All have contributed to greater tonnages with less manpower.

Consider coal. In 1980, in the United States, we mined 680 Mt (750 million st) with more than 200,000 employees. In 2001, we surpassed 907 Mt (1 billion st), yet the coal industry workforce has been reduced to fewer than 80,000. Productivity has nearly doubled in the past decade and most probably has quadrupled in the last 20 years.

In my view, this has reduced the manpower needs at all levels, from miners to engineers and supervisors, with a consequent decline of the general mining pool that determines potential SME members.

We should be proud that our mineral production,

health and safety record and environmental success of the past decade. All have reached new levels of accomplishment with a declining workforce. This may have led to a temporary, cyclical decline in potential SME membership. In essence, if you produce more, at lower cost, with better environmental and safety performance, while engaging fewer people, you should cheer. Let us hope that rather than focusing on our numbers we can emphasize service, programs, visibility, professional development and value. And, with an appropriate membership drive, if we get these goals right, the numbers will also increase.

Individuals join an organization in order to receive services, benefits and professional development that they cannot get elsewhere. I have asked SME to develop membership statistics, including demographics and regional trends that can be correlated with the growth or decline of specific industries, commodities and regions. The aim is to allow a more scientific approach to membership recruitment and program development.

A membership development drive should be pursued domestically, as well as in the international arena. In some cases, and for some members, specific programs must be developed, if SME is going to be relevant to certain nontraditional groups. The more diversified and encompassing SME attempts to become, the greater will be the need to develop new or alternative programs and services. Such diversification may require additional resources. SME should develop cost-benefits studies to examine these ramifications prior to launching any significant membership campaigns.

What about student members?

A new membership initiative demands that SME improve its visibility and relevance to younger members, including those still in student chapters at our universities. If we are not successful in motivating and attracting younger members within our own traditional disciplinary ranks, then we cannot expect to successfully recruit nontraditional candidates. Expanding SME's role in career development and promoting professional and employment networking opportunities are important initiatives in recruiting new, particularly younger, members and assuring their professional growth.

International members?

International membership efforts must intensify by developing closer relationships and interactions with sister societies, in other parts of the world, where minerals-related activities comprise a significant industrial sector. The progress of the Society in electronic publishing and information exchange is a critical aspect of international membership development, as affirmed by our AIME-sister society, the Society of Petroleum Engineers. The international nature of our educational institutions with a significant international alumni body, the worldwide ties and visibility of our minerals-related research institutions, and the presence of US mining companies and organizations overseas, are significant strengths in undertaking this effort.

What about members from the aggregates community?

A strategy to address SME membership and growth must emphasize construction materials, cement and aggregates. They account for more than 50% of all global

mining activity. Looking at the latest domestic figures, industrial minerals, construction materials and aggregates were responsible for 66% of the US nonfuel mineral production in 2000. Furthermore, in terms of value, that segment is responsible for about 53.3% of all US mining. Coal accounts for 31% of production and metals, 15.7%. The share of construction minerals is almost 70% within the industrial minerals, construction materials and aggregates group. This is particularly significant since SME has the least visibility within the construction materials and aggregates community. I am taking steps to recruit professionals of these industries into SME. This task will be the first priority during my term as SME president.

Another significant component of expanding membership is the need to enhance, enrich and better support the activities and interests of local sections. This can be accomplished in conjunction with efforts to improve and upgrade the role and responsiveness of SME's technical divisions. The final point, also important to expanding membership, is the degree of support and encouragement that SME members enjoy from their employers, associates and customers, within the mining and minerals community.

The objectives and mission of SME must be recognized and valued by these groups, if the Society is to grow. I am instituting the SME Presidential Advisory Board this year. It will provide a vehicle for ensuring that SME assumes the visibility that it deserves with the leadership of our industry.

Comment on SME's new Construction Materials and Aggregates committee.

Recently, the SME board of directors, with the encouragement and support from the Industrial Minerals Division, has accepted my recommendation to establish a new SME-level standing committee, named the "Construction Materials and Aggregates Committee." Those industries comprise the largest segment of the minerals industry but they are the least represented group within SME.

The board and I believe that this new committee will provide leadership and guidance to develop a home for the construction materials and aggregates professionals. This will necessitate the development of programs, services and initiatives that can satisfy the professional development, information exchange and networking needs of that community. This new committee will play a vital role in guiding SME in these efforts and will provide a significant opportunity for SME's growth.

This is the start of something great for SME and the professionals in the construction materials and aggregate industry. In selecting the "initial" committee, I included at least one person nominated by each SME division. I am also delighted to announce that Drew Meyer, vice president-marketing and transportation services, Construction Materials Group, Vulcan Materials Co., has accepted the challenge to chair this new committee. The founding committee members will have a say as to who else should be invited to join, based on their vision of the committee structure. My intent was not to fully staff the committee, but to provide the necessary visibility, momentum and support. The committee must then develop a plan and decide on structure, appointments and long-term objectives.

What is your intent with the SME Presidential Advisory Board?

This is a new initiative that I am developing in conjunction with my SME presidency. Over the years, and for a number of reasons, SME has failed to communicate, or at least to increase its visibility, with the chief executive officers (CEOs) of minerals companies. To address this, I have developed a plan, based on my academic experience with university advisory boards, of establishing an SME Presidential Advisory Board for 2002. I have invited the CEOs of a few companies, representing a broad segment of our industry and our community, to serve as advisors to the SME president. This is a one-year commitment, and this board will change as the next SME president assumes the position.

I believe that the proposed advisory board will allow improved communications between SME and the leadership of the minerals industry. I hope that the board will advise SME on key issues facing the industry and suggest ways in which SME can contribute. We are particularly keen to create professional development and technical dissemination programs that meet the needs and priorities of minerals companies. With the proper guidance, I also feel that SME can play an important role in public education and help to improve the visibility and reputation of the industry with the public. In addition, I hope that the involvement of CEOs with SME will foster greater participation by the technical personnel of those companies and will, in turn, have a positive impact on SME membership.

I am pleased to report the following industry leaders have joined the advisory board for 2002:

- Richard A. Benson, President, Caterpillar Global Mining;
- J. Brett Harvey, President and CEO, CONSOL Energy;
- James Komadina, President and CEO, AngloGold North America;
- Steven F. Leer, President and CEO, Arch Coal;
- Bradford Mills, President, BHP Billiton Base Metals;
- Jim Bob Moffett, President and CEO, Freeport McMoran Inc.;
- C. Howard Nye, President and CEO of Hanson Aggregates East;
- Aris Papadopoulos, Chief Executive Officer, Titan America Cement Co.;
- David Tidmarsh, President and CEO, Aggregates Industries;
- Mark Towe, President, Oldcastle Materials; and
- Richard M. Whiting, President and Chief Operating Officer, US Coal Operations, Peabody Group.

Several times you have mentioned “sustainable development” of mineral resources.

The sustainable development of mineral resources incorporates a number of elements, including:

- Finding, extracting, producing, adding value to, using, re-using, recycling and, when necessary, disposing of mineral and metal products in the most efficient, competitive and environmentally responsible manner possible, using best practices.
- Respecting the needs and values of all resource users, and considering those needs and values in gov-

ernment decision-making.

- Maintaining and enhancing the quality of life and the environment for present and future generations.
- Securing the involvement and participation of stakeholders, individuals and communities in decision-making.

Sustainable development and mining covers many issues. So an organizing framework is essential for highlighting the key areas and priorities. A number of groups are currently working towards achieving this goal. For example, I am involved in one such initiative, with the Technical University of Aachen, Germany, and with a number of global companies and organizations. This will lead to an international workshop in May 2003 on sustainable development indicators for mineral operations. There is also much effort underway on the global Mining, Minerals and Sustainable Development (MMSD) initiative (see News item, page 14). MMSD is an independent process of participatory analysis aimed at “identifying how mining and minerals can best contribute to the global transition to sustainable development.”

SME has been following developments about the global mining initiative. SME’s GEM committee has been given the responsibility of informing the membership. Nevertheless, in my opinion, SME has been a spectator on this issue rather than a player. Some of our members are involved in the sustainable development debate. But the Society has not developed any processes nor been engaged in these global discussions. I see opportunities for SME and a role that we could play in this arena. There are two areas that SME could pursue in this initiative. One is the development, monitoring and assessment of sustainable development criteria for mineral operations. The second is the development and dissemination of best operating practices for sustainable development. What is the best way of accomplishing these objectives? I am proposing to establish an SME-level Sustainable Development Committee to lead our effort and direct the Society into a global prominence in this area.

How do you see SME functioning in public information and education?

The mission and role of SME in public education and information is one of the most important, popular and critical issues facing the Society today. SME must play an aggressive role in providing sound, technical and credible information to those involved in public policy. Furthermore, SME should be prepared to proactively develop positions on major topics. These might include economic impacts, technology needs, legislative initiatives, research agendas, educational needs and “sustainable development” concerns as they pertain to mineral resources. SME must establish an infrastructure and a process through which it can participate and respond to public policy issues and debates related to minerals.

In recent years, SME members have embraced public education with enthusiasm, energy and dedication. Funding for this initiative, mainly through the GEM program, was provided primarily by operational funds of SME authorized by the board. Additional funding was generated by the SME Foundation and by contributions from the membership. Furthermore, members, particularly at the local sections, have devoted hours of work to

initiate and participate in public education activities.

The strategic plan calls for continuing to broaden GEM activities by developing, among other initiatives, cooperative relationships with national and state teacher associations and by establishing collaborative partnerships with industry and public agencies. To accomplish these objectives, the board of directors, the membership and the staff of SME must interact with the GEM Committee and the local sections. This means open communications; exchange of ideas for program development; assistance in coordinating efforts with other organizations involved in minerals-related public education; maximization of funding available for GEM activities; reduction of unnecessary overhead costs; and creating an environment that promotes and encourages public education involvement.

Finally, in developing position documents and tech-

nical information related to public policy matters, SME must be able to identify members with expertise in a particular field. This can be addressed by designating our technical unit committees as the experts of the Society in each area. Additional experts can be drawn from the membership, upon the recommendation of these committees, to form a working party. If an appropriate position document is the desired outcome, then the working party must report its findings to the board for approval, and subsequent publication and distribution, in a timely manner. A similar process can be followed when the input of SME is to be presented orally, through testimony, interview or some other means of communication. Occasionally, SME may elect to join forces with another entity in preparing a position document. The process should allow the board to act with expediency, if such an alliance is deemed necessary. **n**

Technology news: Making roofing granules for coloring

The science of coloring minerals originated in colonial times. For the most part, the process continued only in North America. In colonial times, roofs were covered with pitch and then sand or a similar substance was added to protect the bitumen from the rays of the sun. With time, the sand was replaced with colored slates.

The simplicity of those times has been replaced by a multimillion dollar industry. This industry mines, crushes, mills, sizes and colors minerals with an array of colors. These granules are used to make asphalt shingles for the same reason — protect the asphalt from the sun.

One of the earliest patents was dated June 1916. There were no references. Since that time, more than 100 patents have been issued. During the late 1940s, the industry centered on similar processes and formulation methods.

The mining methods are similar to those used in many openpit-mining operations. It is the mineral selection process that is critical. The mineral should be dense, opaque, neutral in color, fine grained, cuboidal in fracture and weigh about 1,361 kg/m³ (85 lbs/cu ft). Translucent granules do not adhere long to the asphalt. A fine-grained mineral is likely to fracture into cuboidal shapes. Minerals such as slates often fracture longitudinally. On a shingle, this creates a problem referred to as “lefts and rights,” positional embedment or metamerization.

In the shingle-making process, longitudinal granules are pressed into the shingle at right angles to the shingle. Each shingle machine has three or four “lanes,” face to face or butt to butt. This means one-third to one-half the shingles will be pressed into place in the opposite direction. The effect is noticeable on the roof. The same applies when cloth is

made in one direction and then sown together in opposite directions from that made.

Product weight is also important. The specifications for shingles are the sum of the granule weight, fiberglass, mineral filler and asphalt.

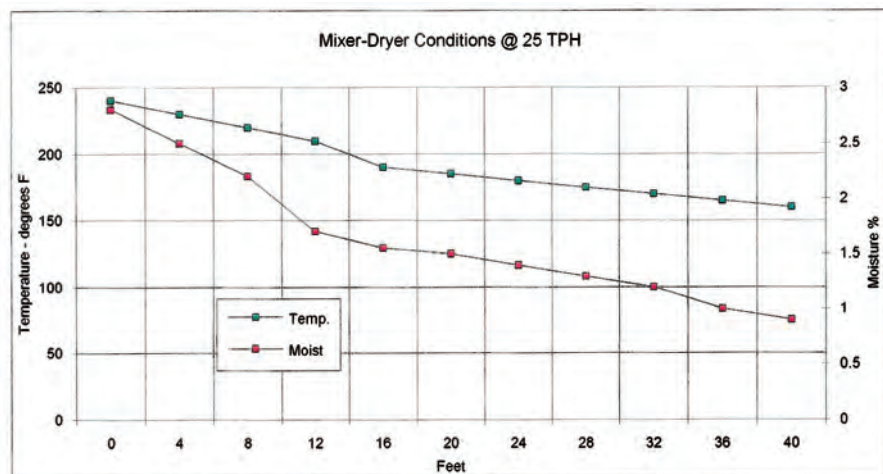
The yield in the crushing and milling process is more than 50%. The final product is a -2.36 mm, +500 μ m (-8 mesh, +35-mesh) granule. This grading is a compromise.

There are certain truisms involved. The coarser the grading means a lower surface area and a reduced need for paint. This can be expensive for some colors. A finer grading — lowering the amounts retained on the 2 mm and 1.4 μ m (10 and 14 mesh) — would improve the mill yield.

A certain portion of the mill “waste” is suitable as filler in the asphalt. While the coloring process is fairly complex, the insideout method of manufacture has some advantages over other systems. The process involves calcining the granules after paint application. The cooled granules are then treated with a combination of snake oils.

There is a great body of information about equipment, raw materials, operating profiles, process parameters, product testing, test methods, quality-assurance and after market problems such as algae and fungus growth.

For more information, contact Crocus+DBR, PO Box 1385, Havelock, NV 28532, phone and fax 252-444-2026, Web site www.jackmeyer.com. **n**



MARCH 2001



Minning

ENGINEERING

A PUBLICATION OF SME



Ta M. Li
2001 SME President

*****0101 8050N
#11070
J. STEVEN RABNER
MINING CONSULTING, LLC INC.
340 S. BROADWAY, 8TH FLOOR
LEXINGTON, KY 40502-1235

Ta M. Li: an interview with the 2001 SME president

Your thoughts on the state of the mining industry.

Put simply, our business is vibrant and resilient. But these days, I wonder how much longer can we or will we put up with those elements that strive to close us down. We have had decades of a demanding regulatory framework, apathy from the public and criticism from those who enjoy the fruits of our labors. Even so, mining organizations still squeeze out a buck mining coal, metals and industrial minerals.

In performing our business, for the most part, our mining companies have been outstanding and responsible corporate citizens. They spend large sums of money to build environmentally clean and modern plants and facilities. Our environmental stewardship has even extended to historic sites, there long before modern day mining evolved. The social commitment and economic well being of the communities we work in are strong components of doing business for the modern-day mining company. I am proud to be part of the mining industry and would follow the same path if I had it to do over again.



Your view is more sanguine than some.

The energy and minerals businesses are strong. They should continue to meet the material needs of the world population. In recent years, globalization has been key for sustained economic growth. In fact, the mining business is already global in scope and breath. A mining firm that is just now thinking about becoming global is behind the eight ball. Globalization is well documented by the recent merger and acquisition activities of multinational companies such as Anglo American, Newmont, Rio-Tinto, Gold Fields and others.

You expect continued merger and acquisition activity?

We expect global consolidation activities to continue for the next few decades. And English speaking companies are no longer the exclusive spokespersons for the global business. This is evidenced by recent "big deal" activities by companies including Grupo Mexico, Penoles, Antofagasta Holdings, Codelco and the Buenaventura Group becoming even more prominent in the global marketplace.

Parallel to multinational company growth has been the increased competition to attract capital. Developing countries in Latin America and Africa have responded by enacting modern mining and investment laws as well as enhancing their political environment. As a result, the majority of new exploration and development efforts have been directed to these countries.

Continued development and growth for the future will be assured by the

industry's personnel and their resourcefulness in adaptation and problem-solving abilities, which now are further enhanced by the information superhighway or Internet.

Your predecessor as SME president thought the Internet was important.

Don Ranta's SME presidency focused on the importance and integration of the Internet into SME's business. His vision for SME has been justified by the proliferation of new companies established and doing business with the major energy and mineral companies. Companies such as NRX Global and Quadrem are focused on consolidating the procurement functions. This can be expected to result in operating-cost reductions and improving profitability to operating companies. E-business is not just on the horizon, but here to assist an information-hungry minerals sector.

Are you concerned about low metal prices?

As we enter the 21st century, depressed commodity prices in precious and base metals as well as the energy minerals will continue to put pressure on companies to operate profitably. Most major mining companies are directing their efforts at better controlling production costs and applying innovative technologies. By doing these things, Newmont, Anglo American, Alcoa and Phelps Dodge, among others, have lowered their cash costs for production to be among the lowest in the world. Economies of scale or "bigger is better" has also been a key for energy-producing companies like Arch Coal, Consol and Peabody.

Recent merger and consolidation activities have put a strain on future capital for the major mining companies. As a result, we can expect continued outsourcing to the service industries through contract mining in accounting, engineering and even operations. In recent years, this trend has resulted in reduced costs, access to world-class capabilities, shared risks and the reduction in capital requirements.

A lot of people, though, still think of mining in terms of environmental damage or widows weeping at the headframe.

I mentioned the technical and economic resiliency of mining companies, which are well known. Even so, the industry continues to suffer from a poor public image. Rio Tinto's Sir Robert Wilson described the gap as "industry's self-perception and how it is seen by others."

Despite the efforts of our national, regional and state mining organizations, we have not turned the tide of public sentiment. How we proceed in the future among our various public audiences will determine how our industry will fare in the global marketplace. The Global Mining Initiative involves a majority of the world's largest mining and minerals companies in a leadership exercise. The initiative will focus on an analysis of the issues that will determine the future of our industry.

In summary, the mineral business is doing fine. The greater pressure placed upon it translates into greater opportunities by its professionals. The role of SME and other professional groups can be expected to become more prominent in the future.

Going beyond the public's perception of mining, what about the industry's education and outreach efforts?

Have they been satisfactory?

Although large sums of money have been spent on this in the United States, the public perception of the minerals business remains virtually unchanged. The Global Mining Initiative carries the burden of defining industry solutions to the problems. And there are many local and regional grassroots efforts by groups within the national and state trade and professional organizations.

The public perception of mining was summarized at the recent SME minerals education forum in Littleton, CO. Here, participants summarized the perception of mining as an old, dirty business that is low tech, unsafe, slick and destructive to the environment. The forum was convened by SME to define a common ground for minerals education efforts. Meeting dialogue addressed the mining industry domain relative to other industry groups; obstacles to getting our messages across; who our audiences are; strategies to reach targeted audiences; as well as expected outcomes.

The SME minerals education forum — what resulted from it?

Some interesting outcomes of the meeting included a consensus that mineral education was a "mission possible — to create an informed and supportive citizenry who recognize the connection between their quality of life and the mineral resource industries."

Other elements of this meeting included developing "articles of truths" or the truths (as they really are) about mining. Simply put, the minerals businesses are essential, increasingly clean, safe, high tech, global, and socially and environmentally responsible. The forum's hopes for the future included a number of items: positive public opinion, increasing the number of students in mining schools, more new mines permitted, positive and supportive articles in major media and an increasing level of congressional support. Efforts such as this forum provide for open dialogue and the common ground for our industry's education-outreach efforts. I expect the pioneering efforts of these participants to continue. And I expect SME to continue as a facilitator for the betterment of our industry.

What about government's role, its interaction with the mining industry?

I dare not venture too much into this one, but I do have some personal opinions. I will say there appears to be too much federal government in our business. The federal government has taken the strategy of creating its own rules through the regulatory process, having apparently de-emphasized the legislative routes.

The days of irresponsible mining did not end with the National Environmental Policy Act of 1970, as environmentalists boast. They ended a lot earlier than that. Some legislation was necessary in the 1960s and 1970s and the results are apparent. The problem is the cadre of early bureaucrats who begot a whole generation of regulatory officials. Most of these officials are well suited to their jobs. The problem is that they have become more and more politically focused to the agendas of the incumbent administration.

In recent years, numerous regulations have closed off natural resource development on public lands, in the name of conservation for future generations. My own conviction is based on multiple-use principles and local

management of natural resources. However, top-down management appears to be the trend. Only through better education can more rational solutions prevail.

There is some precedent for government intervention in the minerals business.

In 1977, then President Jimmy Carter established, by Presidential Order, an Interagency Task Force to study US Nonfuel Minerals Policy. A preliminary draft was circulated to a limited number of internal government agencies in early 1979. The preliminary findings stated, "The (US) nonfuel minerals policymaking process is ad hoc and unstructured." The draft further reported "there is no operational statement of US mineral policy which, on a commodity-by-commodity basis, can serve as a standard against which other national policies and programs can be evaluated."

The report went on to say that supply and demand data and analysis required to back up nonfuel minerals policymaking continues to be seriously deficient or nonexistent. "This inadequacy contributes significantly to identified shortcomings in forecasting mineral prices and supply programs, and in conducting environmental and other policy analysis," concluded the draft report. The draft also mentioned the general secular decline in US competitiveness. "Recent environmental, health and safety regulations in the US and foreign subsidiaries and promotional policies appear to favor mineral production abroad."

In August 1979, the final report was issued and bore little resemblance of the draft. In the editing process, the summary of findings reported that "the existing nonfuel

mineral policymaking process can be said to work adequately." References to the cumulative impact of government policies on the health of the US minerals industry was the most obvious omission. When queried about the findings represented by the draft, the Task Force replied that it "doesn't exist." That was then but can you imagine how it might be now.

Regulatory challenges are one thing. But some environmental groups seem to be unyielding in their hostility toward mining.

In my quest to learn the strategies and tactics of other groups, I joined the Sierra Club in 1990. That was a fascinating experience worthy of brief mention. Within two weeks, I began receiving on the average two to three pieces of mail a month, including their magazine. All that occurred only three weeks after I got my membership card. I also received a questionnaire asking me if I would like to be active in the wilderness and 1872 mining law issues.

The Sierra Club asked if I would be interested in leading rallies for their policies on legislative issues. They also asked if I would become a writer to support their stance on issues. Finally, would I like to receive information on specific topics, including the revision of the Mining Law of 1872. That was then. I shudder to think how they are organized today, especially in the Internet environment.

How about SME? What are your goals as SME president?

SME's strategic plan was completed in 1992. It con-

Ta M. Li — a varied and diverse professional career

Ta M. Li has been an engineer, editor, marketing specialist, political activist, Elvis-impersonator (but only in Elko, NV) and an anecdotist.

Currently, the Littleton, CO resident serves as a marketing manager with the mining division of Washington Group International, formerly Morrison Knudsen.

During his 30-year mining career, Li has also demonstrated his commitment to educating the public and those within the mining profession about issues affecting the industry. He served as editor for two major mining industry publications. His political and association activities included being president of the Northwest Mining Association, chairman of the board for the Colorado Mining Association, and president and founder of the Denver Gold Group. Li has received the SME Distinguished Member award, SME Mining & Exploration Distinguished Service Award, Northwest Mining Life Member and other honors.

Born in Manhattan, NY, Li, 52, graduated from the Henry Krumb School of Mines at Columbia University in 1970. Li was attracted to mining at an early age when he received a "Careers in Mining" brochure from AIME. Then, a starting mining engineer was paid the same as a used car salesman in the Bronx. His mining professors at Columbia, Stefan Boshkov and Malcolm Wane, showed an early interest in him

and, despite lower than expected academic performance, encouraged him.

Boshkov and Wane got Li a summer job at New Jersey Zinc's Sterling Hill Mine in Ogdensburg, NJ. There, he worked in both cut-and-fill and square-set stopping operations. The next summer was spent in Robbins, NC working as a lab technician for Standard Minerals, mining pyrophyllite, a job obtained from AIME's summer-job program. The strong camaraderie with fellow students, attending AIME annual meetings in New York and phrases like "mining is the only business where you start at the top and work your way down" clinched a career in mining for Li.

After graduation, Li worked for Kennecott Copper in Bingham Canyon, UT. Then he worked for *Engineering & Mining Journal* and *Mining Engineering*. As time went on, he returned to mining engineering for Golder Associates. He eventually served in marketing positions for Pincock, Allen & Holt, Behre Dolbear, and ACZ. Li also put in a stint with a Canadian junior venture company. He served as President and CEO of Anglo-Andean Explorations, with properties in Venezuela and Peru. Since 1997, Li has been with Washington Group International. Here, he is responsible for marketing research and business development efforts in contract mining, engineering, procurement and construction management services for project development. ■

tinues as the foundation for the growth and development of the organization. Its primary mission remains “SME advances the worldwide mining and minerals community through information exchange and professional development.”

The organization achieves its mission through three principal goals:

- SME will be a premier society for all professionals in the worldwide mining and minerals community;
- SME will be the primary source of timely mining and minerals information for its members and to the general public, and
- SME will be financially sound and diversified.

Since adoption of its strategic plan, SME has moved forward in a more focused manner.

What about the focus of your term as SME president?

What we are seeing is business trends that include consolidation in the number of companies, declines in minerals engineering enrollments and the continued expansion of activities in the global framework. So the focus of my term will be in the areas of: communications and the Internet, globalization efforts and membership development.

A common denominator for these areas is to better establish a “reason to join” SME. SME is in competition for members. SME competes for members with local technical groups as well as international organizations. The days are long gone of having a professional obligation to join SME.

Why would a person join SME?

Membership surveys show that members join because SME provides the best networking opportunities. Receiving technical information from *Mining Engineering* and other SME publications is also highly valued.

In the past, SME leadership has provided the direction for growth. However, member participation or “buy in” into the programs has been slower than expected. I am hopeful that during the coming year, our supporting organizations and committees may become more active in helping to better realize SME’s mission.

This year, I called a meeting of the SME executive committee to meet prior to the SME Annual Meeting, to define goals and strategies for the groups within the society. Input has been solicited from all the newly elected chairs and vice presidents. In the past, the timing of committee meetings and technical sessions precluded meaningful activities of the various support groups. Here, I am hoping for better-defined directions to grow the Society.

How is SME’s growth related to Internet development?

During the summer of 2000, SME’s board of directors revisited the Strategic Plan to determine its applicability in today’s environment. The plan was reaffirmed. And there was the additional recognition that the emergence of the Internet was an important component to SME’s goal. That goal, again, is to become the premier society for all professionals as well as the primary source of timely mining and minerals information for its members and the public.

The early efforts by President Ranta to integrate the

Internet to SME operations have been outstanding. They will be the “standard of excellence” from which future developments will be based.

What are some of SME’s online accomplishments to this point?

SME’s Internet progress to date has included *Mining Engineering* online, a member-search directory, mineral industry news feeds, online dues, book ordering and meetings registrations, to name a few. An ad-hoc Internet committee, headed by Rick Lambert, will accelerate SME efforts on the home page.

These areas will include employment as well as news groups for public and private forums. These will aid discussion among members and increase staff and committee interaction by report modules. We will upgrade the Internet committee to a standing-committee status during the year. The good news is that these services only scratch the surface of what the Internet will contribute to SME’s growth.

How can the Internet help improve SME’s communications effort?

It is important to note that the Internet is only a tool for better communications. In communications, my emphasis will be external and internal. Externally, I would advocate expanded GEM activities beyond the current scope. This would include the development and availability of mineral facts, international activity reports and governmental policy issues, as well as routine business information. These activities would include developing alliances that currently provide services and aiding their distribution to the general public and others needing information.

Internally, I will be directing the SME efforts to provide better technical information exchanges. This includes activities at the regional and local section level. Historically, the SME local section network has preferred to remain autonomous in its operations and programming. In recent years, SME has acknowledged the importance of local sections. In fact, SME has doubled local section representation on its board of directors.

The mining industry deals with many problems. SME’s local sections provide the foundation to respond to many of the industry’s ills. Local section programs and successes have been well documented in communicating the mineral industry story. Their growth potential for SME will be more fully realized in membership development, networking and technical information exchange through the development of regional and topical meetings.

You earlier referred to the ongoing globalization of the mining industry.

Our minerals industry is global. SME’s growth will significantly depend on how fast we can expand our membership around the world. To coordinate our global activities, SME has formed an international committee, headed by Len Harris.

SME needs to grow globally because the membership growth opportunity is significant in this area. International growth will validate SME as the “premier worldwide minerals society.” An expanded membership base would showcase SME as the major link for industry activities in the global marketplace.

How are you, personally, going to help SME in its international membership effort?

To initiate the SME globalization efforts, I will be visiting with our overseas sections during my year as president. As president-elect, I have already visited the Lima, Peru section for its year-end dinner dance. Speaking before a gathering of more than 500 members and their spouses, I was impressed with the diversity of members and their general enthusiasm as members of SME-AIME.

I could see membership growth and the contributions for networking and technical information exchanges that are largely untapped. And I left the Lima meeting feeling that some of the benefits of SME globalization had already accrued to our organization. A visit to the Mexico and Philippines sections is anticipated and should aid our worldwide recruitment effort.

How about the globalization efforts of SME as an organization?

During the year, an effort will be made to strengthen our alliances with our sister organizations in Australia, Canada, South Africa, the United Kingdom and other nations. Our program will continue to establish joint-venture protocols with these countries and link them through the Internet. Coalition-building combined with marketing will be a key strategy to enhance SME's global membership.

Again, the "reason to join" is the key component of our global initiatives. SME will further its directive in marketing its publications and its meetings services. These tools, through the Internet, will help our progress.

While SME can only perform a finite number of activities, it is my intention to at least initiate the development of a number of global meetings in developing countries. In the past, their poor economies have precluded their representation in SME and other meetings. We can resolve this problem by soliciting financial and technical participation from US and worldwide governmental agencies and other nontraditional sources including the Trade Development Association and the World Bank. Such participation is vital from a balanced representation viewpoint, resulting in meaningful dialogue. Ultimately, successful joint-international meetings help membership growth and establish SME local sections in more countries.

How about membership development? That would seem to be the key item for SME's growth and survival.

A strange thing happened to me on the way to becoming SME president last year. I found out that I was the chairman of the membership committee. That partially explains why we did not do so well last year. The membership committee has been reorganized to provide for program continuity and an aggressive development program supported by the SME staff.

Membership development and growth are the life-line of any professional society. They provide strength in numbers and expansion of services and activities. SME membership has been on a decline for the past 15 years. It now stands at just over 14,000, down from its peak of more than 26,000 during the 1970s.

Consolidation and compression of the business have been cited as the principal reasons for the membership

decline. I do not believe this to be a factor. Perhaps it is more attributable to increased competition from other groups and the lack of "reasons to join" amidst other organizations. The good news is that the SME board of directors has directed more aggressive activities in this area. I am suggesting that the new membership committee will be more effective in developing and defining new targets for growth.

I have heard some discussion about more recruiting in the industrial minerals sector.

In addition to the global membership effort, membership development will indeed be directed toward the industrial minerals sector. Today, an estimated 50% to 60% of the new mining engineering graduates work in this sector. SME programs will be developed to further attract these professionals.

Another key to the membership program will be recruiting local sections to the effort. Here, SME's membership committee will provide prospect lists from nontraditional SME meetings to local sections. It must be remembered that SME is an organization of individuals. It is not run by mining companies. However, support and assistance from these and other nontraditional areas must be revisited and recruited.

A key to achieving successful membership growth is enlisting and developing relationships with mining companies. Participation and support by the management and operating personnel of these companies would underscore the value of SME membership. Company management must believe SME membership is important. If it does, company employees are likely to join. When the Colorado Section enlisted an executive of a major company as honorary chairman, membership participation increased dramatically.

What about SME membership solicitation outside the traditional areas?

We will identify and recruit members from nontraditional industry sectors like the financial and legal communities. The recent performance of SME's environmental division is an example of how fast membership growth can be achieved when SME recognizes and redirects its efforts to a specialized industry sector.

Finally, an important component of SME's membership development program will be efforts to establish strong relationships with companies and their executives. We must communicate the value SME provides to their corporations. Without that support, our goals will be much more difficult to realize. This type of relationship will be the responsibility of the SME board of directors as we initiate an "adopt a company" program for each member.

Any other comments?

Being President of SME requires significant time and financial support to perform proficiently. At a time when there is significant industry consolidation and cut-backs, I would acknowledge the support and commitment by the Washington Group International to SME and its associated energy and minerals business. I would also like to compliment SME's past presidents. They have led the organization to its well being and provided the foundations from which to proceed. ■

MARCH 2000



Mining

ENGINEERING

A PUBLICATION OF SME



Donald E. Ranta
2000 SME President

[illegible]

Donald E. Ranta: an interview with the 2000 SME president

Your assessment of the minerals business.

The global mining industry is strong. I am convinced it will continue meeting the mineral needs of the world population for the foreseeable future. Two developments have greatly enhanced the industry's ability to produce low-cost minerals. Technological innovations have resulted in increased productivity. And there has also been a dramatic expansion of the number of favorable countries in which to explore and mine. Capital expenditures have flowed to the low-production-cost mines and development projects as well as to the exploration projects and stable countries having the best potential for valuable mineral discoveries.

Communications technology will have a big impact.

The new information and communications technology, especially the Internet, is changing the way we conduct business, including in the mining industry. Mining is different from most other industries. The location, quality and quantity of the principal asset (a mineral deposit) cannot be changed. But the new technologies will enhance the speed and methods of information flow. So the ability to select drill targets, the exploration of projects, the announcements of new deposits, the flow of capital to advance the projects, the choice of extractive methods, the time for evaluation and assessing strategic alternatives, and the eventual development of the mineral deposits will all be accelerated.

Those companies that embrace and exploit the new technologies will have a distinct competitive advantage. This also presents a unique opportunity for SME to improve its international position as a leading provider of technical information exchange.

Near term, though, the mining industry has had some problems.

The industry appears to be coming out of a cyclical low that resulted in a two-year recession. The domestic industrial minerals sector largely escaped this recession because of the unprecedented robustness of the vast bulk of the US economy. The 1998 Asian financial crisis had a significant impact on worldwide trade and commodity prices. Low commodity prices for metals, coal and internationally traded industrial minerals have negatively affected the worldwide industry, with some spillover on SME.

With commodity prices rising again on an upcycle coinciding with a slow recovery of Asia's economies, we may be over the worst of this minerals recession. And all of the mining industry should benefit from the recovery.



You have been in the business for awhile. What are some of the changes you have seen?

During the past 30 years, the mining industry has been rife with change. We have witnessed the entry and exit of most of the oil companies, the downsizing and re-engineering of the traditional companies, the development and growth of a large number of precious-metal companies, the periodic consolidation of the industry through mergers and acquisitions, and, more recently, the international expansion and globalization of nearly every company.

Many of the contractive changes, while difficult to swallow at the time, had a beneficial result in making the industry more efficient, competitive and productive. Today the mining industry is more productive than ever before. Greater output is available at lower cost per unit produced. Increasing international competition will continue to favor those companies having large deposits of higher grade ores, the best operations in stable political environments and the lowest production costs.

How about significant changes in the last decade?

The most significant and beneficial changes in the mining industry took place in the 1990s following the demise of communism and the fragmentation of the former USSR. Because of the lack of a viable alternative, developing countries around the world have embraced capitalism, established free-market economies and opened their doors to direct foreign investment into the minerals sector.

One of the most successful of these countries is Chile, which began on the road to capitalism earlier than its neighbors. This open-door policy has helped to enhance all mining companies' abilities to grow and compete based on increasing numbers of outstanding exploration and development opportunities. With the exception of the past two years or so, large amounts of capital have been available for exploration and development. This contributed to the international expansion of the industry into underexplored countries.

Your thoughts on the exploration and development possibilities in the United States.

Substantial opportunities for discovery and development of new mineral deposits remain in the United States. This mineral wealth will be found progressively as our exploration sophistication and knowledge base grow.

The most recent example of this would be the US gold mining industry. It grew explosively from a production level of less than 31.1 t/a (1 million oz/year) in the 1970s, to more than 311 t/a (10 million oz/year) in the 1990s.

An overall employment decline of approximately 50% in US metals mining during the 1980s would have been much more drastic had the gold industry not absorbed many of the displaced miners. SME played a significant role in disseminating the technological information that led to advancements in gold exploration,

With commodity prices rising again on an upcycle coinciding with a slow recovery of Asia's economies, we may be over the worst of this minerals recession. And all of the mining industry should benefit from the recovery.

mining and processing, thus helping to foster the expansion of this domestic industry.

Technology transfer is a charter function of SME. And the development and transfer of exploration technology has been integral to the exploration effort.

For the past 30 years, I have been primarily involved in the metals exploration and development side of the industry. During this time, significant changes have occurred in the methods and techniques used to search for and evaluate mineral deposits. The broaden-

ing of exploration activities throughout the world has greatly benefited from the exploration and evaluation technologies developed in the United States and other countries.

These technologies include use of the following methods and techniques:

- Sophisticated ore deposit modeling for a large variety of deposit types.
- Modern geochemistry and geophysics (including various airborne methods).
- New types of drilling- and geographic-information systems.
- Remote sensing.
- Geostatistical ore-reserve estimation.
- Discounted cash flow financial modeling.
- Computer applications with each of these techniques.

The success of the exploration segment of the industry is attested to by the fact that discovery and development of new deposits have more than kept up with demand. And long-term metal prices have remained relatively stable because of adequate supply.

In the last decade, exploration expenditures first rose and now have fallen.

From 1990 through 1997, worldwide exploration for metals increased dramatically. Expenditures rose from approximately \$2.1 billion to more than \$5.1 billion, according to the Metals Economics Group. Expenditures have decreased the past two years, to \$3.5 billion in 1998 and \$2.7 billion in 1999. And exploration expenditures are expected to be low in 2000 due to the lingering effects of the minerals industry recession.

And what of exploration spending in the United States and Canada?

During the last 10 years, exploration expenditures in the United States have been decreasing slowly. But the percentage of the expenditures targeted for the United States has declined from more than 25% of the worldwide total to less than 10%.

Also there has been a shift from grassroots exploration focused on discovering new deposits to mine-site exploration looking for extensions of known deposits. A similar trend of decreasing exploration expenditures has occurred in Canada.

And the exploration picture internationally?

With the exception of the past two years, a tremendous increase in exploration has occurred in the mineral-rich, developing countries of Latin America, Southeast Asia and Africa, where higher grade deposits are found at the surface. As a result of this shift of exploration focus away from North America, we can expect fewer discoveries and eventual erosion of the US reserves base with time.

Mergers have had an effect on the mining industry.

With the recent merger of Cyprus Amax Minerals into Phelps Dodge, the US mining industry continues to undergo further consolidation. Also, Asarco has been merged with Grupo Mexico. This established the first major expansion of a Mexican mining company into the United States. So the trend of mergers and acquisitions is continuing and resulting in fewer but larger companies.

A similar trend is occurring among the North American junior mining companies as many exploration companies and junior producers struggle to survive. Following a recovery of metal prices, generally at least a year passes before the junior companies regain liquidity in the equity markets.

With normal sources of capital absent, much of the recent financings for these companies has come from the majors who are "cherry picking" the best of the juniors, and thereby acquiring resources, reserves and mines at depressed market prices.

The US mining industry has been one of the world leaders in providing technical manpower and expertise, as well as capital, in the rush to the Third World. At the same time, continued domestic activities, especially at and around operating mines, have resulted in increasing efficiencies and prolonging mine lives, but not many new discoveries.

Do you also see continuing internationalization in the mining industry?

Internationalization of the US mining industry is occurring contemporaneously with a gradual evolution and broadening of the domestic economy from predominantly an industrial base to services and information technology.

Within the United States, and other developed countries, prevailing perceptions are that risks are increasing in the exploration for and operation of mines. Some of these domestic risks include the maturing exploration environment, increasing land withdrawals from mineral entry, increasing government regulations, increasing environmental pressures, and a generally negative image of the industry presented by the media and apparently accepted by the public. Together, these perceptions indicate a growing component of political risk for mining in the United States.

The attractiveness of international operations is based on the view that none of the factors mentioned apply to developing countries where mining is often a

preferred and favored industry, and with the local miners often among the best paid workers in the country.

You mentioned increasing governmental regulations in the United States.

Government policy in the United States and the public attitude toward mining have worsened with time, allowing new, adverse legislation and regulations. One prime example is the new state law in Montana banning the use of cyanide in the processing of mined ores. With the success of the environmental lobby in Montana, there is concern similar initiatives may show up on the ballots in other states. This is an example of the apparent extremism that permeates portions of the environmental movement and fosters the dissemination of misinformation to further their goals.

What can SME and its members do about this?

SME has a continuing role in providing information that gives US citizens and legislators an accurate and responsible picture of the importance of minerals to our

modern civilization and that demonstrates the mining industry does not despoil the environment. SME has been increasing its stature as a source of environmental information. And SME's new Environmental Division has improved the perception of the Society as an environmentally sensitive organization.

The Government, Education and Mining (GEM) Committee has a goal to educate the public about the importance of minerals to society. GEM and other related activities, such as the SME booth at the National Science Teachers' Association convention, must be continued

to help gain acceptance of the need for maintaining a viable domestic minerals industry. The SME Foundation is raising funds to help achieve some of these goals.

Some of the information gleaned from SME functions is useful in the development of mineral-related public policy and as a resource for educating the public and legislators about the mining industry. We need to identify this pertinent information and ensure it is readily accessible to individuals and organizations needing it.

SME can support, through the distribution of appropriate information, well-organized mining company efforts in educating the public and improving the image of the industry. The most beneficial support for these efforts comes from individual members using factual SME information to influence the public, state legislators and congressional representatives.

What are SME strengths?

The greatest strength of the Society is its ability to provide timely programs and services for the professional development of its members. This includes the high-quality, informative *Mining Engineering* magazine, as well as SME books and other publications. The annual meeting, local section meetings, short courses and topical meetings are equally important SME activities. They provide opportunities for networking and informa-

As a result of this shift of exploration focus away from North America, we can expect fewer discoveries and eventual erosion of the US reserves base with time.

tion exchange through technical presentations by leaders in various fields.

Together, SME's publications and meetings are the most important activities. They provide the technology transfer that is, and must continue to be, the core of our Society. The fostering of our members' personal and professional development through publications and meetings will continue to be the Society's primary mission. The success of the organization can be partially attributed to an outstanding SME staff led by Gary Howell, executive director.

Mining Engineering magazine has been modernized and improved, and it is meeting the needs of the membership. The number and quality of publications being distributed and sold by the Society are being expanded and improved. However, the Society needs to organize more symposia and topical meetings and ensure corresponding volumes are published. Publication of single-topic reference books on mining subjects should be augmented by the new policy of providing royalty payments to authors.

Your thoughts on SME's digital efforts?

Access to a broad range of SME information through the Internet is progressing well and will continue to be a major goal of the Society. The Society's Web page, <http://www.smenet.org>, and e-mail address, sme@smenet.org, provide online access to a broad and expanding range of information and communications.

One of SME's major goals is to continuously improve the quality and quantity of information on its Web site, including substantial archives of older data. Currently on the Web site are the following features: online dues payment, online annual meeting registration, membership application, a secure members-only site, membership directory, member information/address change, *Mining Engineering*, meetings and events calendar, and a complete catalog of publications.

SME's Web site is being expanded to include member-information bulletin boards and possibly chat rooms, a positions-available database, a resume service, a consultant-profiles database and other topics of membership interest. Another goal is to provide most publications through an inexpensive electronic format, for example, the *SME Mining Engineering Handbook, 2nd edition*.

Any thoughts about SME's local section activities?

Many activities are sponsored and carried out by SME, and they are all important to the overall success of the organization. Local section activities are essential to the effective working of the Society and need to be encouraged and fostered. Many of the best programs and ideas are generated at the grassroots section level and are carried forward and implemented by the national SME organization.

Other activities that are critical for the Society to continue, support and improve include GEM activities, professional engineering registration, the Accreditation Board for Engineering and Technology (ABET) and the

One of SME's major goals is to continuously improve the quality and quantity of information on its Web site, including substantial archives of older data.

SME Foundation's fund-raising efforts. All of these activities and others not mentioned are important to significant groups within SME.

What about SME's finances?

Financially, SME is stronger than ever. Funds invested have increased from approximately \$4.3 million in late 1995 to more than \$7.7 million in late 1999. The funds are expected to exceed \$8.2 million by year-end 2000 for an estimated

90% increase in five years, thanks partly to a distribution from the parent organization, AIME.

How about areas that SME needs to work on?

The Society has experienced nearly a decade and a half of declining membership, and this is its greatest weakness. The decline in membership roughly parallels the decreasing mining workforce in the United States during the same time period. Accompanying this reduction has been a decrease of the pool of experienced technical and operating professionals available to industry. We must begin growing the Society again through expansion of the membership base by demonstrating to the nonmember mining professionals that SME membership has great value.

The best method of establishing SME's value is by continuing the excellence in publications and meeting programs and ensuring much of the information is easily available on the SME Web site and other electronic media. By providing members with a wealth of information electronically, we can service not only those members in the United States but also those in international locations. This requires timely presentations of the information most pertinent to the practical engineers and scientists, and ready access to the publications and meetings information.

Another weakness is that SME is viewed as a US society with foreign members rather than as an international society with a strong base of US members. Becoming more of an international society should be considered a requirement for the long-term growth of SME.

What groups of people are potential new members?

We need to reach out to more diverse groups of prospective members. One of these groups includes environmental scientists, engineers and coordinators who should find an attractive new home within the recently organized Environmental Division. This emphasis on the environmental and permitting portion of our business is essential, in part, to spread the message that the industry is environmentally concerned and responsible.

A second group of prospective SME members includes expatriates and local nationals who are living and working in international locations outside the United States. Membership in SME is especially logical if these people are working for US companies or if they desire ready access to technology developed and being disseminated by SME. Targeting Latin America, because of its proximity and focus by many companies, and providing some publications in Spanish, as well as English, would be a logical first step. The changing dynamics of both the

domestic and the worldwide industry dictate that SME must look internationally for a significant portion of its future growth.

A third group of potential SME members is implied in the Strategic Plan, which states that membership will include all professionals in the mining and minerals community. This group includes professionals in the support services such as accounting, legal, land, finance and human resources fields. It also could include related technical fields of science and engineering where there are overlapping interests.

Sounds like SME would need more diversified services and programming.

A variety of programs and services provided by the Society should be realigned to support the changing employment status of growing classes of members. These include employees of small companies, independent consultants, and expatriates and local nationals in international settings. With continuing indications of major company downsizing as well as the outsourcing of traditional technical and support groups, more SME members will probably be working for smaller companies and as consultants. As a result of these changes, mining professionals must look out for and plan their own career paths and benefits packages rather than relying on companies' benevolence. Other members requiring unusual services are those situated outside the United States either as expatriates or as local nationals of a country.

You have any thoughts about specific programs for this more diversified membership?

Membership programs and services that will be most beneficial to these groups, as well as all other members, might include:

- Detailed information and access to new technology within specific disciplines.
- General information on a variety of disciplines to gain an understanding and a broader background.
- Career planning and continuing education information, including management development.
- Guidance on how to cope with career changes due to downsizing and outsourcing.
- Guidance on how to run and operate within small companies or how to set up a consulting business.
- "Positions Available" advertised by legitimate companies on the SME Web site.
- Information on cultural awareness and language training for rotational workers in international locations and potential expatriates.
- Directories of consultants and small companies that specialize in outsource services.
- Internet training and detailed directories of mining-related Web sites with descriptions of what they contain.
- Information on packages of benefits available for employees of small companies and consultants, such as a variety of insurance types (including professional liability), financial planning (including tax-sheltered investments) and other pertinent needs.

What are your goals as the incoming SME president?

As President of SME in 2000, I will have two major goals that I believe will help address the priorities of the Society. The first of these goals is new membership growth. Without a strong, long-term membership base, the Society will not survive.

My second goal will be to foster the establishment of a comprehensive Internet presence for the Society's technical information.

Successfully expanding SME's Internet capabilities is expected to produce results enhancing the value of membership and, subsequently, achieving the goal of increasing the number of members. The current SME Web site has progressed amazingly well over the past three years. But we need to place an even greater emphasis on it to maximize its value to both members and prospective members.

You mentioned SME's Strategic Plan.

SME is in the process of reviewing and assessing the Strategic Plan, which was formulated in 1992. The greatest change, if any, might be in defining how the new information technology will be used in achieving the Society's goals.

From my perspective, the three strategic priorities of the Society are the following:

1. To enhance the quality and quantity of publications, programs, meetings and short courses. Together, these items provide the primary means of professional development through information (technology) exchange.
2. To expand the membership base by providing excellence in the first strategic priority, given above, and reaching out to more diverse groups of prospective members, including those in locations outside the United States.
3. To realign the Society and the services it provides, to support those members and prospective members who are more frequently working for small companies, as consultants, and/or outside the United States. The Society's ability to adapt to these types of circumstances will largely determine its future relevance.

Again, how best to achieve these strategic priorities?

The vehicle that will provide the greatest probability of advancing all three priorities is the Internet as well as other electronic media. A substantial expansion of the technical information on the SME web site, members-only section, will be easily accessible and will become an inducement for nonmembers to join SME.

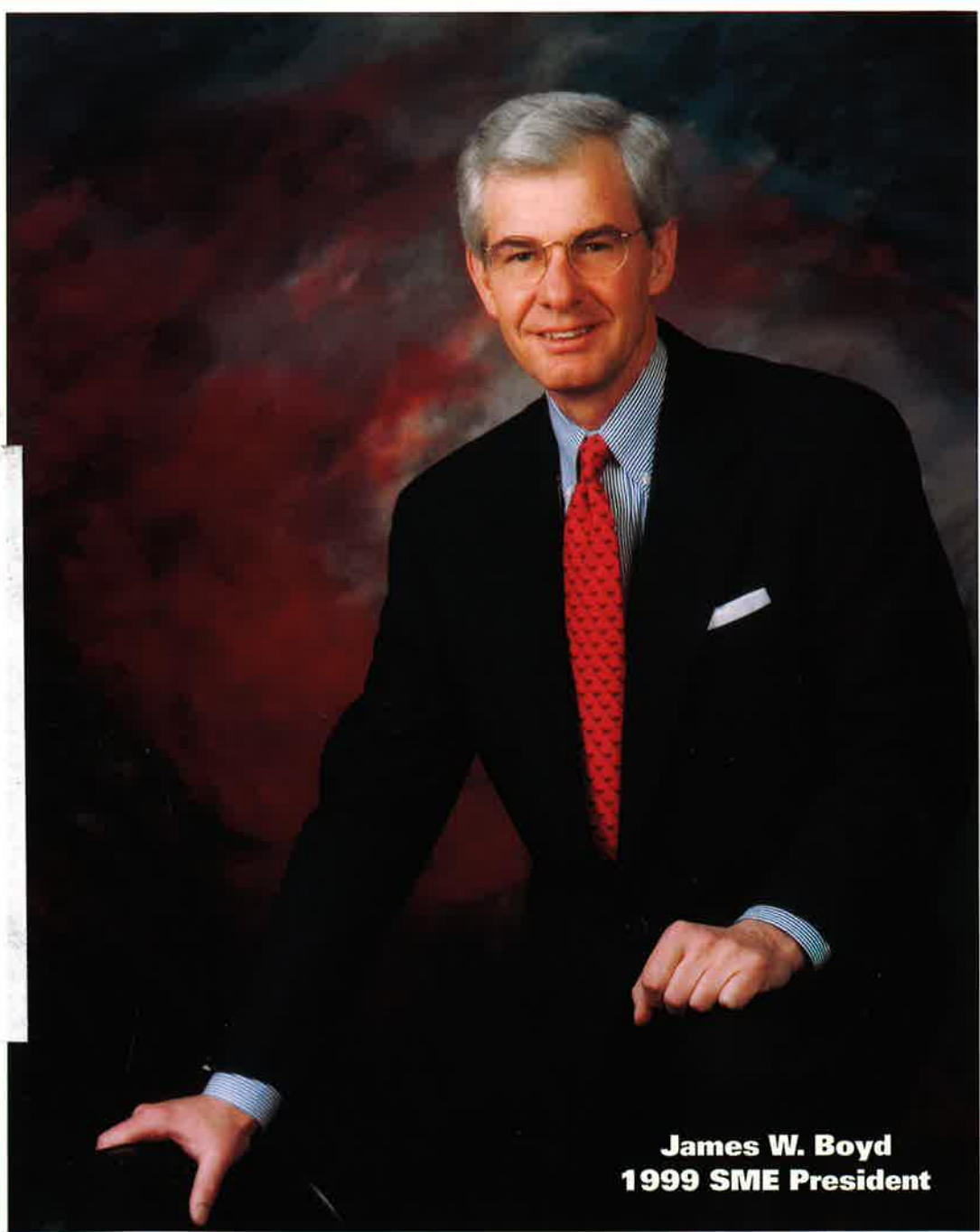
We need to establish the strongest linkage possible among technical information, professional development, the Internet and membership to advance the Society into the 21st century. By these methods we can maintain SME as the strongest technically oriented society it can be.

During the year 2000, it will be my pleasure to follow in the footsteps of our capable 1999 SME president, James Boyd. I look forward to this year as your president and working closely with the 2001 president, Ta Li, as we make progress toward these goals. ■

The first of my goals is new membership growth. Without a strong, long-term membership base, the Society will not survive.



Mining **ENGINEERING** A PUBLICATION OF SME



James W. Boyd
1999 SME President

[illegible]

Jim Boyd: an interview with the 1999 SME president

What is your assessment of the mining industry as we near the end of the 20th century?

As it always has, the industry is continually changing. The recent rate of change has been hectic. Many mining-related commodities are selling at low prices. These include gold, silver, copper, coal and soda ash, to name a few. Lower prices place pressure on mining companies to increase efficiency through productivity, downsizing or mergers. The short-term effect of this situation may adversely affect the individual SME member. But the long-term benefit is to build a stronger, more productive and internationally competitive mining industry. In addition, most of these metals and minerals have been historically cyclical in nature, and prices will rebound.

Do you believe the recent merger and acquisition activity will continue?

Our industry is part of the global marketplace. And I believe this trend will continue across most segments of the mining industry. To date, coal companies have experienced the largest share of consolidation, with several transactions pending. While this action has reduced the number of operating companies, the productivity of the surface and underground coal mines continues to improve. Increased competition and lower prices have required our members to embrace advanced technologies and better management techniques. In the long run, the mining companies that overcome these difficulties that will be stronger competitors for a share of the world's market.

We are also beginning to see this trend in the metals industry. Newmont has acquired Santa Fe Pacific and Alcoa purchased Alumax. In addition, numerous small precious- and base-metal companies have merged or been acquired. Considering the current low pricing of metals in general, further consolidation in this mining sector is highly likely.

The Asian financial crisis has adversely affected all sectors of mining including the industrial minerals group. Trona, rare earth minerals and building materials suppli-



ers have been affected.

In the United States, what do you believe will be the governmental attitude toward mining?

New legislation and regulations are emanating from several directions, such as environmental and legal title. SME must be at the forefront in educating the public and legislators about our industry. Only then can we ensure that any new laws serve the needs of the public and the minerals industry. Proposed rules must be effective and cost effective so that the minerals industry can continue to be strong. Everyone benefits from a strong and viable minerals industry.

On Nov. 3, 1998, the voters in Montana passed new legislation banning cyanide from use in the mining process. The industry was not allowed to lobby against the proposed

legislation or to defend its position on this subject. Challenges to Montana's new restrictive legislation have merit and should be supported by the mining industry and SME members.

Your thoughts about the Mining Law of 1872 and, with your coal background, SO₂ regulations.

Numerous issues still need to be resolved relative to the technological base for reasonable changes to the Mining Law of 1872. In my opinion, there is little likelihood that Congress will pass any legislation during this administration. In addition, ongoing evolution of the mining Resource Conservation and Recovery Act needs to be monitored. In areas such as these, SME needs to move to the forefront as a platform for honest, reasonable dissemination of technical information to assist the public in correctly assessing legislative re-

Tim O'Neil,
Editor

This interview is also available on SME's website. If you have questions of SME's new president, post your questions on SME's website at www.smenet.org/prespage.

quirements. We need to coordinate our efforts in this area with ongoing GEM activities.

Our federal government already has established sulfur-emission standards. The more stringent SO₂ emission regulations take effect in 2000. However, further restrictions on other stack emissions would have a negative impact for electric generators and their coal suppliers. Several mining groups are working to ensure future regulations are reasonable relative to the environment and the energy-based companies. Fossil fuels also face a challenge relative to the Kyoto Protocol and worldwide air emission standards. The issues and politics are numerous. But I believe efforts of unified mining and power industries can prevail and ensure a continuation of clean, low-cost power generation.

SME is improving its stature as a leading source of technical information. SME needs to assist government agencies in obtaining the technical facts to help develop future regulations. We, as a society, will do more in this area to safeguard our vital industry and to provide valuable service to our membership. This will add value to our membership and enhance the image of SME. The SME staff welcomes suggestions from all members.

What are some of the changes that have occurred in the mining industry during your career?

The coal industry experienced a no-growth period during the 1950s and early 1960s. Few companies were hiring and prices were static. This led to a stable, mature work force. During expansion from the late 1960s through the 1970s, new, inexperienced personnel were attracted to an increasing number of mines. By 1978, employee productivity had fallen to an all-time low.

Producing more with fewer mines is the result of improved management techniques, a more educated labor force, and advancements in mining equipment and mining technology. As market demands increased, so did the size and capacity of mining equipment, material handling systems and support gear. This trend continues today with larger trucks, dozers, coal-cutting machines and other auxiliary equipment.

Technology's impact has been significant. Many of today's production units are controlled by microprocessors. This enables more efficient operation and reduces employee exposure to mining hazards. Similarly, mines have improved overall safety by being able to continuously monitor key operations and functions. Our industry has improved its safety record, partly through technological innovations.

Another major industry change is how companies view the marketplace. Years ago, our companies were regional or domestic producers. We are now operating in a global market. We are affected by major fluctuations in international economies.

The level of sophistication required to run a modern-day company continues to increase. CEOs of major producers deal with complex accounting, financial and legal issues. So the requirements for the top position in mining companies have changed. This has provided an opportunity for professionals with a variety of educational backgrounds to assume the leadership role.

Today, most companies are led by professionals other than geologists, mining engineers or metallurgists, which was typical 30 years ago. This change in background of CEOs is an issue for SME. Our traditional ties with key companies' executives by degree and back-

Jim Boyd — diverse experience

Since 1984, Jim Boyd has been president of the John T. Boyd Co. (JTB). From 1968 to 1971, he worked as an engineer in training, section foreman, assistant mine foreman and assistant superintendent for Consolidation Coal Co. From 1966 to 1968, Boyd worked as a United Mine Workers of America underground laborer for Consolidation Coal.

As an SME member, Boyd received the Coal Division's Distinguished Service Award in 1995. In 1992, he was chairman of the Coal Division. In 1985, he was chairman of the Pittsburgh Section. In 1992-1993, Boyd was a member of the SME Board of Directors. He is a former chair of the Distinguished Service Award Committee, the Program Committee and the Woerner Award Committee. And he has served on the Professional Registration Committee.

Boyd is also a member of the National Coal Council. He is on the Board of Directors of the National Mining Hall of Fame and the National Mining Association (NMA) and the Board of Governors for the Manufacturers and Services Division. And he is a member of the National Society of Professional Engineers.

In 1993, Boyd was president of the West Virginia University College of Mineral and Energy Resources. He is a former board member of the Engineers Society of Western Pennsylvania. And he is a Governing Board member of the Arthritis Foundation of West-

ern Pennsylvania. In addition, in 1986, Boyd was the author of *Fundamentals of Coal and Mineral Valuations*. Boyd graduated with a B.S. in engineering of mines from West Virginia University.

In 1971, Boyd joined JTB as a mining engineer. That followed six years of service in labor and mine management capacities with Consol Inc. During his tenure at JTB, Boyd progressed to senior mining engineer. And in the late 1970s, he was promoted to an officer of the company. In 1984, Boyd was elected by the board of directors to serve as JTB's president and chief executive officer.

Boyd is a registered professional engineer in Alabama, Arizona, Colorado, Kentucky, Ohio, Pennsylvania, Texas, Utah and West Virginia. JTB currently operates US offices in Pittsburgh, PA, and Denver, CO.

In October 1993, Boyd received the Pittsburgh Section's SME Distinguished Member Award. He has served the mining industry for more than 30 years. He strives to improve the industry through his professional expertise and personal involvement in SME activities. And he encourages his staff to participate in SME activities. In addition, Boyd devotes considerable effort and attention to further SME objectives and goals through supporting and leadership roles.

Boyd has earned domestic and international recognition for his participation in numerous assignments involving surface and underground mining of coal,

ground have greatly diminished. Therefore, more focus by SME is required to develop a better understanding and liaison with these leaders. Corporate sponsorship and encouragement are part of the underlying foundation of SME.

What challenges and opportunities do you expect for mining?

The world economies are going to affect the mining industry's sales and realizations. The Asian crisis and its ripple effect on our industry in 1998 have been severe. Brazil's economic problems and currency devaluation are not healthy events. Reduced mineral commodity prices through 2000 provide an opportunity for individuals or companies to acquire mineral reserves or mines at depressed market prices.

This past year, I had the misfortune of being in Johannesburg and in Moscow at the time of their currency devaluations. It was not a pretty sight. And the devaluations will exacerbate the turmoil that already existed in those countries. Thankfully, I was not in Brazil this January.

Summarize your career and the experiences that led to your election as SME president?

My exposure to the mining industry started as a child listening to my father's tales of his most recent trip to some remote mining location, such as Chile, India or Africa. Being exposed to a variety of mining people and growing up in the heart of the coalfields influenced my future endeavors. After a year in civil engineering in the Midwest, I transferred to West Virginia University's mining engineering program.

My first intimate glimpse of the mining world was as a union laborer at Consol's Montour No. 4 Mine the summer after my sophomore year. By coincidence, this was also the first mine for which my father worked. Two years of part-time work in underground mines convinced me that coal mining would be a challenging and interesting career.

After college graduation, I joined the then Consolidation Coal's Moundsville Division. The late 1960s were an interesting time to be in the coal business.

The energy boom was starting. And the existing, qualified management pool was not sufficient to meet the industry needs. The volatility of the industry provided an excellent opportunity to take on a variety of underground mine-production jobs in a short period of time.

How long have you worked at your father's company?

In 1971, I joined my father at the John T. Boyd Co. It was not an easy decision. There were challenges presented to a supervisor at a union coal mine in the tumultuous times after the passage of the 1969 federal Mine Health and Safety Act. However, the appeal of seeing different mines, mining methods and industries ultimately won out.

Initially, my work focused on coal and industrial minerals in the United States. Over time, my horizons broadened, leaving coal projects at 60% with slightly more than half of them at domestic locations. My personal career parallels the mining industry in that diversification and change are part of the business. My workload now consists of a variety of acquisition- and operation-related projects for the coal, minerals and

in coal and minerals serves him well

minerals and precious metals in nearly every mining state in the United States.

Boyd has international experience in Australia, Belgium, Botswana, Canada, Germany, Honduras, India, Jamaica, Mexico, New Caledonia, New Zealand, Pakistan, Philippines, Republic of South Africa, Republic of Zambia and the United Kingdom.

Boyd's consulting expertise encompasses valuing coal and mineral properties, analyzing surface and underground mining methods and design, determining capital and operating costs and conducting feasibility studies. Some of the of mineral and precious metal projects he has worked on include copper, iron ore, lead, magnesium, nickel, phosphate, potash, salt, sand and gravel, silver, gold, tungsten and zinc.

Boyd's most recent notable accomplishments include restructuring of a major industrial mineral industry in the Caribbean and the technical assistance he provided to the British government's Department of Trade and Industry, relative to the privatization of British Coal Corp. His efforts culminated in the restructuring of the industry and a successful sale to the private sector.

Boyd is also a recognized expert witness before local, state and federal agencies. He has testified in litigation relative to coal and mineral valuations, lease terms and conditions, coal contracts, subsidence and environmental issues, prudence of mining operations, mining cost and market prices.

Major engineering projects under Boyd's auspices include the privatization of publicly owned mines in the UK and evaluation of the feasibility of mining reserves in the Alaskan coalfields.

He was also responsible for the development of major coalfields in Colombia, Pakistan and Thailand. This allowed the use of indigenous coal reserves and reduced the reliance on outside energy supplies for these countries.

Boyd was member of the board of governors for the former American Mining Congress (now the NMA). He is also a former director of the Engineers Society of Western Pennsylvania.

Boyd has developed innovative solutions to complex problems for his clients. He has recommended new organizational structures, streamlined staffing requirements, developed appropriate job descriptions and prepared standards of accountability. He has evaluated management skills and provided strategic planning advice to increase mine profitability.

Boyd has championed the mineral and coal industries domestically and internationally and to government and other regulatory bodies. His dedication to the mining industry is well documented by his concise, professionally prepared engineering reports and numerous industry publications and presentations. In 1993, he served as a Henry Krumb lecturer for the SME. ■

metals industry. Our company has completed jobs in more than 50 countries.

What is SME's role during these challenging times?

The various mining sectors will continue to experience rapid change. In the process, our industry will remain competitive in the global arena. Many challenges await us. But, in my opinion, our industry and its members are capable of achieving higher goals.

The society must enhance its support of mining companies, governmental agencies and academia. We do this through more efficient use of the resources and talents of the SME staff and its membership. SME has not achieved the goal of being the leading platform for dissemination of technical information to the public, the industry and its members. SME has attained significant gains in its GEM activities and the SME Foundation development. We are working towards goal achievement. The trend is right.

SME is a volunteer organization with an annual rotation of national officers and a broad spectrum of members. So it requires diligence to hold the course and achieve our goals from year to year. SME is in the process of placing more emphasis on its staff and the executive director. Accountability is essential for those involved. And the officers are working with the staff to establish accountability in all areas. Positive results in this area will increase the level of support to our membership and provide improved focus and continuity of our efforts. The staff is addressing the timely movement of information to our members through publishing and Internet issues.

Current practices are being evaluated to determine if a more effective use of resources is possible by switching more hard copy to the Internet web sites. Also, more services will be provided as a result of the Internet. The SME must improve in communicating its value to prospective members about their joining and becoming active participants in SME.

In your view, what are some of the benefits of being an SME member?

SME provides many things to the industry, to its individual members and to society including:

- Public education about mining's role in society.
- Dissemination of technical information.
- Assistance in accreditation of mining programs.
- Professional engineering registration.
- A forum or network for local, divisional and regional functions.
- Monthly publications.
- Annual, regional and topical meetings.
- Continuing education and educational credits.
- A future leaders program.
- Information, materials and answers at national teacher work shops.

"The society must enhance its support of mining companies, governmental agencies and academia. We do this through more efficient use of the resources and talents of the SME staff and its membership."

- And establishing a platform for international cooperation relative to mining technology.

SME attracts approximately 20% of those eligible for membership. Then, approximately 24% of the eligible membership votes in the SME election of national officers. By comparison, national elections in the United States are only slightly better. However, we want to enhance and improve SME's message so that we broaden our participation and our membership base.

In 1992, SME undertook an arduous task to develop a strategic plan for long-term development.

All aspects of the society were reviewed and numerous recommendations were structured. Many of these same issues remain today. We are clarifying the study's findings based on current circumstances. And we are developing accountability of the organization to achieve goals.

What should be SME's short-term priorities?

Membership is my number one priority. Perhaps SME is experiencing a trend similar to other professional societies. The baby boomers are getting older and generation X is less inclined to join because of differing needs and values.

The question, then, is what must we undertake to increase our value of membership to the majority of the industry that are not members? The membership committee and SME Board are well meaning and sincere in their efforts to turn the tide of decreasing numbers. However, we have not been able to achieve our goals. Our whole membership system needs review by a third party with expertise in member recruiting. The SME staff has initiated this process, and they are taking more responsibility for its results.

My second priority is revisiting the strategic plan. I want to see what can be salvaged from the existing work and implemented in a timely and cost-effective manner. Suggestions are welcome. We need to move forward with the general consensus of the SME membership.

A final thought would be to improve our support of individual members. We need to provide assistance with career development for our membership. We are establishing an expanded web site that lists job opportunities for our members.

What about long-term requirements for SME that this organization should focus on now?

The ever-increasing global nature of our industry suggests we formulate a specific plan relative to international membership. Frankly, we do not provide adequately for this group of members. There is also the issue of attracting nontraditional members in foreign countries. Some difficulty arises in countries having an existing mining society. Do we develop long-term liaisons or operate independently of these groups? Since being reorganized two years ago, the International Committee has focused on international programming at the Annual Meeting and that effort has been very successful. I plan to enlist the Committee's assistance in membership

development and to support their efforts and recommendations. A clearer understanding is needed of where and how SME intends to proceed.

Developing greater corporate support of SME members' involvement and activities will take time. We should identify the companies having a low percentage of eligible members. Then, a well thought out dialogue and approach needs to be formulated to address this group. It is possible many of these leaders are not aware of SME. They may not understand the value of having employees belonging to the society.

"We should identify the companies having a low percentage of eligible members. It is possible that many of these leaders are not aware of SME. They may not understand the value of having employees belonging to the society."

Any thoughts about the SME Foundation?

The SME Foundation is operating under a long-term plan. Also, the Foundation is currently refining and further defining its role in the society. Their belief has merit that a more professional approach to fund raising is required. As an example, just talk with our members from academia about how their universities approach fund raising. That is serious business.

What is your vision of the Society in the future?

Our individual members will be more highly educated, 100% computer literate and demanding information exchange at much faster rates. The rapid pace of industrial change and market variations requires well-trained, flexible individuals for the future. Hopefully, SME is the leading society for technical exchange in the mining industry. In addition, I envision the following:

- Efficient electronic publication of timely technical documents.
- Electronic membership and meetings registration.
- Local sections in more than 20 countries.
- Established affiliations with major mining, governmental and academic organizations to provide a global exchange of ideas.
- Developing timely and profitable topical meetings.
- Major meetings in all six US SME regions and at international sites.
- Paying our SME dues on line.

Do you think many of these future visions can occur?

Our membership has demonstrated that they accept change and can work together for the common good. The staff is accepting more accountability. What is left is to settle on the most unified visions and work for their accomplishment. Hopefully, some of my vision will be accepted by the majority.

Maybe this is self evident. What role do you think individual members play in the Society?

The individual member is the foundation of this organization. Whether the member participates at the local section, on national committees or at the regional-officer level, all aspects are important to the organization.

It is the individual member who has daily contact with other potential industry members. SME's value as

perceived by its individual members determines our attractiveness to potential new members.

The local sections are the next tier of importance. Their networking and successful programming are a driving force in attracting and retaining members. Many SME members elect to participate only at this level.

In your opinion, what is happening at the local section level?

In general, sections are having a harder time retaining members. It is also true that some sections are doing more than others. Rather than discuss vague generalities, I would

like to use my home section as an example.

In 1985, I was chairman of the Pittsburgh Section. It had approximately 1,300 members. The annual meeting drew several hundred people. The monthly meetings varied from 60 to 130 people depending on speaker, location and time of year. The consolidation of the local coal industry has reduced the section to 450 members. And getting more than 100 members to our annual meeting and attracting more than 30 to 35 people for infrequent monthly meetings is a challenge.

The section is also having a hard time filling the officers' positions. One positive is that nearly all the mining-related companies sponsor the section calendar. This covers section expenses related to programming. The section has dynamic individuals as officers and board members but it is not broadening its base. The perceived value to its members is paramount.

In the sections, as well as at national, we need to communicate existing value and develop programs to increase value. We have improved our programming and have a dedicated staff and capable committee people and officers. From this base, we must focus on value to the member.

I am pleased that SME's Executive Director, Gary Howell, is joining me and expanding his personal involvement in membership retention and recruitment. We should see progress by year-end. Gary and I are in sync on the membership issue and his commitment is gratifying.

Any final thoughts?

Just one. I would like to thank everyone who has encouraged me over the years to stay active and take on different responsibilities in SME. The opportunity to meet so many people with such varied backgrounds and thought processes has been professionally and personally rewarding. My knowledge and skill levels have risen due to this liaison and I am grateful for the SME experience.

Just think, as President, I will be surrounded by a great group of board members and will be part of the GEM effort, ABET accreditation, professional registration, Foundation board, future leaders, WAAIME's positive long-term impact, students, professors and the input from every member I meet. We all should be so lucky! For your encouragement and tutoring over the years, thank you. ■

MARCH 1998

Mining

ENGINEERING

A PUBLICATION OF SME



Ihor A. Kunasz
1998 SME President

LIBRARY
UNIVERSITY OF MICHIGAN
SERIALS ACQUISITION
300 N ZEEB RD
ANN ARBOR MI 48102-2726

Ihor Kunasz:

An interview with SME's 1998 president

Editor's note: Biographical information about Ihor Kunasz, president, Newmont Uzbekistan, can be found in the February 1998 issue of **ME**, page 94 and in the May 1996 issue, page 92.

Your personal assessment of the minerals business.

Gosh! When I think about what has happened to the minerals industry over the past 27 years that I have been a member of SME! There have been fundamental structural changes in the industry. And I think that SME has been quite successful in coping with these changes as well.

There has been a reorientation in how the minerals industry does business. It used to be called rationalization. Today we call it reengineering. In addition, the minerals industry has become more complex and more global. Shareholders have become more vocal and demanding in the management of the business, asking for protection of their shareholders' value.

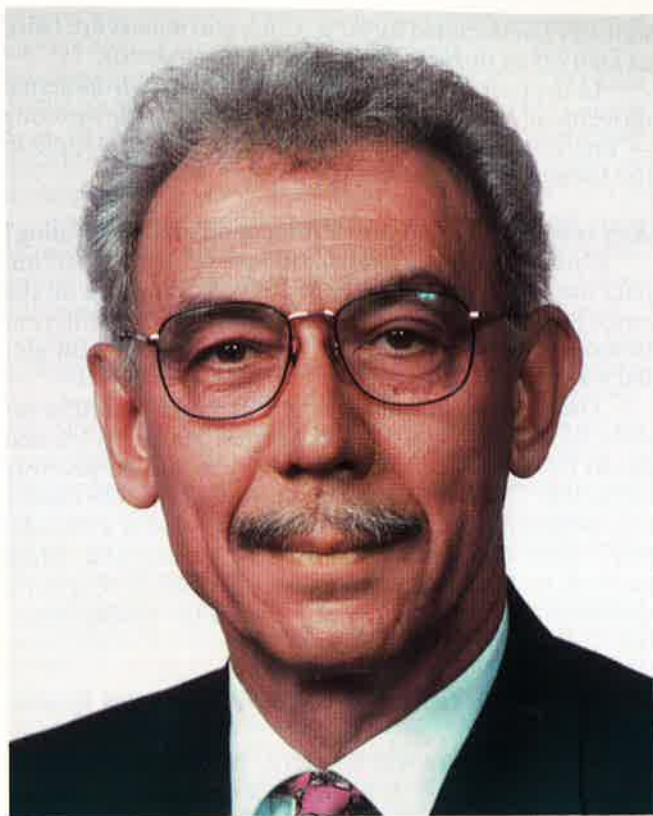
In the 1980s, a fundamental change was precipitated by a merger and acquisition fever in all industries, including the minerals industry. Raiders such as T. Boone Pickens put enormous demands on companies that, in turn, had to spend substantial management time to fend off the raiders. This resulted in a major restructuring of the mining houses. Today, for example, Anaconda, Kennecott and Amax are only historical names.

The remaining mining companies are more competitive and productive, are they not?

Companies have become leaner, reacting to market demands while realizing that the mining business, being global in nature, is becoming extremely competitive for capital and manpower. Mining companies now have practically no geographical borders. With the collapse of the Soviet Union, substantial mineral opportunities are opening up. The same thing is happening with the People's Republic of China.

To date, the investment climate is still difficult in many parts of the world. Even so, the marriage of much needed western capital and technology with attractive worldwide mineral deposits has begun and will continue.

Further changes will continue to mold the fabric of the mining industry. Two events that will certainly impose new thinking are mineral prices and environmental issues. SME has always been able to help its members



deal with industry pressures. And I am confident that tomorrow's SME will also be able to adapt to this constantly changing mining environment.

Environmental issues continue to have a major impact on mining companies.

While preparing myself for these comments, I reviewed the thoughts of my predecessors. One of their pervasive thoughts is that the mining industry will continue to face extreme environmental pressure. I would encourage our members to reread Nancy Bingham's article (**ME**, March 1994, pages 200-203) "Mining's image — what does the public really think?"

I suspect that mining is still perceived as causing harm to the environment and to people and exploiting and providing little personal benefit to people. To combat this negativism, SME has created GEM and works very hard with the Minerals Information Institute and other mining education and information groups.

In addition to public negativism about mining, we have to battle the extremism that permeates the environmental movement. SME must continue to increase its efforts in this area. And we have, for example, with the creation of the new SME Environmental Division.

Many SME members will remember when environmental topics started replacing those concerning the importance of mineral resources to modern society. The result has been the creation of what 1997 SME President Dick Klimpel termed "extremist" environmentalism.

This movement initiated and perpetuated the idea that mining causes harm to the environment and that it provides little personal benefit. The latter is a falsehood perpetuated by uninformed people. Colorado is an example here. While employment in the Colorado mining

Tim O'Neil,
Managing
Editor

industry has declined by 60%, Colorado miners are twice as well off as those in the manufacturing sector.

In the past 20 years, the impact of the environmental movement on the mining industry has been devastating — one result has been less interest by young people in the mining and metallurgical fields.

Any reaction to the Kyoto Protocol on global warming?

One of the latest international events that will impact our industry is the recent Tokyo conference on the emissions of gases into the atmosphere. This international treaty is predicated on supposedly imminent global warming.

The agreement calls for the European Union to reduce its emissions by 8%, the United States by 7% and Japan by 6%. The US coal industry would be severely impacted. The Kyoto agreement would force US energy consumption to be reduced by 30% in about a decade. SME must closely monitor items like this and, when needed, mobilize its membership into action, to avert a disastrous operating environment for the mining industry.

In your 27 years in mining, you have seen many technological changes.

No doubt there will be more. My background is in the lithium industry. It serves as a classical example of such changes.

When lithium was discovered and first used in industrial applications, it was supplied from pegmatites. When the brines at Searles Lake, California were found to contain lithium, a technological change began to affect the lithium industry. At that time, in 1936, the word "unique" was used.

Then in 1966 (although lithium had been identified in the brines as early as 1906) lithium carbonate was produced on a large scale from a brine deposit at Silver Peak, Nevada. And the word "unique" was used once again.

When the brines of the Salar de Atacama in Chile were found to contain 20 times more lithium than those in Nevada, we stopped using the word "unique." Today, the bulk of lithium chemicals is produced from brines. Similar developments can be told for gold — from placer, to lode, to cyanide heap-leach, to bio-redox, etc. And, again, the same can be said for copper and other metals and minerals.

Uniqueness is a concept that reflects our technological knowledge at a particular time. If our past is prologue, we do have an exciting future ahead of us.

SME members have already shown that the future will hold new discoveries, new technologies and new applications. SME must continue to aid such creativity and discovery. In this regard, the SME Research Council will continue to play a valuable role in establishing research directions that will benefit the mining and minerals extraction industries.

In the short term, the mining industry has been under enormous pressure as a result of the recent slide in metal prices. The immediate effect has been some mine cutbacks and closures (see *Industry Newswatch*, pages 21 and 22). For some companies, there has been a decrease on shareholder value and the loss of economic reserves.

Only those companies that are low cost producers and have a portfolio of strong properties will survive this

short-term aberration and emerge as stronger companies.

The big question is whether metals prices will continue to decline.

The mining industry is optimistic that this situation will not continue. But the industry will experience major structural readjustments that will likely result in the disappearance of a number of small-to-medium sized companies. Further, strategic mergers and alliances will continue to reduce costs, increase productivity and fine tune the product mix.

The US mining industry and the service industry that supports it will need to remain a productive and technologically advanced industry in order to survive in an ever-more-competitive industrialized world.

Mining is a long-term business requiring substantial capital investment. Returns on this investment are expected five to 10 years for most major projects. However, many strategic decisions are driven by short-term results. This is understandable because today's business is driven by an aggressive and ever-demanding stock market.

The downturn in metal prices will result in even greater pressure to make short-term decisions. However, companies must adhere to long-term strategies, not only in the product mix necessary to weather price cyclicity, but also in the geographical mix to take advantage of new, available overseas opportunities.

My company, Newmont, is an example here. Until 1992, Newmont Gold Co. was a Nevada gold operator. Today, the company is involved in Peru, Indonesia and Central Asia (Uzbekistan). The same can be said of Cyprus Amax Minerals Co. It is now a product- and geographically diversified company, operating in Chile and the Russian Far East.

You mentioned the Salar de Atacama brines operation in Chile. You spent some time in South America.

This internationalization of the US mining industry has followed areas of major political upheaval that opened up new possibilities for investment. The trend towards internationalization began with Chile. The post-Allende era created a favorable investment climate. This permitted foreign mining companies to invest substantial capital in the mining sector. While modest in the early years following the collapse of the Marxist regime, the Chilean government introduced successful investment laws that created a positive investment climate. So much so that, in 1996, some \$5 billion had been invested in the development of new mines.

More recently, following the stabilization of its political regime, Peru is also experiencing a renewed mining boom, particularly in gold. And increasing exploration activity strongly suggests that Argentina will soon follow.

And on the African continent, international mining companies spent more than \$400 million in exploration, more than double the 1994 expenditures. This is the direct result of privatizing the mining industry.

You work now in Uzbekistan. What is your reaction to the breakup of the Soviet Union?

Without a doubt, the most important political event of this decade has been the unexpected breakup of the

Soviet Union. The former Soviet Union boasted of great mineral riches. Indeed, some of the deposits are spectacular: Norilsk - nickel, Muruntau and Lena - gold, for example. But many of the deposits were developed simply to satisfy production quotas imposed by a demanding central government without consideration of fundamental economics. So, while the possibilities are infinite, the actual number of profitable deposits may be few.

I suspect that the best potential for the discovery and the development of new mineral deposits in the Confederation of Independent States (CIS) will come from the application of new ore body models to the tremendous amount of data generated by Soviet geologists.

Foreign governments must recognize that western mining companies are accustomed to working in an environment that includes a legal structure, currency stability and a stable tax regime. Emerging countries are opening up to foreign mining investment. However, to become integrated into the world marketplace and attract foreign capital, they must provide an investment climate that will favor them over other countries.

On the other hand, to be successful in creating joint ventures, US mining companies should be prepared to dedicate significant management resources during the formation of joint ventures. This helps to ensure that lines of communication to the home office and to key government officials are always open.

It goes without saying that the manager of such joint ventures must be sensitive to local customs that, almost invariably, are different from US corporate culture. Finally, US companies must also learn to manage a foreign government's expectation.

How does SME fit into this?

With so many US companies operating internationally, SME is an ideal forum for its international members to compare notes, exchange their "war" stories and practical experiences. In such a way can other members benefit from an expertise often acquired under difficult pioneering conditions.

I further believe that these structural changes that affect the mining industry will also result in significant changes for societies in general. As the mining industry becomes more global, so should SME. The Society will need to constantly review and tune its strategic plan, to continue to provide the best services to its members as it strives to remain as the premier mineral society in the world.

Kyoto was mentioned. SME must closely monitor events like this one and mobilize its membership into action, to avert a disastrous operating environment for the coal mining industry.

Developed nations, having reached a high standard of living, sometimes fail to realize the reason for this benefit stems from a strong industrial base, which is fueled by minerals, metals and fossil fuels. Sometimes, individuals also forget this cause-and-effect relationship when they embrace some of these extreme environmental causes. The efforts of these individuals would be better spent combating global problems such as disease, hunger, poverty and illiteracy.

What do you see when you look to the future of mining?

The mining industry has and is meeting all the challenges thrown at it. But the basic fabric of the minerals

industry has changed. One fundamental change involves the stability of employment and loyalty to a company. Few of us can claim that we have worked 20 or 30 years for the same company. Today, resumes tend to show three- to five-year moves between companies or the last three to five years as a consultant. This is the result of the acquisition fever of the 1980s.

While some companies were able to fend off such onslaughts, the mining industry did change. For example, my company, Newmont changed from a diversified mineral company to an exclusively gold mining company.

The internationalization of the mining industry has also impacted the US markets. We all remember when increased power costs made it cheaper to import ferroalloys than to manufacture them in the US. And we know the industrial minerals industry is sensitive to transportation costs. But who would have thought that you could import aggregate from Scotland cheaper than you can produce it in the United States and ship it up the Mississippi River?

All these changes have affected our members, sometimes substantially, and have resulted in a different blend in SME's makeup. As a Society, we must constantly strive to serve our changing membership, a membership that is becoming more international, more computer literate and more globally dispersed.

However, the minerals industry will survive through the creativity and ingenuity of its employees, who are the vital link in the industrial chain. As R. Douglas Learmont (ME, Jan. 1997, page 11) said, the mining industry must demonstrate that mining and minerals extraction can be a sustainable activity. The mining industry has proven time and time again that today's low-grade resources can be turned into tomorrow's ore bodies as a result of technological breakthroughs, operational and management efficiencies and tax and regulatory support.

Politicians, environmentalists and academicians must realize that the 21st century will continue to rely on minerals and metals. This is so because developed countries will want to sustain their standard of living and developing countries will strive to achieve economic well being.

Any other challenges to mining?

There are a number of issues that will change the nature of the minerals industry. However, we should not despair. Mining will continue to be viable.

The minerals industry is feeling pressure from many directions. There is still greater preoccupation with global warming than with global mining. Reality has not yet set in with many groups that do not realize that minerals fuel the basic industrial being of societies. Man needs minerals. The slogan "If it cannot be grown, it has to be mined" is a fundamental truth.

Metal mining companies are under severe pressure from the earlier noted low metals prices and gold and copper companies have seen their value diminish substantially. There is a perception in various circles that gold, for example, should be just another commodity and that it should not serve as the monetary parity for world currencies. The sale of gold reserves by some central banks has created an uncertain environment, bringing down gold prices to an 18-year low.

Copper prices have mirrored the gold price decline.

The result is that some companies will have to restate their reserves to reflect the changing economic parameters. This further results in substantially decreased assets and, for some companies, in the loss of all their reserve assets.

Political reforms, global mining — minerals everywhere. Things can only get better, right?

While one reads glowing reports of dramatic political reforms in many parts of the world, the true pace of these reforms is often not as exciting as it appears. US mining companies operate in an international arena where transitional political regimes render investment difficult.

As in the United States, foreign governments control most of the mineralized lands, often all of the mineralized land. In their desire to become integrated into the world economy, these foreign governments are faced with relinquishing mineral rights ownership to foreign investors. In addition, foreign governments are often resisting the conditions necessary to attract the much needed foreign capital infusion required to develop an often ailing mining sector.

So, what is needed to develop healthy mining industries in these foreign countries?

Privatize state-owned mining and processing assets. Even as they privatize, foreign governments often remain the partners in the joint ventures.

Develop a workable mining code where mineral rights are granted openly and regulations are clearly spelled out. These are often poorly understood because of production-oriented vs. profit-oriented philosophies.

And develop workable environmental laws and controls. Past abuses have created a severe backlash, as in the former Soviet Union, that make it practically impossible to operate in certain areas.

The successful companies are those that have the patience, perseverance and deep pockets to weather the difficulties experienced by developing countries. At the same time, SME has a clear role to play in the new geographical areas where US mining companies invest their capital.

SME has a large pool of information regarding operating conditions in many parts of the world. And the Society should serve as a catalyst in helping governments to create an environment conducive to US mining capital inflow.

Your thoughts on SME as an organization.

The Society has witnessed some fundamental changes over the past few years. I believe that each of the SME presidents, assisted by a creative and efficient staff, introduced those necessary steps to strengthen the Society.

Annual meetings draw an increasing number of manufacturers and suppliers of services. And the quality of programming is reflected by increasing attendance. *MINING ENGINEERING* continues to be a leading professional publication. And we are well on our way onto the information highway. From a relatively passive Society in the past, we are well poised to become the premier proactive minerals society in the world.

And let us not forget the SME Foundation. It needs the Society's support as it builds its endowment as well

as begins to support educational and scientific activities of the Society. In 1998, the Foundation supported the production of a primer on silica, the improvement of the SME Home Page and the Niggemeyer Scholarship Fund. These were modest support dollars, but I believe the Trustees of the Foundation are going to put every effort in raising more money and supporting more of the Society's programs, and I feel strongly our industries and members will want to participate in that effort.

In any changing environment, new opportunities are created. The anti-mining sentiment has resulted in the demise of the US Bureau of Mines — an institution that provided important and critical minerals data. The US Geological Survey is under pressure.

In such an environment, technical information must be provided by other organizations. So, in the mining, metallurgical and geological fields, SME has a vital role to play. SME must focus on those areas that offer the most value to its members. And we must constantly challenge ourselves in this regard. The Society must serve as the repository of information on mineral resources and mining technology.

With the advance of computer technology, SME has the opportunity to become the medium that provides basic, advanced and critical technical information for its members and for its world. The ease of access to information by our members in North America makes us forget that many parts of the world still employ technologies oftentimes a generation or more old that are no longer effective or productive. Consider the application of large-scale heap leaching technology by Newmont at the Muruntau Mine site in Uzbekistan in 1992. That was a first in the CIS.

You are an advocate of digital communication?

It will take time to realize the benefits of SME's integration onto the information highway. However, in time, that integration will pay big dividends to the Society.

It must be noted, though, that the same computer technology that facilitates the exchange of information is being used to defame mining. Web sites have attacked mining companies, using false and distorted information. The problem is that you do not have a way of correcting such misinformation or even knowing who reads the information. The Society and its members must be ever vigilant.

Your thoughts on SME membership?

Our Society must remember that a substantial part of our membership belongs to services companies. There is clearly an incentive for these companies to participate in SME. Our Society must provide them with the access to our members and the extractive industries they represent.

Drilling companies, equipment manufacturing companies and engineering companies, to name a few types, are an important source of support for local as well as international SME chapters. On the international scene, these companies can serve an important role in the life of the local section and organization.

For example, in Uzbekistan, Kvaerne Metals Davy made a presentation on its activities in Russia at a meeting in Tashkent. This helps the local organization to defray the high cost of bringing in a speaker from abroad.

It also serves to present advances in technical fields, finances, law and accounting to the local professionals and government people who have a minimal knowledge of western practices.

Any final comments for SME members?

The motto for the Orlando meeting is "The changing world of mining...our role." Indeed, the world of mining is changing and will change even more. SME must and will change with it.

Mining used to be a relatively simple activity. It has become a sophisticated blend of financial, technological, environmental and regulatory activities.

SME is also a changing society and our role must also become a blend of different services to our members. The need for transformation was recognized by my predecessors.

Thus the formulation of a strategic plan. This plan has created a more effective Society that provides quality services to its members — annual meetings, quality publications in print and through electronic media. We must be ready for the future.

In recent years, the Society has had to respond to events that did not exist 20 years ago, or even 10 years ago. I have noted the increasing pressure from the environmental lobby. So the Society decided that its membership needed a vehicle to manage this new dimension. GEM was created to keep SME members informed and to provide a vehicle to disseminate the correct image of mining to the public. Today, GEM is an energetic group that is seeing more and more success, taking mining messages to teachers.

I mentioned SME has also created a new environ-

mental division. The Society recognizes that the membership is concerned about the impact of environmental pressures and needs to address various issues formally rather than on an ad-hoc basis.

I encourage all members whose activities are affected by excessive environmental and regulatory pressures to join and support this new division of our Society.

As you know, SME has decided to take advantage of the Internet and now has in place a website. Our initial survey indicates that a relatively large percentage of our members do not use this tool. Even so, there is no question that large-scale transfers of information will be possible through this technology.

The Internet will become more and more important as the mining industry becomes more global and our membership is dispersed over various continents. As a matter of fact, my conversations with SME headquarters is by means of the internet and my comments have been transferred electronically to headquarters.

A Society can survive only through a strong membership and strong leadership. Recognizing this, SME has started the "future leaders program." The program is designed to seek out and involve young professionals in our society. There is a lot of talent out there and we need to energize it for the benefit of both SME and the mining profession. I encourage our young members to participate in this program.

For SME, as for many mining companies, 1998 will be a challenge and our society must realize that membership will be put to the test. However, SME has been resilient in the past and I am sure that the Society will continue to provide the highest quality service to its members. ■

*American Association of Engineering Societies and
Engineering Foundation Announce*

1998 ENGINEERING JOURNALISM AWARDS

◆ Daily Newspapers

◆ General Circulation Print Media

◆ Broadcast Radio or Television

Up to three Prizes of \$1000 will be awarded

Engineering Journalism Awards recognize outstanding reporting of an event or issue that furthers public understanding of engineering.

1997 winners were:

Jon Palfreman for Nuclear Reaction, *Frontline*

Arthur Fisher for World's Largest Dam, *Popular Science*

David G. Willman for his series, Defective Welds: Structures at Risk, *L.A. Times*

Nominated works must have first run or been first aired between July 1, 1997 and September 30, 1998.

Print entries must be easily reproducible; two copies of VHS tapes or audio cassettes are required (scripts are requested but not required). Application deadline is October 15, 1998.

For more information, contact: Dr. Charles Freiman, Director, Engineering Foundation,
345 East 47th Street, Suite 303, New York, NY 10017; engfnd@aol.com; 212-705-7836 (fx 7441).

MARCH 1997

Mining

ENGINEERING

A PUBLICATION OF SME



Richard R. Klimpel
1997 SME President

***** 5-DIGIT 40502
VID A ZEEGER
ALLY RD
NGTON KY 40502-2726

Dick Klimpel:

An interview with SME's 1997 president



You have been involved with research activities in froth flotation and size reduction. What do you think the future holds for these technologies?

Froth flotation and size reduction are essential processing steps common to almost all current mineral-processing operations. The most significant recent advances in both of these technologies have been in the increased size of equipment and in some alternative machine designs, such as the column cells and the high-pressure roller mills.

I believe that the next major area of improvement in size reduction will be at least partially driven by an improved awareness of controlling the conditions that influence the efficiency of particle breakage. This would include factors such as water-chemistry influences, the influence of fines from classification, chemical grinding additives and better rheology control. In froth flotation, significant changes are currently taking place in the plant use of frothers. Also, there will be an increasing number of new collector chemistries for certain types of flotation, such as with oxide minerals, oxidized mineral recovery in sulfide systems and improved selectivity with certain sulfide mineral systems.

You have been active in implementing new engineering technology in industry. What do you think will be the technological future of mineral processing?

Being involved in the invention and industrial implementation of new technology has been one of the most positive experiences of my career. I also have had the unique experience of working in the chemical and petroleum industries as well as in mineral processing. In my opinion, the future of mineral processing will be an exciting, wonderful work area in which to be involved.

The development of new technology in minerals processing offers a special challenge compared, for example, to that of chemistry or chemical engineering. In successful industrial innovation involving minerals, having a sound theory is not enough. Instead, what is required is a valid blend of a good idea, meaningful laboratory characterization and, most key, the experience necessary to adjust the plant in such a way to incorporate the idea.

The complexity of engineering systems that contain solids, liquids and gases, as well as highly variable natural mineral properties, means that nothing new comes easily. In some cases, it has been difficult to explain how processes practiced in industry for decades actually work, in terms of physical and chemical fundamentals. On the other hand, when a new idea is successfully implemented, the economic and professional returns can be very rewarding. I know of no more challenging field of engineering than minerals processing.

What is your view of the future of the minerals industry in general?

The need for minerals, metals and coal will be with us for decades to come. In many aspects, the minerals industry became global much earlier than some of the other industrial sectors that are currently experiencing globalization. I believe that fair international competition is beneficial to the users of minerals, metals and coals and to those involved in producing such materials. The key word here for a global economy to work is "fair." So the various playing fields involved such as finance, profit return, regulation and labor should be relatively level for all the players involved.

Competition is an amazing driving force for inno

Dick Klimpel — A career in generating

Dick Klimpel is currently president of RK Associates LLC, a consulting and process research firm located in Midland, MI. His activities include helping mineral operating companies design and optimize their concentrator operations, presenting industrial short courses on size reduction and froth flotation and inventing new chemical processing agents.

Klimpel is also an adjunct professor of materials science associated with the National Science Foundation's Engineering Research Center on particle technology located at the University of Florida in Gainesville. The work at the university includes teaching seniors and graduate students along with the preparation of engineering teaching materials.

Fascination with rocks when young

Klimpel spent his youth in Montana, North Dakota and Min-

nesota. He remembers being fascinated by the wide variety of rock and geological formations in the area. His mother was an active rock collector. Mom and son had literally tons of samples in their house.

Klimpel was selected as an all-state high school football player. And he was awarded a combined football and track scholarship at North Dakota State University. During Klimpel's freshman year, he married Charlene, his wife of 39 years. There followed eventually their two sons, Richard and Steven. And thanks to a scholarship from Dow Chemical, Klimpel graduated in 1961 with B.S. degrees in chemistry and mathematics and was the university class salutatorian.

Then came an M.S. in mathematics and a Ph.D. in materials-science at the Pennsylvania State University in 1964. Klimpel said that being at Penn State was the Technical turning point in his life

As never before, there was an exposure to engineering research as well as coals and minerals. It was the beginning of a lifelong career of generating new engineering technology. Penn State and its people have always been special to Klimpel. He has since often returned there as an interested alumnus as well as an adjunct professor of minerals processing.

31-year career at Dow

In 1964, Klimpel joined Dow Chemical as a process chemical engineer working on energy utilization projects. That began what turned out to be a 31-year career with the company. He held a number of technology management positions. These included manager of the corporate engineering analysis division, manager of technology for the global mining chemical business and corporate manager of process risk analysis.

During his last 10 years at

vation. This has been true in the minerals industry during the last few decades. The mining industry is producing more at less cost per unit than ever before in our history. I anticipate that this trend will continue as long as the global political situation remains relatively stable.

How have US mining companies fared in this global environment?

US-based minerals companies and those US oriented companies operating globally have adapted well to international competition. I am proud of the achievements of the US business and technology communities in this increasingly difficult operating environment. This is not to say that everything is rosy. It is rather a recognition that all of us will have to be ever more flexible, adaptive and innovative to stay in business and prosper in the long term.

Most importantly, the evidence of the last few decades shows what our industry has done and that we can adapt quite well. All of us remember the 1987 *Business Week* magazine article, "The death of mining." Certainly, today's situation for the US minerals industry is a far cry from that gloomy cover feature.

What do you think are the major challenges for the minerals and mining industry?

At least some of the challenges facing the minerals industry are the same as those facing any of the basic material-supply industries, such as the chemical, oil and gas, and pulp and paper industries that are operating in

the more developed countries.

Challenges to the natural resource industries come from a variety of sources: a generally uninformed public on issues of minerals needs and uses; overly zealous regulators; extreme environmentalists; and politicians who are elected on anti-business platforms. There are ways to deal with such challenges. Individual companies involved must come together and act more collectively through industry focus groups. We must make better use of organizations such as the National Mining Association and the Chemical Manufacturers Association.

The funding by such groups for appropriate advertising and broadly based educational opportunities can play an increasing role in the public acceptance of the need for a domestic minerals industry. In this regard, SME can play an effective, supportive role to a well-organized company/association effort through its GEM programs and the preparation of targeted educational materials. Corporate support of SME's effort is important, to augment the activities focusing on a better informed public.

Any other challenges?

Another challenge that the minerals industry is facing is the significant erosion of the pool of available, trained and experienced operating personnel. Many of the traditional mining and metallurgical college programs are smaller than they used to be. The economic swings that have occurred during the last three decades have had a negative impact on employment. And there

new process engineering technology

Dow, Klimpel served as a senior research scientist, the company's highest technical position. His efforts in this regard included personal invention work and directing the efforts of other Dow researchers involved in particle-processing technology and surfactant chemistry development.

Throughout his career at Dow, Klimpel maintained an intimate relationship with global mining operating companies in the areas of engineering technology and mining chemical usage.

Awards received for inventions and research

Klimpel's contributions to industry have been widely recognized. He has been named Michigan Inventor of the Year and was twice named as Dow Chemical's Inventor of the Year. In addition, SME has awarded Klimpel the Antoine M. Gaudin, Arthur E. Taggart, Book Publishing

and Distinguished Member awards. And AIME has presented Klimpel with its Robert H. Richards and the Henry Krumb lecturer awards. There have also been several chemical engineering recognitions. These include *Chemical Processing* magazine's Novel New Product award.

Klimpel has been granted 40 US patents, has published more than 100 refereed publications, has organized several international conferences and has coedited five engineering reference books.

Minerals processing a family affair

All of Klimpel's family have become involved in minerals processing. Charlene has become his financial partner in RK Associates. His oldest son, Richard, earned a Ph.D. in minerals processing from Penn State and is currently employed at DuPont. Klimpel's other son, Steven, is a laboratory techni-

cian for RK Associates and works closely with his father.

Currently, Klimpel enjoys his consulting work and spends as much time as possible playing tennis, the sports passion of his life.

SME has always been an important part of Klimpel's professional career.

Initially, his SME involvement was with various technical unit committees in both the Coal Division and the Minerals and Metallurgical Processing Division. SME's new president feels strongly that the society has played a positive role in his career. And he feels an obligation to serve SME as a means of helping others in the minerals profession.

A quote taken from one of Klimpel's presentations sums up his feelings: "SME is really the only broadly based technology society available to people involved with minerals and coals. So let us make it the best it can be for all of us."

are more nontraditional technology people coming into mining, such as chemical and environmental engineers. This puts more training pressure on operating companies.

SME must play an increased role to deal with these challenges. We should offer more short courses and operator-training sessions. These should include, when appropriate, offering such courses on a geographically dispersed basis rather than just at SME's national meetings. Associated with these challenges is the need for SME to provide enhanced professional development seminars, especially for its younger members.

Speaking of challenges, what do you think will be the major challenges for SME in the next few years?

All professionals involved with engineering and geologically oriented work areas have seen major changes during the last three decades. Our working environment used to be one of high job availability and flexibility, an emphasis on company loyalty both given and received, good benefits and company and public belief in research and technology. Today, almost exactly the opposite ground rules seem to apply.

This is not to say that being associated with an engineering-oriented profession is the wrong place to be. In fact, I still consider being involved with engineering technology as an excellent opportunity. My point is that the attitudes, flexibility and personal responsibilities required by engineers today are different. Younger engineers and professionals with many years of their career left will need to provide much more than before

for their own continuing education, career planning, paying for SME dues and meetings, and finances and benefits planning.

Another major concern for SME is how the organization is going to adapt and change to be an important force in the careers of future professionals in the minerals industry. As SME president, I will encourage the SME Executive Committee and the SME Board of Directors to review a wide variety of items relative to this issue. SME must be the best it can be for its current and future members.

Along these lines, for the society to improve and be more vital, it is necessary that many more members give their support to SME. Members need to give more of their time, become involved with activities, attend local and national meetings, pursue new members and respond to interest surveys to develop priorities. It is a truism that any organization that only gives to its constituency and does not receive their support and involvement is doomed as a long-term influence.

Where do you think SME needs to place its priorities and emphasis in order to strengthen itself as an organization?

As an active member of SME for many years, I have had the feeling that the organization has gradually lost sight of some of its major obligations to its members. Using current business terminology, I believe SME needs to go back to its core businesses: technical publications, valuable magazines, top quality meetings and conferences and **applied**, technical short

courses. We need to look critically at SME activities in terms of member benefits. We have somewhat slowed the membership losses. Still, we need to continue to address the membership issue. Of particular concern is the large number of working minerals industry professionals who are not SME members. We need to develop a sustained benefit and opportunity package to get these professionals involved in SME.

With regard to publications and related income, we clearly are worse off now than 10 years ago. We need more books and published products. We must implement a much more aggressive and timely book and reference publications acquisition policy.

What about meetings and conferences?

I have noticed the increasing availability from non-SME affiliated organizations of short courses, industry seminars and topical meetings on subjects of interest to our members. It is not uncommon in these offerings to see the bulk of the organizers and attendance being SME members. The door is open for these members to use SME. We need to discover why these people are not inclined to do that. There are technology needs of our members that SME is not fulfilling. We need to understand this situation better than we do and decide a realistic course of action.

In addition, as an organization, SME probably has too many ineffective committees that waste its volunteers' time. We need to look at this area. We need to cut down on the costs to volunteer members and reduce staff support time if a particular committee is not moving SME and its goals forward.

Where do you think SME has gained ground in recent years?

Some very positive trends are occurring within SME. One of these has been the name change several years ago. There is now an increased awareness that SME is a society for all professionals involved in the minerals industry. Related to this is evidence that SME's technical and membership diversity is increasing. We are in the process of forming a new environmental division. In addition, specialty technical committees such as the Minerals Resource Management Committee and the Bulk Materials Handling Committee offer new technical diversity. There have been discussions with a variety of specialized groups that have not been part of SME. This interaction will lead to expanded SME participation and joint ventures with other professional societies and organizations.

SME has recently done joint programming with the Canadian Institute of Mining, Metallurgy and Petroleum and has entered cooperative agreements with Camera Minera de Venezuela and the Mining Engineers Association of India. In addition, SME is co-sponsoring with The Minerals, Metals and Materials Society the upcoming Copper '99 meeting in Phoenix, AZ. This cooperative expansion mode bodes well for SME's future.

The growth in recent years of the SME Annual Meeting and Exhibit and the constant 5000+ attendees **have been of significant value to industry vendors as well as to SME members. The SME Annual Meeting and Exhibit is the premier mining technical exchange in the world.**

I also feel that the primary communication tool of the society, *Mining Engineering*, is moving in the right direction and continues to be the leading mining magazine in the world.

Anything else?

Another positive trend is the increased representation of the geographic regions on the SME Board of Directors. The involvement of more regional representatives on the board of directors can only be positive. Such enhanced involvement in the national SME organization will, over time, lead to a strengthening of local SME section activities in the new regions.

The impact on SME of a stronger section network will be a major factor in the society's long-term growth. We must not lose sight of the fact that there are many SME members who do not or cannot attend the SME Annual Meeting. So for many SME members, their only contact with the society is at their local section meetings and as a reader of *Mining Engineering*. To help promote stronger section development, I visited four local sections in 1996. I have plans to visit with at least 10 more sections this year. Also, the SME staff has increased its visits to sections, with positive results and feedback.

What are your thoughts about SME's involvement with the American Institute of Mining, Metallurgical and Petroleum Engineers (AIME)?

I think SME should be a positive participant in the continued existence of AIME. The current philosophy is appropriate for using AIME's endowment fund earnings for projects that assist in improving the technology-transfer mechanisms beneficial to all of the sister societies. I am somewhat of a traditionalist. I believe that AIME has much to offer. Among other things, AIME is the best communications link that we have with our sister engineering societies of somewhat similar interests.

On the other hand, we must remind ourselves that SME, like its sister societies, has an independent identity. We must make decisions that are appropriate for SME and its members.

What are your thoughts on the responsibility of SME to perform public information activities?

This is a complex issue. As mentioned earlier, the basic material industries in the United States, including coal and minerals, suffer from a poor or misunderstood image. Turning this situation around is a very big challenge. It will require extensive resources, changes in educational approach, effective political lobbying, nationwide advertising, etc. To make things even more difficult, these inputs will be required for a long time to have any impact.

Public information and improving our industry's public image is one of those issues that all agree on and to which we can all be emotionally attached. However, rather quickly the questions arise: who, what, when, how, where and how effective.

I believe that all of us, as individuals, need to be as active in the educational and political processes as our individual convictions will allow us to be. I also think that mining companies of our industry need to be the lead players in this effort.

SME has increased its financial support of the GEM effort in recent years. And the society has underwritten the cost of establishing the SME Foundation. These two efforts are an appropriate reflection of our members' concerns.

However, I do not believe that as a society we can continue to take ever larger portions of our operating budget for public education activities. Let me say this another way. I like what the GEM effort has done and is accomplishing. But to fund an ever increasing amount of GEM activity is to deprive members of other important activities. The time has come to grow the GEM efforts independent of using just SME funds. We must accept the reality that SME's primary responsibility is to provide the best technology transfer possible for all of its members.

So where should SME be putting its money?

I believe that the best contribution that SME can make to our industry and its associated companies is to be the strongest technically oriented society it can be. Our sister societies in AIME as well as other related professional engineering societies are rapidly coming to the same conclusion. We are all entering an era of attempting, with generally dwindling society monies, to be of sufficient professional value to our members to be viable while fulfilling our primary technology transfer obligation.

I would love to see, for example, the SME Foundation as a place where companies would fund special

projects of particular interest to them. Successful individual members of SME could establish scholarships for the encouragement of "a few good people" to carry on our professions.

The question of public education in the SME is really now one of: "How strongly do we as individuals or as company representatives believe in public education so that we contribute beyond our normal society dues?" If, collectively, we are not willing to do this or SME as an organization is not the right type of organization, then SME should not attempt to be a major player in public education efforts.

Do you have any specific message for SME members?

Yes, I do. I think SME is the only broadly based technology society available to professionals involved with the minerals and mining industry. In essence, SME is like an extended family. The diversity of SME, with regard to its members' interests as well as the wide variety of industry segments represented, is a weakness as well as a strength.

There are always issues that members of any family will disagree on. Yet on issues of importance we must act as a united family. As an organization, SME can only be as good as we collectively want it to be. This means that each member has something to contribute. All of us must encourage each other to offer our unique talents, to help make the society work well for all of us. I look forward to the upcoming year as your president.

From the Society for Mining, Metallurgy, and Exploration, Inc.:

PROCEEDINGS of the XIX INTERNATIONAL MINERAL PROCESSING CONGRESS

Information-packed set of four volumes offering the latest worldwide research as presented at the Congress in San Francisco, October 1995. Purchase all four volumes for \$99; any individual volume for \$29. Each volume contains tables of contents for all four and a cumulative subject index for the entire set.

Vol. 1: Comminution and Simulation and Control

300 pp, indiv. vol. price: \$29, Order No. 139-8, 2 lbs

Vol. 2: Physical & Chemical Processing

266 pp, indiv. vol. price: \$29, Order No. 140-1, 2 lbs

Vol. 3: Flotation Operating Practices & Fundamentals

312 pp, indiv. vol. price: \$29, Order No. 141-X, 2 lbs

Vol. 4: Precious Metal Processing & Mineral Waste and the Environment

190 pp, indiv. vol. price: \$29, Order No. 142-8, 2 lbs

Set: Price: \$99, Order No. 134-7, 8 lbs

ORDER NOW AT 1-800-763-3132 or SMENET@AOL.COM

To: Customer Service

Society for Mining, Metallurgy, and Exploration, Inc.

PO Box 625002

Littleton CO 80162-5002 USA

Phone orders: Customer Service (800) 763-3132; (303) 973-9550

Fax orders: Customer Service (303) 973-3845

Please send the following:

Credit card _____ Card No. _____

Exp. _____ Signature _____

Remittance of US \$ _____ enclosed. Colorado residents please add 4.8% sales tax.

Send to:

Name _____

Address _____

POSTAGE: Zone 1: US, 1st book \$3.00, ea. add'l book \$1.00; Zone 2: Canada, 1st lb \$4.00, ea. add'l lb \$1.00; Zone 3: Mexico, 1st lb \$30, ea. add'l lb \$3.00; Zone 4: Europe, Far East, Australia, India, 1st lb \$20, ea. add'l lb \$4.00; Zone 5: Central & South America, 1st lb \$30, ea. add'l lb \$6.00; Zone 6: Mid-East, Africa, 1st lb \$45, ea. add'l lb \$8.00



Presidents 1987-1996
VOL. 39 – VOL. 48

1996 SME President John F. Burst

March 1996: VOL. 48 NO. 3 - John F. Burst: an interview with the 1996 SME President

1995 SME President Raja V. Ramani

March 1995: VOL. 47 NO. 3 - Interview with Raja V. Ramani, 1995 SME President

1994 SME President Robert C. Freas

March 1994: VOL. 46 NO. 3 – President's Page

March 1994: VOL. 46 NO. 3 - Interview with Robert C. Freas, 1994 SME President

1993 SME President Donald W. Gentry

March 1993: VOL. 45 NO. 3 - Interview with Donald W. Gentry, 1993 SME President

1992 SME President Mark A. Anderson

March 1992: VOL. 44 NO. 3 – Interview with Mark A. Anderson, 1992 SME President

1991 SME President Ted H. Eyde

March 1991: VOL. 43 NO. 3 - Interview with Ted H. Eyde, 1991 President of the Society for Mining, Metallurgy, and Exploration

1990 SME President Roshan B. Bhappu

March 1990: VOL. 42 NO. 3 – Interview with Roshan B. Bhappu, 1990 President of the Society for Mining, Metallurgy, and Exploration

1989 SME President Robert E. Murray

March 1989: VOL. 41 NO. 3 – Interview with Robert E. Murray, 1989 President of the Society of Mining Engineers

1988 SME President Haydn H. Murray

March 1988: VOL. 40 NO. 3 – Interview with Haydn H. Murray 1988 President of the Society of Mining Engineers

1987 SME President Bruce A. Kennedy

March 1987: VOL. 39 NO. 3 – Interview with Bruce A. Kennedy 1987 President of the Society of Mining Engineers

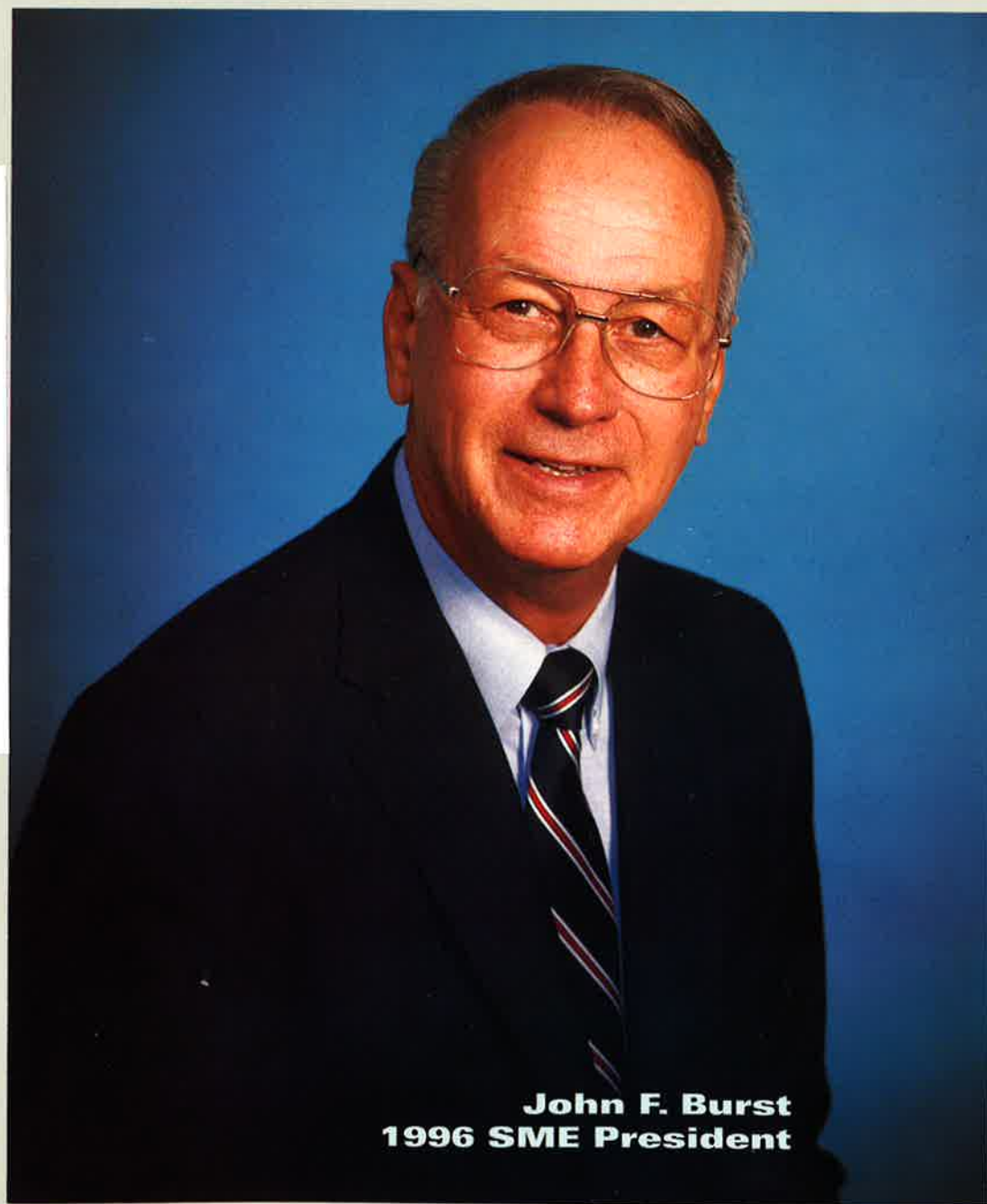
MARCH 1996

Mining

ENGINEERING

A PUBLICATION OF SME

I 1D E 3604700
MR DAVID A ZEEGER
625 TALLY RD
LEXINGTON, KY 40502-2726



John F. Burst
1996 SME President

John E Burst:

An interview with SME's 1996 president



How do you think the US Bureau of Mines closing will affect SME?

The demise of the bureau represents a challenge, an opportunity and, above all, new responsibilities for our profession. A lot of good professionals are seeking **new** positions. A lot of worthwhile research is available for transfer to the private sector. Logic dictates that worthwhile projects of any **defunded** government activities should find support in the private sector.

The bureau may be gone but its legacy is deeply rooted in the profession. The bureau's contributions will be remembered as long as there are mines and miners. Its 1994 **research** program was divided into **three** major areas: environmental technology; health, safety and mining technology; and minerals and materials science. There must be a place in either the government or private sector to continue these worthwhile activities.

When the bureau was formed in 1910, improving the health and safety of miners was one of the objectives.

Ever since the bureau was first

given the assignment to find ways to reduce mine accidents and fatalities, "safety first" has been the guiding paradigm. The 97% drop in mine-related fatalities during the bureau's existence indicates how successful its continuing vigilance and research have been. The bureau died but a thousand miners have lived. Maybe that is the story of the bureau. It worked itself out of a job.

The bureau's annual compilation of production figures has been transferred to the US Geological Survey (USGS), where it will be pursued for some indefinite period. In due course, it may find a permanent home in the USGS or, then again, it may be eliminated. Should this happen, is this a project that SME could adopt?

SME can ill afford to lose any of the 350 members who until recently have been in the employ of the bureau. The society is sustained in spirit and financially supported by its membership. We need every member we can get and certainly we need to retain every member now on our roles. Our members in the bureau have helped us for years. Now is the

time for us to help them by establishing a contact net through which they can continue their professional careers.

SME should move forward with a stated intent and a rational program to transfer bureau projects and personnel to private labs. I call for a working party to do three things:

- Analyze the bureau's programs that will not be continued.
- Identify areas of need in the private sector that could be served by these programs.
- Effect a transfer of this hard-won intellectual property to organizations that can use it.

How did you come to be associated with mining?

I have what is perhaps an unusual answer. We often hear how people got into mining as a result of some accidental happening or some academic personality who changed their career choice.

In my case, it was an accident that kept me out of a hands-on mining career. My great-grandfather was a quarryman and the owner of a stone quarry. By all

rights, I should be the current quarryman. But on a fateful day long ago, the old gentleman was killed in his own quarry. The event so shook his widow that the quarry was sold. And mining became a "never again" occupation for the family. Having lost his mining career opportunity, my grandfather emigrated to America and to the manufacturing environment.

It was not until I entered the Missouri School of Mines that mining again entered my background. My professional career has been devoted essentially to adding value to mined products. My lot has been planning and observing mining operations rather than participating in the day-to-day, hands-on activities. I do not apologize for that. It is just the way the ball bounced.

Your career has been mostly involved with surface operations.

Choosing a career in industrial minerals pretty well confined me to surface-mining operations, but not completely. In the early part of my career, I was able to study Missouri's last underground clay mine. Later, I had the opportunity to visit underground magnesite mines in Canada, Austria and Greece as a function of my employment in the refractories industry. And, of course, I maintain a strong interest in the survival of the deep lead mines in Missouri.

My great preference is open-pit mining because it is closely related to my background in geology. I guess I have been in a couple of hundred pits in the Western Hemisphere and Europe.

What about the present state of the mining industry and what about its future?

Mining has always been a cyclical industry and we have been sliding through the bottom of a saucer-shaped downturn for some time. We will recover, but probably never to our former strength and importance. More and more, regulation and red tape are diminishing the American mining industry. More and more, mining companies are finding countries outside the United States more comfortable places to do business.

But we are not going to dry up and blow away. "If it cannot be

grown, it must be mined" still describes the solid base of the American economy. This country was built by its farmers, its miners, its lumbermen and others who wrested natural values from the earth and put them to work to create the good life we know in America.

So, if we are doing all this good work, why are we suffering from such criticism?

I think it is because a myth has been created that has developed into an image. If we can destroy the myth, we can change the image. And what is the myth? It is that mining despoils the land and that greedy mining companies are making obscene profits from irresponsible exploitation. If we can successfully challenge the myth, we can change the image.

The challenges must come from our membership. They must respond without delay to attacks in the media. Most of these media attacks are wire service regurgitation of Washington, DC beltway propaganda. Most of the attacks contain outrageous misinterpretations of fact.

For example?

The Secretary of the Interior's charge that mining companies — for pocket change — are buying billions of dollars worth of gold ore. In reality, the mining companies are exercising an option to spend countless millions in the hope that they can recover sufficient values from the deposits to maintain their reported 5% operating profits.

I encourage the membership to respond vigorously to negative characterizations of the mining industry that may appear in their local newspapers. Set the reader-ship straight. Fight the good fight!

Why does SME continue to lose members and what does this portend for the profession?

The answer often given to this question is that the mining industry is shrinking. However, if you look at mining globally, this may not be true. There has been a demographical repositioning of a good part of the industry. I am not convinced that the mining industry is shrinking. But I certainly agree

that the number of mining professionals required to operate the mines has decreased. The mining industry has just found ways to do more with fewer engineers.

The positive side to this situation is that corporate staffs are small. New consulting opportunities are available to entrepreneurial engineers through corporate outsourcing.

SME has not been singled out. The trend has affected virtually all of the major professional societies. I belong to three of them. They are all in the same boat. Middle management is gone! The industrial age is gone! The digital communication age is here. It is allowing corporate downsizing to take place.

Read the headlines. 3 M is laying off 5,000 employees; Sears, 50,000. Bell South is laying off 12,000 people this year. And on and on it goes. AT&T and IBM have laid off enough employees in the past few years to populate a small country.

As you say, fewer people now do more work.

An engineering acquaintance of mine worked on the design of the Verrazano Bridge. For many months, more than 200 structural engineers were employed to grind out design specifications. This friend is now associated with a successful engineering consulting firm. He says he could design a Verrazano-type bridge in 90 days with only five engineers. And, of course, five computer work stations.

Is it any wonder that professionals are in oversupply? Telephone operators, too. If you have a touch-tone phone, press 1. Are digital communications replacing humans? You betcha!

Will the mining industry employment picture ever change? Of course it will, but not for many of us. It will equilibrate because even today's significantly smaller number of mining engineering graduates will eventually be able to fill the ever smaller manning tables of the industry.

And, oh yes, these new graduates will be excellent electronic communicators.

So what is the future of the profession? The answer is smaller and smarter.

Jack Burst researcher, author, company president, international traveler

Jack Burst is a principal in IMMI Consulting Group, an organization begun about 10 years ago to evaluate mining and manufacturing properties and companies for acquisition. In the course of time, the industrial mineral consultancy assignments gave way to environmental studies. These, in turn, led to the formation of Triangle Environmental Science & Engineering of which Burst is president.

Burst received two degrees, B.S. and M.S. in Ceramic Engineering from the Missouri School of Mines and Metallurgy in Rolla (now UMR) and a doctorate in geology from the University of Missouri at Columbia. He is currently an Adjunct Professor of Geology and Geophysics at UMR.

Leaving Missouri after completing his university studies, Burst began his professional career in Houston, TX with the famed Shell Development Laboratory. There he spent 15 years doing basic research in the earth sciences and established himself as a prolific author. In spite of holding a full-time "day job" and experiencing almost continuous travel during his career, Burst has managed to publish more than 50 refereed, professional

papers. These include co-authorship of the "Clay-based ceramic materials" section of SME's *Industrial Minerals and Rocks, Sixth Edition*, 1994.

Moving on to General Refractories Co. in Philadelphia, Burst became corporate director of technology. He assumed international technical oversight responsibilities for laboratories and projects in the United States, Europe, the Middle East, Mexico and South America. Interesting projects included establishing a sea water magnesite plant in Tampico, Mexico. That project entailed mining and transporting the El Abra dolomite to the Mexican coast. Another "sea water" magnesite production facility used the water of the Dead Sea. "Quite an experience."

Burst returned to Texas as director of research for Dresser Minerals. He worked on drilling-mud raw materials. After a five-year stint devoted to establishing a minerals laboratory and organizing a staff, the Dresser organization transferred Burst to Pittsburgh as director of planning for its Harbison-Walker Division. Subsequently, he rejoined Dresser Minerals as vice-president, resource development.

"Thus far, I have had a wonderful life and a most rewarding pro-

fessional career," Burst said. "I have been fortunate to do the two things I enjoy most: scientific enquiry and international travel. And I am still participating in both activities as much as I can and still keep the day-to-day functions of the business running."

Burst has climbed the SME qualifying ladder of the Industrial Minerals Division. He organized the barite symposium of 1980 in Las Vegas, NV, the "Fibers, Fibers, Fibers" topical meeting of 1989 in Baltimore, MD, and the "Regulation of Crystalline Silica" topical meeting of 1990 in Washington, DC.

Burst is a past chairman of the Industrial Minerals Division, a Distinguished Member of the Society and a current member of the board of directors. He was elected President Elect Designate at the 1994 SME Annual Meeting held in Albuquerque, NM.

In addition, Burst is a fellow in the Geological Society of America and the Mineralogical Society of America. He is also past president of the Clay Minerals Society (America). He holds memberships in several additional scientific organizations in the United States, United Kingdom and continental Europe. ■

How will this general downsizing affect SME?

As we have seen during the past few years, the society is downsizing in reaction to external forces that it cannot control. However, the society is healthy and operating effectively even though it is only half as large as it once was.

Importantly, the membership decline, which at one time was in freefall, slowed to just above 2% in 1995. There are great expectations that we are nearing equilibrium. We may reverse the membership decline in the very near future.

If this scenario actually transpires, SME's structure and operations will continue much as they are now.

And if SME's membership continues to decline?

If the society's membership and its attendant revenues fall below the critical mass that permits efficient operation, I think we shall see a merging of societies. The precedent has already been established. Witness the merger of the American Mining Congress and the National Coal Association to form the National Mining Association.

What role will the academic community play in the future of the society and industry?

The academic community is the wellspring of the mining profession. Through it enter all of our

new engineers. Each year, Consol collects data from the 20 or so mining programs in the United States (see Industry Newswatch, page 16). In a typical academic year, these schools will graduate between 100 and 150 engineers at the bachelor's level. Immediately we see that this group cannot repopulate the ranks of the society that are being *depleted* at the rate of 300 to 400 members a year. This does not sound encouraging for the society but it fits well with the overall downsizing trend. Perhaps the supply-demand balance is not far off.

The mining schools have had a tough time recruiting because of the perceived lack of job opportunities and the negative image of

mining that is often portrayed by the media and several of the "green" groups. It does not help that the number of engineering students is declining and the recruitment pool is shrinking.

The academic community provides another service that is often overlooked by our membership. That is, fulfilling the obligations of the Accreditation Board for Engineering and Technology (ABET) wherein the professional standards are set and monitored. It is a time-consuming and not always appreciated function of our society. ABET is the quality gatekeeper of our profession.

I encourage everyone to support his or her mining alma mater as well as any mining programs in your section area. Visit the schools. Arrange for field trips to your mining operations. Keep the lifeblood flowing.

What areas of the society's operation will you focus on as president?

The society needs members. And our GEM program needs a steady and reliable source of money for its activities. The items of special interest that I will focus on, therefore, are the membership-development programs, the funding of the SME Foundation's program

to raise money for the support of GEM activities and pressing forward with our public policy commitments.

The defunding of the Bureau of Mines emphasizes the importance of our public policy initiatives that have been somewhat neglected lately.

Many of our efforts preach to the choir. We need to preach to the opinion molders and to the lawmakers.

Does this mean that the classical technical efforts of the society will be downplayed?

Absolutely not. Our greatest technical effort is *MINING ENGINEERING*. It is also the most appreciated aspect of SME, as indicated by our recent readers' poll.

Great effort will be placed on the continuous improvement of the magazine and also on strengthening the SME annual meeting, which is our foremost interactive-communications vehicle.

Not mentioning these technical efforts in answering the previous question did not mean they would be downplayed, but is a recognition that these functions are up and running and running well.

In this vein of technical com

munication, I should also mention our entry onto the Internet with a World Wide Web page has recently debuted.

You have spoken to the importance of public policy. What specific legislation needs SME scrutiny or support?

The most vicious attacks by anti-mining interests come in the form of largely unwarranted criticism of abandoned mining sites and their environmentally degraded appearances. It has long been the objective of anti-mining interests to shut down any mining operation that resulted in alteration of the local topography.

A remedy is sought for this criticism in House Resolution 1580, 104th Congress, first session, known as the "Mining Law Reform Act of 1995." It proposes a modest, "reasonable" royalty from mineral activities on federal lands ... for reclamation and other purposes. This bill merits careful study.

Establishing a royalty for even as admirable a cause as cleanup could be a step forward in our argument with the anti-mining forces or it could be the nose of the camel poking through the door.

HR-1580 certainly needs SME scrutiny. Support? We shall see. ■

From the Society for Mining, Metallurgy, and Exploration, Inc.

Surface Subsidence Engineering

by Syd S. Peng

1992, 161 pages, illus., subject index, hardcover.

Prices: \$52.50 Member, \$42 Student Member, \$73.50 List Price, Order No. 114-2

Used as an unofficial textbook prior to and after SME publication, the contents have been fine tuned into a comprehensive volume. The ten chapters, together with copious tables and figures, cover this topic from all its aspects. A must for students and professionals alike in this field.

ORDER NOW AT 1-800-763-3132 or SMENET@AOL.COM

To: Publications Sales, ME3
Society for Mining, Metallurgy, and Exploration, Inc.
PO Box 625002
Littleton CO 80162-5002, USA

Send to:

Name

Address

Phone orders: Publication Sales (303) 973-9550; (800) 763-3132

Fax orders: Publication Sales (303) 973-3845

Please send _____ copy/copies of "Surface Subsidence Engineering"

Remittance of US\$ _____ is enclosed.

Credit card _____

Card No. _____ Exp. _____

Colorado residents please add appropriate sales tax. Student Members may order only one copy at SM price. US postage: \$3.00 for the first book, \$1.00 for each additional book. Non-US rates: Please add 30% of the List Price.

MARCH 1995

MINING ENGINEERING

A PUBLICATION OF THE SOCIETY
FOR MINING, METALLURGY,
AND EXPLORATION, INC.

I 1D E 3604700
MR DAVID A ZEEGER
525 TALLY RD
LEXINGTON, KY 40502-2726



Raja V. Ramani
1995 SME President

Interview with Raja V. Ramani, 1995 SME President

Tim O'Neil, Managing Editor

Your view on the current state of the mining industry.

I firmly believe that the best for the US mining industry is still ahead of us. With the explosion of free market economies around the world and the emergence of open markets, one should expect a better rationale between costs and prices. The special advantages to the US minerals industry are its large consuming population and its high operational efficiencies in health, safety and productivity.

Currently, minerals development activities are expanding. Minerals exploration is active, particularly outside the United States and particularly for copper and gold.

Forecasts call for continuing increased demand for metals and energy because of increased international growth and global economic activities.

The prices of many metals — copper, lead, zinc and aluminum, for example — are as encouraging as at any time in recent years. The predictions of gloom and doom for the mining industry, made about a decade ago, have been completely discredited. As we start the year, the coal, industrial minerals and metal-mining segments are all poised for growth.

You have been involved with mining for more than 30 years. What changes have you seen in the US mining industry?

Achievements in the early 1950s were primarily directed to health-and-safety time studies, and motion- and method studies.

In the 1960s, the use of computer-oriented mining simulation was beginning to make an impact. In the 1970s, as a result of legislative action, other issues came to the fore. These included greater health-and-safety requirements, environmental concerns, and underground- and surface-equipment development.

The 1980s saw significant progress in mining health, safety, environment and production performance. This trend has continued into the 1990s. This decade has also seen the globalization of environmental issues related to minerals extraction, beneficiation and utilization.

The minerals industry is now dealing with an expanded knowledge base in geomechanics, hydrology, environment control, geostatistics, monitoring, automation and robotics and artificial intelligence.

How is high technology making itself felt in mining?

Innovative high-technology applications are showing up in all aspects of mining. In underground coal mining, for instance, remote- and automatic-control of longwall machines are becoming standard. The industrial-stone industry is rapidly moving from its traditional composition of individual operations serving small regions to vertically integrated conglomerates serving larger regions.

In the metals sector, impressive economies of scale have been achieved in mining and processing low-grade ores. With the heap leach process, in situ mine operators have revitalized that segment of the domestic mining business.

On the environmental issues, the quality of the air, water and land affected by mining operations is much improved. In addition, outstanding examples exist in all mining sectors of land that has been reclaimed and restored to its natural setting and to even better land uses than existed before mining.

Technological advancements in mining along with monitoring-and-control equipment have spurred huge productivity gains in the surface mining of coal as well as metallic and nonmetallic deposits.

On the management side, enhanced training, extended working times, shift changes at the mining face, concentrated work areas, incentive programs and computer use all point to the continuation



of a vibrant, more technologically effective mining industry.

Any immediate issues for the mining industry?

All domestic mining sectors have to be constantly wary of the risks from legislative and environmental actions. Even here, though, there are indications that the political climate may be more favorable to the domestic mining industry than it has been for years.

It is also important for the mining industry to join the current debate on "sustainable development." This popular new phrase is beginning to be widely used as the objective of development. Methodologies are being developed to assess the impacts of the human use of the biosphere and other natural resources, and intergenerational conflicts.

The mining industry must provide focus for the debate as it relates to nonrenewable resources. The industry must define the relevance of sustainable development to minerals. And the industry must be a major player in developing the minerals policies and programs that, I am sure, will emanate from this debate. Professional groups, including SME, should also address this important issue.

Childhood experience leads Ramani into mining

Raja V. Ramani is a native of Madras, India. From his early years until he was 18, he lived in Calcutta. He went to college and worked in Dhanbad and Asansol, major coal mining towns in the Eastern part of India.

Ramani developed an interest in geology and mining early in life. When he was eight, he visited his uncle, the chief personnel officer in a major underground-copper mine. He saw an aerial ropeway transporting broken rock to a processing plant and smelter.

"I was enchanted by rocks coming out from underground, taken to a factory and then copper coming out of there," he laughed. "Presto — magic, here you have copper flowing out of a rock."

Ramani went to the Indian School of Mines in Dhanbad. This national mining and geology academy offered intensive education and preparation for a mine-management career. The school also exposed Ramani to visiting professors from the United Kingdom, the United States and the former Soviet Union.

After graduating in 1962, Ramani joined Andrew Yule & Co., a leading

underground coal-mining company. He worked his way up from graduate trainee engineer through the ventilation, safety and production departments to manager of mines.

In school and at work, Ramani became familiar with US Bureau of Mines publications. He came to realize the importance of research.

During Ramani's four years as a mining manager in his native India, he realized the mining industry was facing a growing public awareness of worker-safety issues and environmental hazards.

A couple of major mine disasters, coal mine explosions in the late 1950s and early 1960s, further developed Ramani's interest in working on these problems. To learn more about these things, Ramani came to the United States in 1966. He enrolled as a graduate student at The Pennsylvania State University.

"These are issues that need more research and understanding," Ramani said. "I came to the United States because it is ahead of the rest of the world in addressing these issues. I felt that the United States had more programs going to find solutions to these issues and problems. I believe this is still true today," he added.

When Ramani came to Penn State, Robert Stefanko was chairman of the Mining Department. Stefanko encouraged Ramani to pursue his interests in health and safety.

Chuck Manula and Tom Falkie were Ramani's advisors. They supported his interest in management and computer applications.

Ramani obtained his MS (1968) and PhD (1970) degrees in mining engineering.

Ramani then joined the Penn State faculty in 1970 as an assistant professor. In 1974, he was named as an associate professor and chairman of the Mineral Engineering Management section. Then, in 1978, he was made a full professor and in 1987 was appointed head of the Department of Mineral Engineering. During the past 25 years, Ramani has directed more than 75 students from 20 countries for advanced degrees in mining engineering.

Ramani said many people have helped him during his 30-year association with Penn State. In addition to Stefanko, Manula and Falkie, helpful fellow graduate students and professional colleagues included Jan Mutmanský, Y.C. Kim and Bob Frantz. Stefanko and Falkie would go on to be SME presidents

Much of your background is in coal. Your thoughts on the industry.

The structure of the US coal industry is changing. During the last decade, the number of US coal mines decreased about 50% and coal production increased by 20%.

There are a large number of small mines, mainly in Appalachia, that open and close as coal prices rise and fall. They serve a niche market. In recent years, many of these mines have left the industry. As a result, 10% of the 2500 domestic coal mines operating today account for two-thirds of the coal production. Consolidation has been under way for some time now in the US coal industry and can be expected to continue. Production is increasingly concentrated in the hands of large companies and large mines.

Any other trends?

Another major trend is the internationalization of the coal industry. Foreign companies have been increasingly interested in investing in the US coal industry. Likewise, in recent years, several US coal companies have

increased their stakes in international operations.

The international supply-and-demand situation for coal is on the verge of major changes. No one could have predicted the dramatic events of the late 1980s in the world's coal industry. From 1988 to 1993, coal production in Poland, Ukraine, Russia and the Czech Republic has dropped by 33%. However, coal production is increasing in China, India, Australia, Columbia and Indonesia.

Restructuring of the coal industry is also occurring in the former Soviet Union and in Eastern Europe. At the same time, production decreases are occurring in France, Germany, the United Kingdom and Japan. All these changes will affect the international supply and demand of coal.

It is predicted that world coal demand will continue to grow, albeit more slowly than anticipated. At the same time, the world's coal supply is getting tighter. Since the early 1990s, the worldwide export market for coal has been about 363 Mt (400 million st). The United States has had a major share of this market, about 25%. However, US coal

exports amount to only 10% of its production. On balance, the stability of the US coal industry and the vast extent and quality of its coal reserves should be important factors in increased US coal exports.

What about coal's role in domestic power generation?

Coal generates more than 55% of America's electric power. Coal continues to maintain its economic edge over other fossil fuels for baseload electricity generation by utilities. In 1993, the average price nationwide for steam coal delivered to utilities was \$1.39 per million Btu. And that price is falling. During the same period, the delivered price of petroleum was \$2.43 and natural gas, \$2.56 per million Btu, respectively. Some utilities are actually promoting the idea that coal is electricity.

However, the coal industry must watch closely the changing business environment of the utilities. The utilities are experiencing increasing pressures to meet tougher regulations. They are being asked to promote alternate technologies and to invest in cleanup programs. They

themselves: Stefanko in 1980, Falkie in 1984.

When Ramani enrolled at Penn State, Stefanko started him in SME as a student member. And in 1970, Ramani joined the SME Coal Division's health-and-safety program committee.

Manula and Falkie started Ramani in SME's Application of Computers in the Minerals Industries (APCOM) symposia series. Frantz was responsible for getting Ramani involved in continuing- and extension-education programs. Ramani said his association with SME and its activities was responsible for his larger professional involvement with academia, industry and government on health-and-safety issues.

Ramani has served on a number of governmental-advisory committees. At various times, he has been appointed to advisory committees on health-and-safety research by the Secretary of Labor, the Secretary of Health and Human Services and the Secretary of the Interior.

Since 1983, Ramani has been involved with the United Nations in assignments on health, safety, productivity and environmental issues. These duties have sent him to Brazil, Eastern Europe, the People's Republic of China, India and Japan.

SME's president is currently the co-director of two major research centers.

One is the Center for Respirable Dust and the other is the National Mined-Land Reclamation Research Center. Both are funded by the US Bureau of Mines' Mineral Institutes program. So Ramani has firsthand knowledge of the contributions that universities and mining schools can make to the mining industry.

"There is a synergism between research and undergraduate and graduate education and service to industry. Each program enhances the quality of the others," Ramani said.

"I am distressed at the elimination of the Minerals Institutes program. This will have a serious impact on many academic programs in the minerals field," he added.

Ramani has served on more than 40 SME and American Institute of Mining, Metallurgical and Petroleum Engineers (AIME) committees. He was chairman of SME's Coal Division in 1987 and was a member of the SME Board of Directors from 1987 to 1991. He also serves on the AIME Board of Trustees.

In addition to Ramani's SME and AIME activities, he is active in several other professional and technical societies. These include the Mine Ventilation Society of South Africa, the Institute for Operations Research and Management Science, the American

Society for Surface Mining and Reclamation, and the Mining, Geological and Metallurgical Institute of India. And Ramani is a certified professional engineer in the Commonwealth of Pennsylvania.

In 1978, Ramani was named a Distinguished Alumnus of the Indian School of Mines. And his teaching, research and mining contributions have been recognized with AIME's Environmental Conservation Award in 1989, SME's Howard Eavenson Award in 1991 and AIME's Percy Nichols Award in 1992. And in 1993, he received SME's Robert Stefanko Best Paper Award. Ramani has also received teaching awards from Penn State and the Pittsburgh Coal Mining Institute of America.

In 1989, Ramani was named an SME Distinguished Member. And that same year he was named a Fulbright Scholar to the former Soviet Union. In 1994, he was an SME Henry Krumb lecturer.

Ramani and his wife, Geetha, live in State College, PA. They have two sons, Deepak, 20, and Gautam, 18, both in college. Ramani is an avid coin collector. He also enjoys playing cricket and soccer. His business and pleasure travels have taken him to more than 40 countries. ♦

are also party to decisions on deregulation, generation, transmission and demand-side management issues.

Any upside for the utilities? And any upside for the coal industry as a result?

A bright note for the utilities is the increasing use of electrotechnologies in everyday life. Many of the advanced manufacturing technologies are the "plug-into-the-wall" kind that require a strong utility industry. One of the most exciting developments is the electric car. These new technologies are going to have positive impacts on the utilities. One appealing idea here is to replace decentralized-combustion sources with centralized electricity generators. If utilities live up to the idea that electricity is coal, this bodes well for future coal prosperity and would decrease our dependence on imported oil.

There are other reasons for optimism about coal's future. Coal is by far the nation's most abundant fossil fuel. The demonstrated reserve base is estimated at 363 Gt (400 billion st). More than 218 Gt (240 billion st) of that is in the "recoverable" category. This tonnage

represents the largest recoverable reserves in the world.

US coal reserves are huge. What about coal technology?

US coal technology is the most developed in the world. Continuous improvements in room-and-pillar mining and greater use of longwall methods have led to phenomenal productivity increases. These technology advances have allowed the US coal industry to stay competitive in the energy sector with the rest of the world, despite falling domestic coal prices.

How about health-and-safety conditions?

Health-and-safety conditions in the US coal industry are the best in the world. Fatalities in US coal mines have been steadily decreasing. During the last three years, the coal industry has averaged fewer than 50 fatalities a year, less than 20% of the fatalities in the mid-seventies. Increased attention to safety training has been a big help here.

On the health side, there are indications that the incidence of black lung disease

may be decreasing. In the 1980s, the number of beneficiaries and the benefits paid from the federal black lung program decreased.

Overall, these are the results of several activities by industry, government and labor aimed at improving the conditions and performance in coal mines.

So coal is still king?

I see no other easy alternative to increased coal use for our domestic energy supply. There are limits to the domestic oil-and-gas supply. Public doubts and fears continue about nuclear plants. Uncertainty abounds concerning wind, solar and geothermal as renewable sources of energy. With rising health, safety, productivity and environmental performances, an abundant resource base and a competitive industry structure, the coal industry is well poised to compete in both the domestic and international energy sectors well into the future.

Any thoughts about the outcome of the November elections?

The November elections are being

called a tsunami, a landslide and a revolution reflecting the potential for major changes in the business environment. The expectation from the new Congress is that it may propose to go slower and seek more technical justification for new laws and regulations.

I think greater attention will be paid to the economic impact of natural resource development, amendments to the Mining Law of 1872 and incorporating risk assessment into environmental regulations.

For business in general and mining in particular, this is good news. It may help allay the belief that the business climate of the domestic mining industry has been jeopardized.

How will the coal industry be affected?

As an example, let us take the coal industry's production east and west of the Mississippi River. In the last 10 years, coal production and distribution patterns have shifted significantly. In 1983, Eastern coal accounted for about 65% of domestic production. In 1993, that share was below 60%. During this same period, the tonnage of Western coal finding its way to Eastern markets has increased more than 100%.

The Clean Air Act requirements have contributed to this trend. However, there are major advances in the Clean Coal Technology program that have the potential to counteract this trend. Some suggest that there may be a feeling in the new Congress to de-emphasize the Clean Coal Technology program for sulfur reduction in favor of promoting low-sulfur Western coals.

I believe, however, that technology is the solution to problems of coal production, productivity and costs. The ability to produce coal at a lower cost using the best technology to mine and clean the coal will ultimately overcome coal's price fluctuations.

There is no doubt, however, that the competitive pressures will continue to mount in Eastern markets from the low-sulfur, highly favorable mining conditions caused by Powder River Basin coals in the West.

Republican members of Congress have put forth a so-called *Contract with America*. According to an attachment to that contract, the US Department of the Interior's Bureau of Mines has been targeted for elimination.

There is concern about the US Bureau of Mines. The 1995-96 Bureau budget is 25% less than it was in 1993-94. This

represents nearly a \$40-million reduction in programs and personnel. It is lamentable that the public and some in positions of political power are not aware of the relevance of the Bureau's work to mine health, safety, productivity and the environment.

Without the Bureau's research, we could not have achieved the rapid technological developments that lead to explosion and fire control, ground support for underground-mine workings, safe use of explosives and reduced health hazards from respirable dust.

The Bureau is undergoing major reorganization. Still, it lacks a defined approach for supporting outside mining research, particularly at the universities. Consider the loss, for example, of Bureau support for the Mineral Institute programs and attendant university research. This will immediately impair mining schools' educational programs and will ultimately impair the mining industry.

Anything positive here?

Yes. There are some positive aspects to the Bureau's reorganization. A National Academy of Sciences committee is evaluating the Bureau's research program. More recently, the Secretary of the Interior appointed an advisory committee to the Bureau.

The immediate beneficiary of the Bureau's research is the minerals industry. The ultimate beneficiaries, of course, are the American people. I am pleased that SME has an active relationship with the Bureau and provides it with input from the SME Research Council. It is essential that as a leading mining society SME continue to serve our membership and the industry with this important technical input.

Any concern about US minerals dependency?

I see a problem with the lack of appreciation of minerals' importance in the United States. We lack domestic preparedness and minerals availability in the event of a major military emergency. I am not speaking of conflicts like Bosnia or Somalia or Haiti. I am concerned about a larger-scale emergency where greater mobilization and coordinated action might be needed in a short time.

Public education is an important safeguard here. In this regard, I might add that I believe that SME's Government, Education and Mining (GEM) function — particularly its minerals education programs — is extremely important, to reach school

teachers and students. This program needs to be expanded and enlarged.

You have been an educator for more than 25 years. What about the mining engineer of the future?

I believe that there are tremendous opportunities for personal growth and professional challenges in this industry. But, with the expansion of the knowledge base in the minerals industry, we may soon be getting to a point where an all-purpose mining engineering education is not even possible. Yet the mining industry still wants engineers to be able to do traditional things. They must be able to plan and design mineral operations, perform property evaluations, enhance health and safety, contain costs and expand profits and wealth. And I agree.

Today, the challenge to the minerals industry is to achieve optimum utilization of a diminishing reserve base without causing any unacceptable disturbance to the environment. So far, the industry is doing a great job in meeting this challenge. The challenge to the minerals educator is to prepare scientists, engineers and **managers** for this reality.

However, adapting the existing curriculum to reflect these changing needs while preserving major elements of the traditional curriculum are difficult. This is particularly true when the job must be done within the confines of fixed or even reduced credit hours in the undergraduate program.

The need to both change and preserve, though, is apparent. In this age of specialization, we should examine the philosophy of minerals engineering education to develop processes and programs that will provide greater focus on the needs of engineers in industry. For example, several mining schools are already developing environmental engineering programs.

In 1993, the National Academy of Sciences recommended the following: "Colleges and universities should explore new educational opportunities (at both the undergraduate and graduate levels) that bridge the needs of the earth sciences and the engineering departments.

"This need arises from the growth of problems related to land use, urban geology, environmental geology and engineering and waste disposal. The convergence of interests and research is striking and the classification subject of engineering geology could become a significantly redefined area of critical

importance for society." The same kinds of concerns are being expressed in the industrial sector. The coal industry is an important example. *Coal* magazine commissioned a poll of more than 200 mining-industry executives.

Among other things, the magazine asked what particular engineering skills they expected to be in demand during the next 10 years. Environmental skills ranked first at 40%, significantly ahead of mining engineering skills at 28%. Similar predictions can be heard from other parts of the minerals and energy industrials.

What is Penn State doing to meet these changing curricular needs?

In the 1993 fall semester, Penn State established a new interdisciplinary undergraduate program, geoenvironmental engineering. This major is designed to address critical environmental problems of the basic industries, especially those involved in the extraction, conversion and utilization of mineral resources.

The more general environmental science program emphasizes the identification and evaluation of environmental problems. The more classical environmental-engineering program is offered by civil engineering. It stresses public-sector concerns of water supply, municipal waste-water treatment and solid-waste management and disposal. The geo-environmental engineering program is intended to be complementary to these. We intend to seek accreditation of this major.

Here I will stress the important role of SME for quality control in earth science and engineering education through its education committees and the Accreditation Board for Engineering and Technology (ABET) program. I am pleased that SME will cooperate with the American Academy of Environmental Engineers for accreditation of mineral-engineering related environmental-engineering programs.

Let us turn our attention to SME.

I have been an SME member for nearly 30 years. I have served on more than 40 committees at the local, divisional and national levels. I have been mainly associated with the Coal Division. But I have also served on and chaired a number of committees in the Mining & Exploration Division.

As a result of this participation, I have come to appreciate the fact that SME's strength lies in its membership, particularly in the diversity of its

membership. This diversity is reflected in the commodities, the geographical distributions, the technical and administrative functions within the industry, the basic- and earth-science and engineering orientations, and the administrative and business functions of individual SME members.

Such a diverse constituency can cause problems. There may be complaints of inadequate attention, lack of focus or seeming not to care for a particular membership segment arising from such differences as East vs. West, hardrock vs. coal and low-sulfur vs. high-sulfur coal.

These issues and interests must be properly addressed and handled as they relate to SME's mission. If they are not, issues like these have the potential to destroy the strong SME bonds that have endured for years.

For example, the problems that are faced by central Pennsylvania limestone producers to open new quarries are not unlike those of a coal company waiting to open a mine in the East or the West.

The actions SME has taken in recent years to address these issues of diversity as they surface may not satisfy every SME member or group of members. The Society's actions, however, represent the concern of its elected officers to sort out these problems, to best serve its important educational role to its members, to industry and to the government. The realization of the commonality of these problems can be seen, for example, in the merger of the American Mining Congress and the National Coal Association.

How does SME's Strategic Plan factor in here?

The implementation of SME Strategic Plan started last year and will have a major impact on SME's future. We must continue to look at the services we provide to our members and to increase the quality of those services. The most important item, though, is that we arrest the decline in membership. We must increase the membership base.

After several years of financial losses, SME posted a modest financial gain in 1994.

There is no future for SME without financial stability. This means we must explore the base of our nondues revenue. Here, SME must enhance its international presence and involvement. SME's 1995 Annual Meeting and the keynote session on Global Mining Strategies reflect the Society's awareness of the importance of its

international involvement.

SME has also initiated steps to create stronger bonds with the international mining community, particularly in Canada and South America, and is charting new avenues of interaction through joint meetings. One example is SME's 1998 Annual Meeting in Orlando, FL. The meeting site will allow easier access for Eastern members and greater visibility for SME in the Eastern US. And it will provide greater Society exposure for international involvement in Central- and South America.

SME's new Executive Director brings special strengths to the publications and communications areas and is engaged in enhancing future communications efforts. We are proceeding with our involvement with the American Geological Institute and the National Science Teachers Association conventions. In addition, with AIME's support, we are increasing our ability to create diverse, but critically needed, educational programs. These programs will help provide a solid educational foundation for SME's future.

As an academic, your view of SME's educational efforts.

I feel a special bond with SME's educational activities. I know of no other professional body that has done as much in the books publication area as SME. The Society's books are widely used in engineering and professional libraries. Mining engineering schools worldwide write to SME for its publications. And the roles of SME's Research Council and Council of Education are invaluable in defining and developing critical areas of research and education.

Overall, you are optimistic about SME?

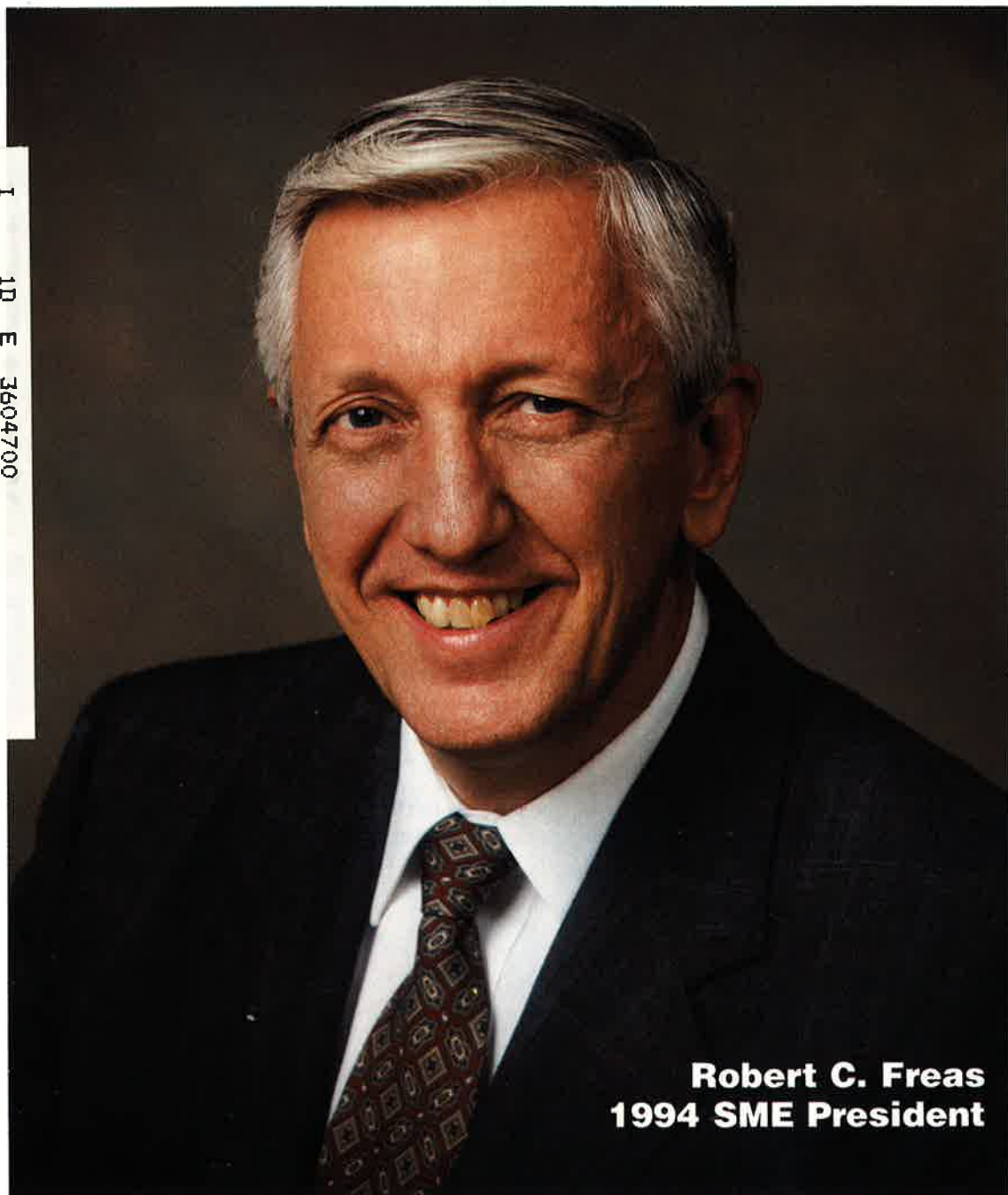
From my vantage point, I see that the Society has charted out a new plan for the future and has new staff leadership in place. Working parties have been appointed. They are working out the action plan details of implementing the major goals and objectives of SME's Strategic Plan. In addition, we have begun a number of important steps toward greater membership involvement in SME governance. One item would be the Board decision to a slate of two candidates for the 1997 SME president. The Society has seen tough times in the past and will certainly see tough times in the future. But, for the present and the near future, I see a determined preparedness that assures the Society of progress in coming years. •

MARCH 1994

MINING ENGINEERING

A PUBLICATION OF THE SOCIETY
FOR MINING, METALLURGY,
AND EXPLORATION, INC.

I 1D E 3604700
MR. DAVID A ZEGEER
625 TALLY RD
LEXINGTON, KY 40502-2726



Robert C. Freas
1994 SME President

Interview with Robert C. Freas, 1994 SME President

Tim O'Neil, Managing Editor

Let's start with your thoughts about the state of the mining industry in 1994.

By nature, I am an optimistic person. So I am positive about the mining industry. I am excited about and fascinated by the technological advances that have been made over the last 10 years, the expanding role and capabilities of computers, and the innovations that have been embraced by our industry. My first response, then, is quite upbeat. However, I am also a realist. Overall, the mining industry is fairly stable for the moment. But I sense an uneasiness in many of our members as a result of factors both internal and external to their employers.

For example.

The consolidations and downsizings that have taken place have been costly in terms of jobs and morale. Based upon recent events, it appears that additional downsizing will take place, further acquisitions will happen and additional regulations will be promulgated. Some doomsday naysayers may even say mining is dead. But I don't believe it.

While it is unlikely that any major new mine will be developed in the United States anytime soon, most existing mines will continue to operate. Further, I see mining companies investing in new technology, new ideas and quietly acquiring additional reserves. So the life of many operations may well be extended considerably beyond original forecasts and projections.

What about the economics of mining?

On the economic side, we see that copper prices are currently down, but history has shown that they will come back. The same is true of several other

base metals as well as most of the commodity type minerals, but again, as supply comes into balance, prices will rise. At the same time, while it has been painful, most companies have reduced or at least contained their cost of production. As a result, they have positioned themselves for survival. This suggests a level of underlying strength that I think should not be ignored.

Any concerns?

One area of particular concern is what I perceive to be a trend toward short-term management. The mining industry by its very nature is capital intensive and is based upon relatively long-time lines. However, I believe too many executive decisions are being based upon quarterly results, stock market performance and other short-term measuring sticks.

These short-term managers, by definition, relegate themselves to kneejerk reactions and decision making that do not adequately consider long-term ramifications. I certainly hope that sanity returns to the board rooms and executive offices where this is happening. Senior-level mining professionals must have the moxie to stand up and accept the responsibility that they have to speak out for a more rational course of action.



What other factors do you see impacting the mining industry?

Whenever two or more mining people get together, the discussion ultimately turns to the environmental and regulatory climate in which we operate. I do not disagree with those who suggest that the pendulum has swung too far to the left. Governmental bureaucracy at all levels, particularly within the federal government, seems to have developed a life of its own and is fueled by a legislative body more responsive to hysteria than fact.

It is discouraging to see the ridiculousness of some proposed legislation, the waste in non-productive and non-

effective regulation, and the punitive and adversarial attitudes of many of our public employees.

But, here again, I still see signs of hope. The same technology, innovation and dedicated effort that our industry has used to achieve productivity gains have also been brought to bear on environmental issues and the resolution of regulatory impasse. Insurance statistics and Mine Safety and Health Administration data both support the fact that we are creating a safer working environment. Water quality, air quality and reclamation requirements, to name just a few areas, are being met and frequently exceeded.

The minerals industry has repeatedly met the challenge. We have proven we can be and are responsible members of the communities where we operate. What we have not done is a very effective job of communicating our intents or our accomplishments. As an industry, we have done a poor job of public education, public relations and political lobbying.

Do you see any hope for improvement?

I do, but it will take individual company efforts at the local level and a concerted and cooperative effort of all parties within the industry at the national level if we are to have any impact. And it will require a well thought out and well financed effort that goes beyond geographic, regional interests or specific mineral commodity interests. Clearly, this is an effort well beyond and outside of SME's charter.

Your career has been centered in industrial minerals. Do you see any trends here that are unique to the nonmetals?

Certainly, many of the things that can be said about the minerals industry as a whole are applicable to industrial minerals as well. Like everyone else, industrial minerals have seen the impact of substantial foreign investment, the importation of minerals and the influence of regulatory and environmental requirements.

It has surprised me to see the extent to which foreign companies have invested in industrial minerals. Certainly no segment of our industry has been exempt—sand, clay, aggregate materials, lime, cement, etc. Each has seen a

In many instances, foreign ownership of industrial minerals companies has pumped new money into operations that has allowed them continued life. Unfortunately, not all of the foreign investment has worked out as well. Several operations have cut back or closed altogether.

significant trend toward foreign ownership or investment.

In many instances, this foreign ownership has pumped new money into these operations that has allowed them continued life where they might not have survived under the existing US ownership. Unfortunately, not all of the foreign investment has worked out as well. Whether it is cultural and managerial differences or other factors, several industrial mineral operations have cut back or closed altogether.

How about the impact of imported industrial minerals?

There has been an increasing trend toward the importation of industrial minerals, much the same as with base metals. However, in the case of industrial minerals, imports have had their most significant impact along coastal areas and the Mississippi River. Industrial minerals are so transportation sensitive that it is often difficult to import them into the interior of the United States for processing without rendering them uneconomical. Nonetheless, the impact of imports is being felt all along the Eastern US coast, the Gulf of Mexico and in major industrial centers along the Mississippi and Ohio Rivers. I expect this trend will continue and will force US operators to focus closely on their operating costs and their effectiveness in delivering their products to market.

What can the nonmetals producers do to meet these challenges?

There has been much comment and concern within the mining industry about

foreign imports, regulatory requirements and environmental standards. However, all of these issues constitute facts of life for each of us.

Several years ago I wrote an editorial entitled "The Role of Luck in Business Survival." In that article, I noted that there was some question as to how "lucky" the survivors really were. Rather, it has been my observation that those who are "lucky" enough to survive are those who have had the foresight to plan for the future and have been prepared to meet the challenges as they develop.

I do not believe that success happens by accident. Rather it is something that is achieved through management leadership that provides the vision, dedication and commitment to the long-term success of their individual companies. Within the industrial minerals industry, I would note a specific area that is indicative of what I am suggesting. We are seeing an ever tighter focus on specification requirements, technical support and service, the achievement of ISO 9000 standards and a variety of other factors that relate to enhancing the value of the mineral produced. There are companies that are accepting these challenges head-on. And they are planning for and making strides toward meeting these challenges.

On the other hand, there are firms that have chosen to draw a line in the sand, resist these changes and fight them tooth and nail. Let me ask you, which ones do you think will be the "lucky" survivors?

Do you see any of this being applicable to the long-term success of SME?

Yes I do. SME is a professional society. As such, it provides a forum for professionals in the mining industry to participate in the exchange of technical information. This information exchange takes place through many formats. But no matter how it is accomplished, that information exchange is critical to the long-term success of our industry. Communication is a vital part of any business. It is no less important to the mining industry. I believe that SME does an excellent job of fulfilling this communications role.

As an example, SME professional publications include more than 100 titles ranging from *Minerals Exploration* to *Mineral and Mining Finance*. Each year, we produce a host of short courses.

Boyhood experiences with quarries led Freas into mining

Robert C. Freas (Bob) is Senior Vice-President, Sales and Marketing, for Franklin Industrial Minerals in Nashville, TN. He joined Franklin in 1985 as Vice President of Marketing and was promoted to his current position in October 1993.

Franklin has seven operating facilities including plants in Florida, Georgia, Tennessee, Texas and New Mexico. The company's minerals base includes calcium carbonate, mica, alumina trihydrate and gypsum. Franklin's marketing efforts include supplying more than 15 industrial and agricultural market sectors. The company has a strong focus on glass and fiberglass manufacturing, as well as fillers and extenders for plastics, paint and rubber.

Prior to joining Franklin, Freas was Director of Operations for Limestone Products Corp., a division of Penn-Virginia, in Sparta, NJ. Prior to becoming Director of Operations in 1982, he was Director of Research and Corporate Development with responsibility for quality control, mine planning and geology. These efforts also extended to Penn-Virginia's Tenn-Luttrell lime plant in Luttrell, TN.

During the 1970s, Freas was Chief Geologist for Dravo Lime Co. in

Pittsburgh, PA, and also served as a Technical Advisor to the Electric Power Research Institute (EPRI) in Palo Alto, CA. While at Dravo, he played a major part in developing and bringing online Dravo's underground limestone operations and lime plant at Maysville, KY.

It was when Freas joined Dravo that he really began his association with mining. Prior to this, he had been an engineering geologist specializing in soil and rock mechanics, slope stability analysis and mine subsidence problems. However, Dravo was not Freas' first association with the minerals industry.

SME's President is a native of northern Ohio. He grew up in a rural area not far from a crushed aggregate sandstone quarry. As a youth, he spent many hours at the quarry watching the operations as the company extracted crushed stone from the Sharon Conglomerate. It was then that Freas decided that he wanted to be in a science, work outside and, probably, be a civil engineer.

While a freshman at Baldwin-Wallace College in Berea, OH, Freas changed his focus from engineering to geology and ultimately received his BS in 1962. He then went on to receive his MS in Geology from Miami University in Oxford, OH, and some 20 years later an MBA from Rutgers University in Newark, NJ.

Freas has been an active SME member for many years. In 1986, he chaired the Industrial Minerals Division. He also spent two terms as chairman of the GEM Committee and was chairman of the **Mining Engineering** Committee and the Membership Committee. In 1991/92, Freas served as SME's Vice-President of Finance.

Freas has also been a prolific author for Society publications and other journals. He recently co-authored three chapters for SME's *Industrial Minerals and Rocks*, Sixth Edition.

In addition to his activities with SME, Freas is also a certified professional geologist with the American Institute of Professional Geologists. He is also a member of the Association of Engineering Geologists, the American Society of Testing and Materials and the American Chemical Society. And Freas is a registered as a geologist in Tennessee, Indiana and Georgia.

Freas and his wife, Judy, live in Brentwood, TN. They have four grown children and three grandchildren. Freas, a true sports lover, is a longtime coach in youth athletics. He is also a private pilot and enjoys hiking, canoeing and skiing. •

These provide training opportunities for professionals as well as for those new to the industry.

The SME Annual Meeting and Exhibit ranks as one of the finest technical forums for the minerals industry anywhere in the world. Including the symposia, 447 papers were presented at our February Annual Meeting in Albuquerque. SME's meetings, including section meetings, and our network of professionals in the domestic and international mining communities, present our members with an opportunity to interface with literally thousands of people with common technical interests.

Does SME need to be doing anything differently?

It would be unrealistic to assume that we are doing everything right and

that there is no room for improvement. The pressures and changes faced by both our industry and each of us as professionals' demand that SME maintain a flexibility that will allow it to meet the evolving needs of our membership. I believe that the initiatives embodied in the Strategic Plan will be an important part of the future growth and continued success of SME.

We cannot afford the luxury of just maintaining the *status quo*. Our products, programs and services, and even our organizational structure will have to undergo progressive change as we attempt to keep pace with the environment in which we work. But change for change's sake cannot be tolerated. Rather, it must be focused to accomplish a specific purpose and constructive improvement. One of the real chal-

lenges for the SME leadership will be to maintain the dynamic spirit envisioned in the Strategic Plan and to target those areas and activities that will continue to enhance the value of SME to the individual member.

With that in mind, what are your priorities as SME President?

My priorities will focus on the implementation of the Strategic Plan and will target four principal activities. They include increasing the value of SME membership, bolstering the Society's international presence, strengthening the organizational structure of the Society and ensuring the long-term success of SME's GEM program and the early wins achieved by the SME Foundation for Public Information and Education.

My first priority is enhancing the value of membership in SME. It is incumbent on us to define our members' needs and requirements. Then we must design products to meet those requirements and deliver them. This is a marketing plan focused on enhancing the value and desirability of membership.

All four of these priorities were addressed in the Strategic Planning effort and were areas of considerable concern and discussion.

My first priority is enhancing the value of membership in SME. Simply put, SME's membership numbers continue to decline. This trend will not be reversed until our members and potential members are satisfied that the benefits of membership outweigh the costs of membership.

As a Society, it is incumbent on us to develop a comprehensive program to define our members' needs and requirements. Then we must design products to meet those requirements and deliver them. This is, in fact, a marketing plan focused on enhancing the value and desirability of membership.

You are saying some mining people do not see the value of joining SME.

Personally, I believe strongly in the value of SME membership. I have gained immeasurably from my Society association. Like many professionals, I am a member of several technical/professional societies. Each of these has a very real purpose and provides a definite service to its members. However, I do not believe there is any other technical/professional society or organization that contributes more to the mining industry than SME.

However, while I am passionate in my belief in SME, I am not so naive as to think that all our members, let alone potential members, share my feelings. The reasons for this vary, but include two very critical items.

First, in several instances, SME has missed windows of opportunity to present new or innovative programs on a timely basis. For example, just look at the number of "for profit" programs that have been spawned to fill technical information voids that SME ignored.

Secondly, too many of our members do not look beyond **Mining Engineering** when considering the value of their association with SME. As a result, the magazine is frequently the dominant or only benefit promoted when and if a member encourages a colleague to join the Society.

Because of that, I have appointed a task force to focus on how we can better define member needs and then more aggressively move toward meeting them. Traditionally, professional societies do a poor job of market development. We hope to change this and in the process enhance the value of SME membership.

What about boosting SME's international presence?

As you know, we already have members in more than 20 countries and have several offshore sections. We also have an international advisory committee. It is their responsibility to assess the needs of our international membership and increase the involvement of SME in international activities. Yet, we continue to be neophytes in the international arena. We are still seen as a US society with foreign members rather than an international society with a strong base of US members.

Previous SME presidents have visited sister societies in other nations, attended their meetings and participated in lecture exchange programs. They have also invited these same groups to visit the United States and to interact with our members. Our most recent President, Don Gentry, attended sister society meetings in Australia, Canada and Mexico. He also participated in hosting the Australasian Institute of Mining and Metallurgy President, Allister McCloud, and his wife on their recent visit to the United States.

While I intend to continue this practice, it is not enough. The wealth of

technical literature published through SME and the strength of our membership base put us in a unique and enviable position to assume a leadership role among the world's professional mining societies. We have the opportunity to build bridges that can lead to better communications and the strengthening of the roles of each society.

How to start?

As a first step, we will be working toward establishing an International Summit Meeting during SME's 1995 Annual Meeting in Denver, CO. The intent will be to establish a format for discussions and the interchange of ideas on how to further aid the flow of technical information between societies. The groundwork has already been laid by the work of previous SME presidents and the SME staff. SME's large membership base and the extensive list of technical materials the Society has published dictate that we take a leadership role. The "internationalization" of the mining industry suggests we should take action now.

In addition to working with other international societies, we must also look at ways to better serve our international members. In this area, we will attempt to draw on the experience of others. One of our fellow member societies in AIME, the Society of Petroleum Engineers (SPE), has made tremendous strides in reaching and expanding its international membership. I believe we can learn from them and that several of the initiatives they have implemented are applicable to SME. We will be looking at how SPE achieved these successes and what we can do to accelerate our progress.

Do you anticipate that these efforts will require any changes to SME's organizational structure?

That is a hard question to answer. However, I do know that we have a finite resource available in terms of fulltime staff, volunteer efforts and revenues. So it is incumbent on us to examine how well we husband our human and financial resources. I believe it is dangerous to continue to maintain an existing organizational structure just because it is convenient, it seems to work and we have always done business that way. We must ask, are we struc-

tured to accommodate a more active, international role and membership? For that matter, are we structured to accommodate the changing requirements of the full breadth of our membership? I suspect the answer to both questions is that there is room for improvement.

I noted earlier my concern that we focus on enhancing the value of membership in SME. This means that we must be structured and prepared to serve all of our members, domestic and international, men and women.

If one examines our programming efforts, the committee structure within the divisions, local section organizations, etc., it is apparent that there are overlaps and duplication.

The Society also have many members who are hard pressed to identify where they fit in SME's structure and how they can become more involved in society activities.

How about some examples?

SME members include environmental engineers, biologists, health and safety engineers, human resource directors and others who are involved in the mining industry. Each of these individuals is a professional who has staked his or her career on the mining industry. Their commitment to mining is at least partially reflected in their choosing to be members of SME.

Are we structured to meet the needs of these professionals? Or are we so inbred, so focused on engineers, geologists and metallurgists that we have failed to accommodate the broader spectrum of professional disciplines comprising today's mining industry. To survive in the year 2000 and beyond, SME must be ready to support new activities, new services, and new ways of communicating and aiding the exchange of technical information.

Therefore, I will appoint a working party with the charge of taking an in-depth look at our organizational structure. This working party will be asked to make specific recommendations on how we might strengthen SME, what organizational changes might be made, and how we can most effectively serve evolving member needs.

Do we need new divisions or activities; what, if anything, should be abolished; and how do we make the best use of our resources?

What about the GEM efforts?

SME's GEM activities at the local and national levels have been significantly more visible and effective since the creation of SME's Foundation for Public Information and Education. There have been numerous wins and a heightened awareness on the part of our membership. But these wins have had a very real cost.

The question before SME is how to sustain this continued level of activity and maintain the enthusiasm that has been generated. There are several alternatives. Each has its own pros and cons.

We must seek a format by which we can continue to stay in communication with these dedicated teachers and provide them with information that gives a positive and factual picture of the mining industry.

Together with the Foundation Trustees, we will be evaluating these alternatives. The objective will be to continue our enhanced GEM efforts at the local and national levels.

As originally founded, it was anticipated that the Foundation for Public Information and Education would achieve funding support to establish an endowment that would sustain it for many years to come. So far, that effort has not borne fruit.

To their credit, the Foundation Trustees have sought outside counsel and assistance in raising the funds necessary first, to meet operating obligations, and secondly, to establish that endowment. However, the ultimate outcome of these efforts is yet to be determined.

With that in mind, I think it would be foolhardy for SME not to plan ahead and determine how we can continue to support this level of GEM activity as it is clear that it has strong membership support.

Any thoughts at this point about how

to do that?

Both the SME Foundation for Public Information and Education and the SME Board of Directors are discussing ways in which we can continue to strengthen the GEM activities. One idea that has been put forth is the possible creation of an affiliate membership for school teachers. The efforts that have been made to date with the National Science Teachers Association have been overwhelming in their success. We would hope that that success is not short lived. Rather, we must seek a format by which we can continue to stay in communication with these dedicated teachers and continue to provide them with information that gives a positive and factual picture of the mining industry.

Right now, I do not know what form that communication may take. But I do know that teachers play a key role in molding the opinions of their students. Further, they need support and factual information and materials if they are to convey a true and realistic picture of the minerals industry.

I intend to work toward solidifying SME's presence in this arena and our long-term support of these teachers.

Any final thoughts on SME?

As I said earlier, I am committed to SME's long-term success. I believe that this Society embodies the very essence of what constitutes a technical/professional society. SME does an outstanding job of providing for the professional and aiding the communication among professionals.

I hope that efforts put forth during 1994 will build on what has been done by the many dedicated individuals who have gone before. SME needs to continue to build the platform of support that will allow those who follow to continue to enhance and strengthen Society activities.

Based upon the comments that I have received from my predecessors, I suspect that our individual members are not bashful in expressing their opinions. I have already received a number of letters from individual members expressing their thoughts on activities on which we have embarked. I hope that our members will continue to communicate with me. I solicit their feedback, both positive and negative. •

As I begin my term as President of SME in the 1994 program year, I would be remiss if I did not begin by thanking Donald Gentry for the outstanding job and service he provided to the Society during his term. By now, the SME membership is aware of the efforts Don made with the Strategic Plan, as well as the impetus and initiative he provided in bringing about the planning process.

I suspect, however, that most members are unaware of the totality of the commitment that Don has made to SME over the past year. His leadership during the selection and transition to an interim executive director carried SME through a period that could have been chaotic. Thus, I believe that the SME membership owes Don a huge "thank you" for a job well done.

A second "thank you" needs to be expressed to Bill Shepard, who served as interim executive director throughout the past several months. Bill thought he was semi-retired. In reality, though, we managed to keep him quite busy and presented him with several new challenges. Bill accepted these challenges and the call from SME and has performed an exemplary job in what would normally be called a thankless role.

Bill has provided a steady hand at the helm and provided a tremendous amount of assistance to the Search Committee as it worked its way through the process of locating and selecting a new executive director for SME. Thus, I want to publicly thank Bill for the efforts he has made and the dedication he has shown in his most recent role with the Society.

As we begin the 1994 program year, we also welcome SME's new executive director, Gary Howell. Gary is an experienced association executive. He brings with him the expertise in several areas that need specific attention under the Strategic Plan. I am pleased with Gary's selection and am particularly encouraged with his experience in the international arena and in publications. Over the next several months, Gary and I will be working together to facilitate his transition to SME.

Annual Meetings in the East

My comments made at the SME Annual Meeting in Albuquerque, NM, and in the President's Interview (page 195 of this issue) address the implementation of the Strategic Plan. However, there are several other items that the SME Board of Directors is discussing that are of specific concern to the membership.

One of these is the perception that SME has become a western mining association and has ignored our members east of the Mississippi River. Obviously, the perception of SME with a western orientation is perpetuated by a policy over the past several years of holding the Annual Meeting in a city west of the Mississippi River.

At the time this policy was adopted, SME did not hold a vendors' exhibit in conjunction with the Annual Meeting. Rather, the exhibit was part of the Fall Meeting. This occurred in the years when there was no American Mining Congress exhibit and show in Las Vegas, NV. In addition, western locations were also justified, at least in part, by the fact that the eastern meetings tended to be financial break-even events at best, and frequently lost money.

Subsequently, the SME exhibit was moved to coincide with the Annual Meeting. In addition, it has become more aggressively

promoted and supported, including the incorporation of two hosted receptions in the exhibit hall.

As a consequence of all the effort put forth to support the exhibit, the SME Annual Meeting has become one of the premier mining events in the United States.

The SME staff and the Board of Directors are evaluating meeting locations. It now appears feasible to revisit the potential for holding the Annual Meeting and Exhibit in a major eastern city. And it is hoped that an announcement to this effect can be made soon. The quality and reputation of the meeting and exhibit suggest that both could achieve a level of success previously believed to be unattainable. While there are risks associated with an eastern meeting, the Board believes that if SME is to serve all of its members, an eastern location is necessary.

As we contemplate holding a meeting in the East, we do so with three basic assumptions. First, the quality and content of the programming of an SME Annual Meeting is generally insensitive to location. In other words, it is interest-oriented and not location-oriented.

Second, recent annual meetings have either been breakeven or revenue negative. Thus, it was necessary to increase the registration fee in 1993 for the 1994 Annual Meeting. At the current fee level, it is expected that an eastern meeting could achieve satisfactory financial performance.

Third, it is anticipated that some additional exhibitors would be secured who do not normally have a western presence.

These three assumptions are based on the belief that a quality event is a stronger draw than location. Underlying all of this is the Board of Directors' commitment to serving all of the membership of SME while at the same time paying close attention to their very real fiduciary responsibility.

A second decision relative to the Annual Meeting highlights the Board's sensitivity to responsible cost control. We have the opportunity to implement specific cost savings by holding the Annual Meeting in Denver, CO in alternate years. After thorough debate and discussion, it was decided to make a limited commitment to the alternate year venue. In doing so, the Board of Directors believed that it would offer SME an opportunity for cost saving and still maintain the flexibility of locating the meeting in other cities.

As we address meetings, publications, budgets, etc., it is our continuing intention to focus on being responsive to membership requirements and comments. Individuals may not always be satisfied with the Board's decisions but if we have learned nothing else through the planning efforts this past year, we have learned that we must pay closer attention to member input. ♦



Robert C. Freas

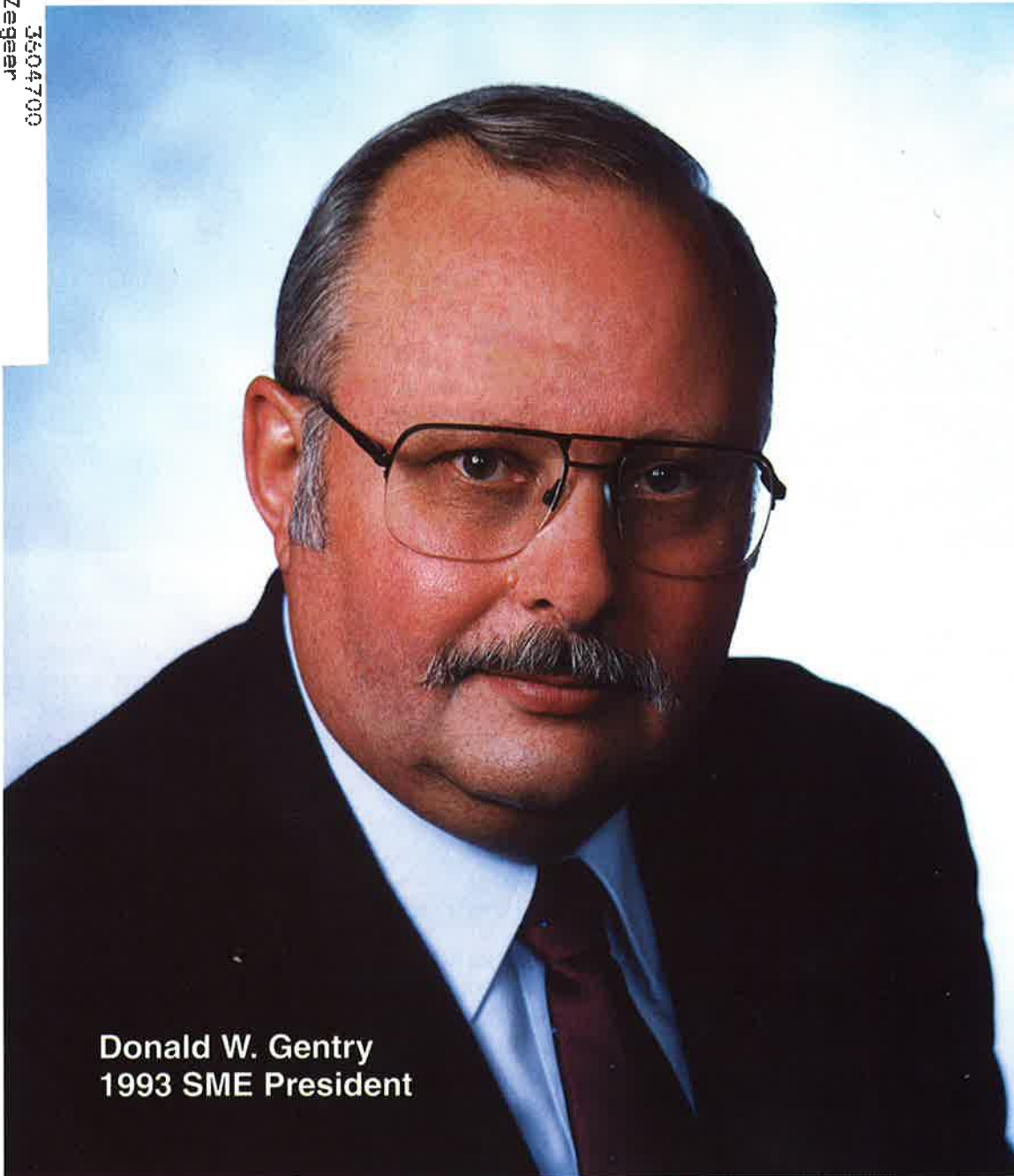
MARCH 1993

MINING ENGINEERING

A PUBLICATION OF THE SOCIETY
FOR MINING, METALLURGY,
AND EXPLORATION, INC.

I
ID E 3504700
Mr. David A Zeigler
625 Tally Road
Lexington, KY 40502

MAR 9 1993



Donald W. Gentry
1993 SME President

Interview with Donald W. Gentry, 1993 SME President

Tim O'Neil, Managing Editor

Your assessment of the domestic mining industry.

As an academic, I suppose I should be apprehensive about answering such a question. Then again, I have never been accused of hiding my opinions on any subject.

Clearly, US mining companies operate the safest and most productive mines in the world. Nearly every mining company in the world would be delighted to achieve even average US productivity rates and possess the managerial talents of domestic mine operators. The innovation and creativity exercised by US mine operators in applying current, sophisticated technologies are amazing.

However, I do perceive some trends within the domestic mining industry that concern me. As we all know, by its very nature mining is a long-term business. Yet, a growing number of strategic decisions by major corporations seem to be based on how those decisions will impact the next quarterly shareholder's report. Obviously, such decisions should be based on the long-term health of the organization as it attempts to function in a changing business environment.

Also, mining is inherently a risky business. We use the most advanced geological and mining techniques and processes available to better understand and hopefully minimize the impact of these risks. Rarely, though, can we eliminate all the risks.

Interestingly, many, if not most, of the major US mining companies appear to be practicing risk avoidance. This is particularly noticeable in the exploration end of the business. Major US producers seem to be averse to grass roots exploration and slow to react to potential windfall investment opportunities abroad. Yet, once mineralization is discovered, these same companies seem eager to pay top dollar to juniors and speculators for operating interests and joint venture positions.

It can be argued that this is just good business strategy in the current environment. But we had all better hope that Canadian junior companies and other juniors stay healthy and continue to provide feedstock for our major domestic producers. Although this may sound harsh, I suspect we are observing a symptom of a more fundamental problem, as opposed to a cure for the ever-present need to enhance a firm's relative reserve position in a very competitive business.

What about the near- and long-term future of domestic mining? Think it is viable?

I think there will always be a viable domestic mining industry. I find it curious that virtually every other country, as well as foreign mining-related investment capital, views the United States as the most economically, politically and socially stable country in the world. In addition, this country is blessed with an unbelievable natural resource endowment. Yet, recent data pertaining to annual exploration and mining investment expenditures suggest that US mining companies seem to be rushing to invest in projects in Third World countries, particularly Latin American countries.

There are a number of good internal and external reasons for this apparent

shift. One reason is the recent liberalization of laws governing mining and investment in several Latin American countries as they attempt to attract foreign mining-investment capital.

Think there is a basic issue in all of this?

I think the real question relates to the magnitude and structure of the domestic mining industry as it will be in the future. Today's domestic mining industry is quite different from that of the 1970s in size, structure, operating philosophies and distribution of commodities. Similarly, the US mining industry of the early 21st century will be much different from that of today.



How do you think the mining companies will be different in the future?

I think individual mines will be smaller in size because of increased permitting difficulties and the need to make economically viable smaller and smaller units or deposits. Even though current trends suggest otherwise, I suspect there also will be an increasing number of underground mines, perhaps in the form of in situ operations. And there will be growing importance on the production of select industrial minerals and nonmetals to service basic societal infrastructure requirements.

By its very nature, the mining business is international in scope. I believe the decade of the 1990s promises to be one of increasing internationalization for domestic minerals producers. They will continue to scramble to enhance relative positions in highly competitive international markets.

The result of this restructuring?

The net result will be the substantial relocation of primary minerals production from the United States and other industrialized nations to Third World, mineral-exporting countries. This is clearly evidenced by the annual exploration expenditure statistics reported by the Society of Economic Geologists and others. These statistics show a rather dramatic shift from the United States, Canada and Australia to Latin America. As an example, in 1990 there reportedly was approximately \$672 million invested in mining projects in Chile alone.

You have had some experience in international mining.

For the past decade or more, I have had the good fortune to work extensively in Third World countries in the area of minerals development. I have worked for domestic and foreign governmental agencies, corporations and individuals in both the public and private sectors. I have observed that domestic mining companies are active abroad for one of three reasons.

First, some have come to understand that their organizations can only achieve specified corporate goals if they make a long-term commitment to the finding, development, mining, processing and marketing of minerals internationally.

Second, some companies are active internationally because they have been forced to follow the mineral discoveries of junior companies and others that are more aggressive and possess the ability to be decisive in a timely manner.

Third, still other companies view the

The net result of industry restructuring will be the relocation of primary minerals production from the US and other industrialized nations to Third World mineral-exporting countries. Exploration expenditures are shifting from the US, Canada and Australia to Latin America

prospect of high-grade, low-cost deposits as a quick fix to financial and other immediate woes. In my judgment, these companies are not prepared to commit to the long-term nature of international minerals development. Sooner or later, these companies will find themselves grossly disappointed with the glitter now associated with these opportunities.

Are some domestic mining companies doing it right internationally?

I have come to learn that fewer than a handful of domestic mining companies possess the ability to conduct business abroad effectively and efficiently, particularly in Latin American countries. There seems to be little interest in performing the necessary homework before action is taken.

For instance, too little effort is spent in determining the precise functions, as well as the levels of authority and responsibility of various foreign governmental agencies. Not enough time is spent identifying key decision makers in society and at all levels of government. Also, not enough effort is made to understand the societal, political, economic and cultural impacts of minerals development in specific regions. Interestingly, the difficulty in learning these lessons often seems to correlate directly with company size.

The environmental and regulatory requirements of mining in the United States are driving companies abroad?

There is no question that at present it is possible to operate abroad with far fewer regulatory restrictions of all types and far less interference from environmental groups. Nonetheless, over the intermediate- to long-term, this really becomes a non-issue.

It does?

Make no mistake. Developing countries are extremely concerned about the environment. They simply are at a different level than the United States on the environmental awareness curve. These countries will negotiate that curve quickly. I hope they do so by avoiding at least some of the many mistakes made in this country relative to unrealistic policies and regulations and the resulting bureaucratic maze.

Also, responsible US companies operate abroad just as they do at home. They adhere to the various US environmental requirements and regulations, incorporate the newest technologies available to mitigate environmental hazards and pursue rigorous reclamation programs on disturbed lands. Anything less would be irresponsible and immoral.

So I believe the long-term shifts to the international sector are not motivated solely by increasing environmental costs and regulations at all levels of government in this country. Rather, these shifts seem to be related to specific corporate strategies to achieve competitive positions in international mineral markets, as they should be.

Your thoughts on the health of the US mining schools.

In general, the health and viability of minerals-related educational programs parallel those of the domestic mining industry, except there always exists a two- or three-year lag time. As enrollments plummeted in the early- to mid-1980s, university administrators began to seek ways to reduce expenditures in these engineering programs. In most instances, departmental capital and operating budgets were severely pared.

In some cases, minerals programs lost space, facilities and even laboratories to educational programs showing "more promise" or greater "opportunities for growth." At the same time, financial and other forms of support for these programs from the industrial sector also decreased dramatically for obvious and understandable reasons.

Sometimes, faculty sizes were reduced to the point where only through creative accounting or manipulations unique to educational institutions did some programs meet minimum national accreditation requirements for faculty size.

The Society is involved in accreditation.

Some SME members may not realize this. But, for accreditation purposes, university educational programs in min-

ing, geological and geophysical engineering are sponsored solely under Society auspices. So, for accreditation, SME determines the program-specific criteria pertaining to faculty size and qualifications, curricular distribution, subject areas covered, etc.

For nine years, I had the pleasure of representing SME on the Engineering Accreditation Commission. For seven years, I represented the Society on the Board of Directors of the Accreditation Board for Engineering and Technology. During that time, the accreditation actions earned by minerals-related educational programs steadily declined, on average, to levels below those of other engineering disciplines nationally.

The accreditation action itself does not necessarily reflect absolute program quality. But it does indicate the relative health as well as the serious concerns associated with the programs evaluated. The implications for our industry are obvious.

From your perspective, then, what are the major challenges facing the mining industry?

My first concern relates to research and technology, my second to incoming personnel. My third concern relates to the oftstated need to communicate the importance of mining.

First, the domestic mining industry must commit itself to achieving once again its position of technological dominance. The industry must do this if it hopes to enhance its long-term competitive position within the restructured international minerals industry.

Since the early 1960s, there has been a relative stagnation of North American technological commitment and advancement. Mining and processing technologies have become increasingly standardized. And it now appears that many of the best new technologies used in the United States are imported.

Also, there appears to be a major deficiency in the quantity and type of research directed toward the minerals industry. Historically, minerals-related research activities supported and conducted by industry and government have focused on applied, deliverable technology. As such, these activities have had relatively short-term objectives oriented toward productivity increases, operating cost reductions, increased recoveries, safety and so on.

Unfortunately, these programs typically have suffered from underfunding. They have also lacked consistent and continuous program planning and di-

Gentry has had distinguished mining career, received many honors

Donald W. Gentry is Professor and Head of the Mining Engineering Department at the Colorado School of Mines. After working several years in the mining industry, Gentry joined the CSM staff in 1972 as assistant professor of mining engineering.

Gentry has consulted for numerous mining organizations in the areas of investment decision analysis, project financing, and project and new mine property evaluation. He has also presented some 45 short courses and published extensively on these subjects in the United States and abroad.

Gentry has also held consulting posts to several US and foreign governmental agencies dealing with mineral policy and taxation issues. And he has authored more than 75 professional publications and is co-author

of a textbook, *Mine Investment Analysis*.

Gentry is the Past Chairman of the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET) and an ABET fellow. In addition, Gentry is listed in 10 separate "Who's Who" directories, including "Two Thousand Notable Americans."

The 1993 SME President is also the holder of the 1992 John W. Mackay Silver Medal as the outstanding alumnus of the Mackay School of Mines in Reno, NV. In 1990, Gentry received the AIME Mineral Industry Education Award. In 1987, he was an AIME Henry Krumb Lecturer. And in 1992, Gentry was elected a Distinguished Member of SME. •

rection. And there has been an inability to coordinate these efforts into a national industry objective that avoids unnecessary duplication of effort and expenditures.

What is needed here?

A return of longer-run health and vitality for domestic minerals producers will require the creation of new knowledge to assist and strengthen short-term strategies of cost cutting and operational efficiencies. In essence, we need to develop a meaningful industry research agenda. It must balance the need to produce short- to intermediate-term applications. At the same time, this research must focus on the longer-term, fundamental items so desperately needed by our industry in the 21st century.

This basic research must recognize the long-term nature of the interdisciplinary, technical problems confronting our industry and focus on developing new base technologies. These technologies must result in significant and dramatic changes in the ways we produce minerals and upon which the future will be built.

I hope that our efforts through the SME Research Council, in conjunction with complementary activities within the American Mining Congress, are supportive and beneficial to this need.

What about the young men and

women coming into the mining industry?

That is my second concern. The quantity and quality of entry-level professionals coming into our business are a concern to many. According to the annual survey compiled by Consol Inc., there were approximately 100 mining engineers graduated in the United States during the 1990-1991 academic year. Approximately 130 graduated during 1991-1992; and approximately 110 are projected to graduate in 1992-1993.

At the 1992 SME Annual Meeting in Phoenix, department heads of mining programs from around the country estimated there were between 100 and 120 jobs available annually for entry-level mining graduates. This suggests that supply and current demand are nearly in balance. So it is doubtful that mining engineering programs will grow appreciably in the near-term. However, program enrollments have been creeping modestly upward during the last three years. This no doubt reflects the increase in job opportunities during the last four to five years.

The type and quality of engineering graduates are also in question. The engineering professionals required to lead the minerals industry into competitive positions in the next century's international resource markets will emerge from educational processes and environments that do the following:

In my judgment, the most important activity underway within SME is the long-range strategic planning program. This strategic plan must be the result of a vision for our Society by representatives from all our constituencies.

- Motivate students to learn and instill in them a desire to achieve intellectual growth through lifelong learning.
- Teach students to communicate effectively and to reason logically.
- Develop within students the ability to work effectively, both independently and in interdisciplinary groups.
- Teach students to understand the social, economic and political environments in which they will work.
- Emphasize an understanding of people and their institutions — how to move them, how to change them and how to lead them.
- Teach students to appreciate their own culture and to examine critically their values and those of others.
- Expand their knowledge of the international aspects of energy and minerals development, particularly as it relates to global economics and the interaction of political regimes.
- Provide students opportunities to broaden their technical education, either through a single discipline or through interdisciplinary programs.
- And provide students with an education in and a desire for leadership in the minerals and energy industries through the design and introduction of new technologies that address the changing social, political, economic and philosophical issues facing these industries.

I feel certain these needs are not receiving the attention they should in our educational institutions.

What feedback are you getting from your students?

Students are not oblivious to the day-to-day happenings in our industry. They observe the process of restructuring, streamlining — or whatever the operative word is for cutbacks and layoffs — and they see the treatment given to loyal, quality professionals. As a result, students increasingly view the mining industry as a place, maybe, to seek a job, but not necessarily to build a career. Students are less willing to consider a future in an industry where career, long-term employment appears to be at the mercy of short-term swings in commodity prices. If this attitude persists, the future intellectual health of our

domestic industry is in question.

We all recognize the need to communicate mining's importance — your third point.

As an industry we simply must become more effective in communicating to the public the importance of the domestic minerals sector. It is gratifying indeed to observe the renewed vigor and excitement in our SME GEM committees. In addition, various mining groups and organizations have underway other public awareness activities. This includes our own SME Foundation for Public Information and Education. Some of these education and information efforts are outstanding.

I think the key to any long-term change in public attitudes is focusing on young people in elementary and junior high schools. There is evidence that some of the efforts directed at these groups are having a positive impact. Even so, we need to remind ourselves that we are counting on this approach for the longer term. So we must ensure that these efforts are well directed, focused and as effective as possible.

You think mining can make its voice heard?

It is not a question of can we make it heard. We must make it heard. The last time I checked, there were fewer than 300,000 people employed in the minerals industry in this country. That is just not very many votes.

We have to tell our story effectively, make some allies and offset the growing "anti-mining" opinions in this country. We must not fail in this endeavor. At stake are the future of our domestic mining industry and the professions represented by SME. Success will demand participation from each of us.

As SME President, what are your goals, your areas of focus?

It seems that each new SME President has a specific agenda to initiate changes in the Society in accordance with some particular goals or objectives that are especially important to him. In other words, each president understandably wants to leave his mark on the Society.

The result in recent years was the initiation of many new policies and activities. Some of these have greatly benefited SME as a professional society, others have not.

I do not intend to follow the path of my predecessors and offer still more innovative changes for SME — at least not immediately. The time has come for us to concentrate on implementing the numerous changes on our plate. Let us operate the Society efficiently in order to determine which of these changes and activities will ultimately be effective for SME.

What is important for SME?

In my judgment, the most important activity underway within SME at present is the long-range strategic planning process. The successful development and implementation of a strategic plan is essential. This strategic plan must be the result of a vision for our Society by representatives from all our constituencies.

I am convinced that the most significant changes really needed within SME will be clearly identified as a consequence of the current planning process. I choose to expend my energies on these identified needs and not on issues that I, and perhaps only I, feel strongly about.

You have any current areas of concern?

I would be less than honest if I did not express my strong belief that two perhaps interrelated issues must soon be resolved by SME. The first deals with our declining membership base. Our importance as a society of minerals professionals is being put to a severe test. I plan to work closely with our membership committee in an attempt to reverse recent trends in this area.

The second issue concerns the need to significantly enhance the international nature of our Society. We must find a mechanism by which minerals professionals around the world can join and actively participate in SME.

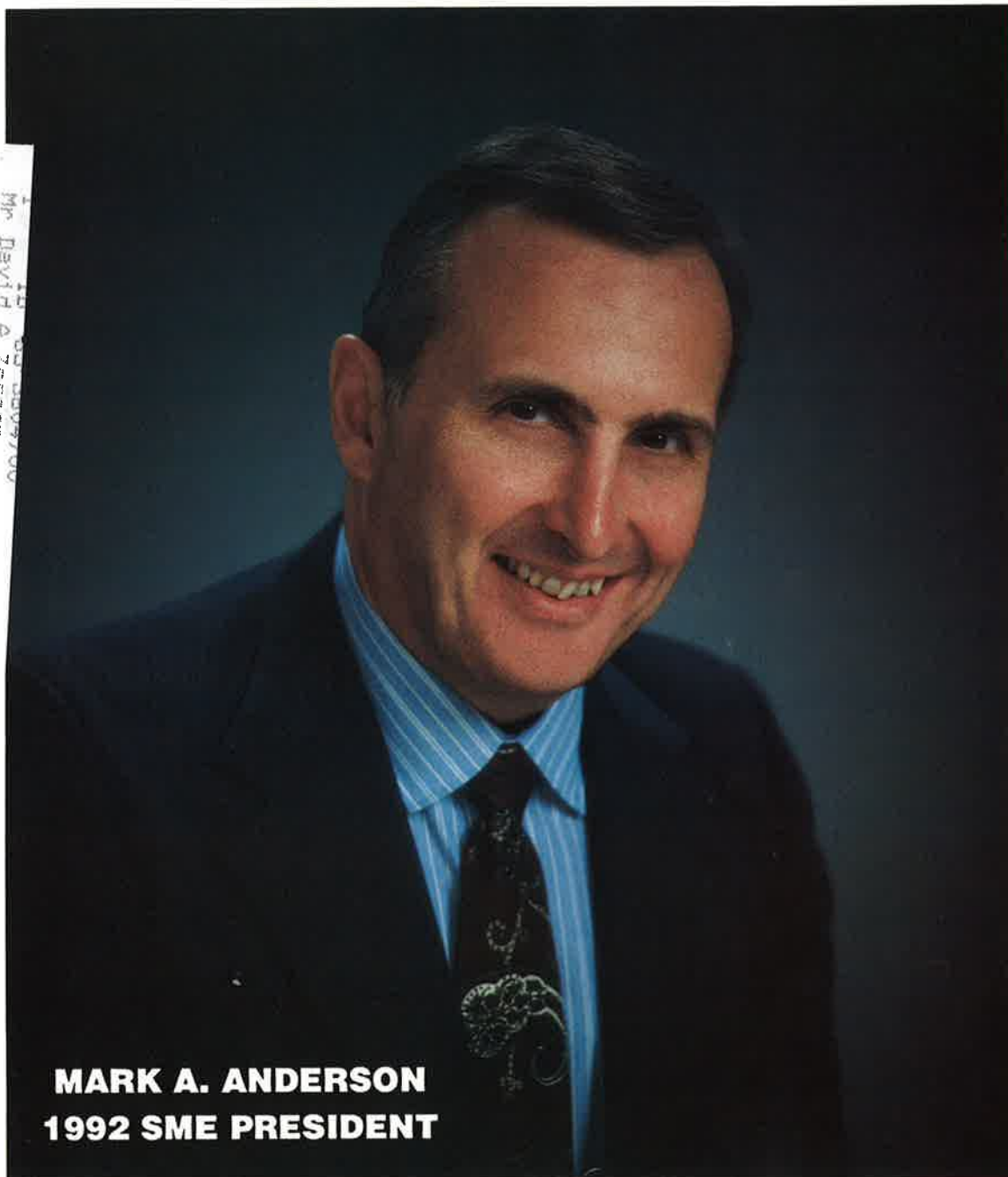
The minerals industry is truly international in nature and, as such, we must embrace our colleagues abroad. We must ensure that they have an opportunity to participate in what must be universally recognized as the premiere minerals-related, technical, professional society in the world — The Society for Mining, Metallurgy and Exploration, Inc.

I trust we can take a significantly large step in this direction during my year as SME President. •

MARCH 1992

MINING ENGINEERING

A PUBLICATION OF THE SOCIETY
FOR MINING, METALLURGY,
AND EXPLORATION, INC.



MARK A. ANDERSON
1992 SME PRESIDENT

Mr. David A. Ziegler
625 Tully Road
Lexington, KY 40502

MAR 12 1992

Interview with Mark A. Anderson, 1992 SME President

Tim O'Neil, Managing Editor

How did you get interested in mining? Your family a mining family?

My mother's parents were Italian immigrants and my father's parents were Swedish immigrants. They fled poverty — that's probably not a strong enough word — to come to this country.

And it was the mining business that provided them with the opportunity to participate in the American dream. It did not take generations. Within 25 years, they owned homes, were raising families and were sending their children to college.

This was on the Iron Range in northern Minnesota. It was during a time of labor strife, prejudice and discrimination. The binding force was this vital mining community. Mining provided the opportunity to work and earn a decent living.

I grew up listening to table conversation about mining and ore bodies and unions and trains and trucks. This was part of my fabric. So it's not surprising that I stayed in the business.

Looking back at this mining community, the quality of the education, the close social discourse among the people, it should be no surprise that I can trace my friends back three generations. My grandparents' friends, my parents' friends — they are my friends too. They were, they are part of my life.

I was born, one generation from the boat, thinking everyone had these opportunities. I was never hungry. I went to good schools supported with taxes that came from mining.

I do not have a hard time getting enthusiastic about what mining has done for me and my family, and you don't have to remind me where I came from.

Are you optimistic about the future of mining in this country?

Yes. Over the long term, mining will continue to provide the resources that support the basic fabric of our society. But I am a realist as well. And I think we are going to see some near-term pain as society tinkers with the rules that govern how we perform as an industry. Frankly, some mining companies may

not make it. As miners, we have been going through these cycles for a long time. For instance, I watched the copper business go into the doldrums and then come back technically stronger and more efficient than it ever was.

The companies that survived and prospered are efficiently producing copper today because, in large part, they embraced new technologies and methods.

This allowed them to compete economically and comply with a new generation of environmental regulations. Members of the SME provided the technical leadership that led to the copper success story. And SME will continue to provide leadership as we grapple with a host of other issues facing our industry.

It seems that increasing environmental and regulatory pressures are causing some domestic mining companies to look elsewhere for ore bodies?

I am concerned about that. This country should be concerned about that. We've learned the hard way that if we have to rely on foreign sources, we are dependent as a nation on those foreign sources.

Mining is important to this country and our industry is essential to America's strength and stability. Yet, what disturbs me the most is when I hear managers say that, in their view, political instability in the United States is a greater factor than it is in South America. There's something very wrong about this.



Political instability?

Today, we do not know from day-to-day what the various government regulatory agencies are going to do. Some days I, like many, want to throw up my hands or wring somebody's neck. It's frustrating. But the solution, in my view, is not to go looking offshore for stability. We have a responsibility as an industry and as professionals to work within the political and regulatory processes to bring about responsible policies and regulations. We can't accomplish this from the sunny beaches of Costa Rica. I have some hope that this situation won't last forever. And we are seeing signs that society and government are beginning to react negatively to all forms of extremism.

Our challenge is to communicate with and educate the people of this country about mining's importance. Some teachers and school children, for instance,

Anderson's mining career spent in key management positions

Anderson is currently president of Columbia Resources Inc., a company he has formed to purchase the assets of Asamera Minerals Inc. White with Asamera, Anderson was general manager of its US mining operations. He had general management responsibilities for two operating underground precious metals mines: Cannon Mine in Wenatchee, WA and the Gooseberry Mine near Reno, N.V. He supervised 200 people at the two sites, had an annual operating budget in excess of \$26 million and a capital budget varying between \$5 and \$10 million annually.

Prior to joining Asamera, Anderson held key positions with several industry leaders, including: vice president of operations with Marathon/Centennial Gold Corp.; senior project manager for the Ralph M. Parsons Co.; mill manager/project manager with the Nevada Moly Project of Anaconda Minerals; plant manager for Climax Molybdenum; and reduction plant superintendent of the Nevada Mines Division, with Kennecott Copper Corp.

Anderson is active in a number of civic and professional groups, including directorships with the United Fund, the Association of Washington Businesses, the Central Washington Economic Development Council, and memberships in the Rotary and the Mining and Metallurgical Society of America.

He has held various offices in SME, AIME and the Northwest Mining Association. Anderson's professional and civic recognition and awards include Paul Harris Fellow, Who's Who in the West and Mill Man of Distinction.

Anderson has a Bachelor of Science degree in metallurgical engineering from Michigan Technological University and has authored a number of papers and served as co-editor of *Design and Installation of Concentration and Dewatering Circuits*, SME, 1986.

Anderson and his wife, Carol, live in Wenatchee, Washington. They have three children, two of them pursuing careers as metallurgical engineers.

distrust the mining industry because of what they have been told — and not by miners. But, when presented with a rational explanation of why basic industry is necessary — and important — to this country, they accept it and begin to see our side of the story.

I'm proud of my profession. But I fault us for not doing a very good job of sharing our pride or telling our story. If we don't tell our story, someone else will. And it won't be our story. It will be their version of our story. We have a big job ahead of us to communicate and it won't happen overnight. The mining industry is small. We need allies and coalitions. That is why I am such an enthusiastic supporter of the SME Foundation and the People for the West campaign.

Were regulations and environmental concerns a problem at Cannon?

They were a challenge and an opportunity. We were within eyesight of homes. So you can imagine the tremendous number of questions, suspicions and issues we had to address. At Cannon, the things we did to cope with the

regulations and concerns turned out to be worthwhile things that should have been done in the first place. We had to think about things we probably did not think about before. This made Cannon a better mine, even though the regulations added to the costs. In the end, it became a win-win situation, for Cannon and for the community.

On a broader front, I do get irritated when people say it is a company's responsibility to clean up an environmental problem created 30 years ago by somebody else. That's not fair. The way society ran 30 years ago, those practices were acceptable. If society participated in the creation of the problem, then society should participate in correcting it. For instance, the cleanup of Superfund sites could be accomplished sooner and for a lot less money if there was a spirit of cooperation among communities, government and business instead of the adversarial and mean-spirited climate that now exists for many of them.

Why do you suppose the Australians, the Canadians, the British come to

the United States and find mining economics viable while some of the domestic producers do not seem to have the same motivation?

I was surprised to find that if you look for capital in the mining business, you look first to Europe and Canada where there are money managers who are willing to risk a percentage of their capital on mineral ventures. The United States has done a poor job of financing entrepreneurial mining ventures. Historically, offshore sources of money have provided significant capital for US mining operations.

The reason, I think, is rooted in more than a thousand years of history. The Europeans and other, older nations understand that the availability of basic resources is the foundation of their economies. I think you'd find that the origins of most wars fought in the old world had more to do with controlling resources than with differences between philosophical or humanitarian ideals.

We're still a very young nation and, unfortunately, many United States financial institutions have a short-term, frontier ethic that demands results tomorrow, not next year or 10 years from now. It's a matter of perspective.

You mentioned People for the West.

It has galvanized people and helped bring about the realization that miners, loggers and cattlemen are not despoilers. They are people just like us — friends, neighbors and proud members of our communities — and maybe the general public should listen to our issues.

For us, it means modifying the mining industry's historic attitude of going it alone. The idea of coalitions and different industries working together does not come easily to some of us. People for the West has demonstrated that attitudes are beginning to change; that we are stronger together than we are alone; and that, by working together, the natural resources industries can exert a strong influence on the formulation of new policies.

Priority items for you as SME president.

There are a couple of things that are extremely important to me. First, I'd like to see our kindred technical societies strengthen our bonds under the AIME banner. There is strength in numbers, and I believe our common interests far outweigh some of our perceived differences.

I take my cue from the many local

section members who, if asked what Society they belong to, will respond 'AIME.' I have to admit that during my early years as a member of eastern Nevada section of AIME, I had only a minimal awareness that the SME existed, mainly through the receipt of *Mining Engineering* once a month. There are thousands of members who continue to identify with AIME and their local section and only become active in SME if given the opportunity by their employer.

The four societies — SME, TMS, SPE and ISS — have more in common under the AIME banner than is currently reflected by the activities of AIME. Aside from the uniqueness of our respective technical programming, the four societies enjoy a vast common ground in the areas of public education, political activism, professional development, relationships with other technical societies and international outreach.

I know this won't be easy and I realize that walls will have to come down before a foundation can go up. Again, being a realist, I recognize that it will require many small steps in order to get started. A good example has been our Society's desire to put together a successful technical meeting in the eastern United States. Several studies have indicated that this task is formidable, if not impossible. However, if we examine the common interests of members of ISS, TMS and SME, it is easier to visualize an exciting, productive program that could guarantee a successful meeting.

Again, a win-win situation. Under the AIME banner, SME, TMS and ISS could organize a meeting that would be held in the eastern United States. That would give SME members in the East the opportunity to participate. I do not intend to slight SPE. They just don't fit the particular example I've given.

You said a couple of things were important to you.

In response to the membership, SME created the SME Foundation for Public Information and Education. I support the Foundation wholeheartedly and believe that it is SME's single most important accomplishment in recent years. Now is a critical and formative time for the Foundation because of the number of issues that bear upon our profession and our industry. The Foundation needs to actively address issues and make sound technical information available to the public and to our membership.

Some SME members do not think the Society should be involved with these types of efforts.

I know, but I disagree. I think we must have a proactive communications and education program. We must state our case and state it frequently and strongly. Give people the facts about mining. Tell them the likely results, for example, if the Mining Law is changed; how it will put companies out of business, individuals out of work, and send communities into economic turmoil.

If people only hear from the 'other side,' what can we expect them to think? Silence is affirmation, in my view. If 'they' say we don't care about the environment, about safety, about the communities in which we live and work, and we say nothing, what conclusion will the average person reach?

I'm proud of the mining industry and its accomplishments. It's time we share our pride with our employees, our neighbors, our elected officials, and especially with young people who are considering a career in mining.

Yes, we've made mistakes. And maybe taken more than our fair share of lumps. But we are important to this country and its future. If we're not willing to make our case, why should anyone else?

The Foundation's goal is to become self supporting by raising \$3 million over the next three to five years.

The Foundation has to have the sup-

port of our membership. Members demanded a public information and education effort and the Society's leadership responded. While the Foundation is in place, the financial support to maintain it is not. In my mind, logical long-term financing, aside from company contributions, can only come from an increase in membership dues. The Foundation is too important to our future to be left to passing the hat.

It is possible that a dues increase may result in a loss of membership for SME. But I believe quality and commitment, not quantity, are far more important.

You think there will be fewer members in SME?

I think that membership in the Society will continue to reflect the industry that we represent. The technically advanced and efficient mining operations of the future will not require the numbers of professionals they have in the past. The key is to understand that the average member will possess a higher degree of technical competence and professional commitment.

Companies themselves will be the sources of membership development in future. Our Society provides the only proven and effective vehicle for dissemination of technical knowledge that companies will require in order to remain successful in a changing technological world. In other words, to attract and retain competent professionals,

Anderson seeks Cannon purchase

For five and a half years, Mark Anderson was in charge of the second largest underground gold mine in the United States, Asamera's Cannon Mine in Wenatchee, Washington. Anderson recently left Cannon, has formed a new company, Columbia Resources Inc. and is attempting to put together a financial package to buy all of the mineral assets of Asamera Minerals Inc.

The Cannon Mine is a joint venture between Asamera Minerals Inc., which owns 51%, and Breakwater Resources Inc., which owns the remaining 49%. Cannon is the centerpiece of a minerals-based portfolio that Gulf Canada Resources, Asamera's parent company, is committed to sell, in order to concentrate on its core oil and gas business.

Anderson is attempting to secure the financing necessary to buy Asamera Minerals US Inc. and the Cana-

dian exploration assets of Asamera Minerals Inc. Anderson leads a team consisting of himself; Allan Manor, former chief financial officer of Crown Resources; Gaylord Watkins, a Calgary, Alberta-based attorney and exploration geologist; and James Dunnett and Steve Buchanan of Capital Finance Corp.

Anderson himself rates the prospects of success in buying Asamera at about one in four.

Why, then, jeopardize a 30-year mining career in hopes of buying the company? The answer, in a word, was "ethics."

"Leaving a secure position was not an easy decision for me, my wife or my children. I did it to avoid any perception of conflict of interest by potential sources of financing or other prospective purchasers. Financial relationships must be bulk on trust and integrity." Anderson said. •

The large, diversified companies will be as dominant in the year 2015 as they are now. However, I believe we will see the continuing emergence of smaller companies that are niche players. These smaller companies will be risk takers. Larger companies have always relied on contributions of smaller companies.

companies will find themselves encouraging active participation in our Society.

This is not a new thought. Canadian mining companies historically have actively supported the professional society activities of their staffs, as employee-retention and technical-development tools.

You think SME needs to thrust itself more internationally in terms of membership development, meetings, those types of things?

I am not an expert in internationalism. But I do agree with the current activities of our Society that have resulted in making many of our publications available to mining professionals in other countries. Closer to home, my first inclination would be to prioritize our international efforts toward our neighbors in Canada and Mexico. We have never had a joint meeting with the Canadian Institute of Mining and Metallurgy; yet, for years, the Northwest Mining Association's annual meeting has successfully attracted more than 25% of its attendance from Canada.

You mentioned mining companies in the future. What do you think they will look like?

The large, diversified companies like RTZ, Newmont and BHP will continue to be as dominant in the year 2015 as they are now. However, I believe we are going to see the continuing emergence of smaller companies that are niche players in the business.

These smaller mining companies will be risk takers. And they will demonstrate excellence either in the particular commodity they produce, or in the environment in which they operate. This is not a particularly new phenomenon in the mining business. Larger corporations have always relied, in part, on the entrepreneurial contributions of smaller exploration and development companies. What will be significantly different will be the nature and qualifications of their staffs. As a group, mining professionals will tend to be multilin-

gual, probably not predominantly North American, and able to function anywhere in the world. Understanding this, future opportunities for a young American engineer will be enormous. However, this person will need tools that many of us do not currently possess.

Since you were a part of the business, your thoughts on gold?

My years in the gold business have been the most exciting, challenging and rewarding times of my professional life. Aside from the job itself, the most significant difference from my earlier experiences was our ability as a company to predict the price of our product by forward selling. This was a stability I had never known in my career.

But forward selling keeps the price down.

In my experience, forward selling allowed the Cannon Mine to successfully plan for the future and to meet these plans. In the words of our marketing manager, there were two strategies for us to evaluate: utilize well-planned forward selling; or, in his words, 'Let us pray for higher prices.'

Thoughts on the time you spent at the Cannon Mine.

Cannon represented a unique opportunity for me. Asamera management and my direct superior gave me the resources and the authority to run the mine and make it perform as planned. The rest was up to me. In other words, I didn't have to ask for permission to be successful.

Remember, the Cannon Mine operates on the edge of a city, within sight of homes and the high school. In addition, we faced the challenge of utilizing a mining method that was relatively unique. In order to accomplish the goals set out for us, we were able to use the most modern computer techniques, the most effective heavy equipment and the most knowledgeable consultants available to the industry. The Cannon Mine started up and became a member of the

Wenatchee, Washington community in less than a year. For the last six years, the mine has successfully made its production commitments, protected the environment, and earned a reputation for working with the community.

No opposition?

There will always be some people who oppose anything. In securing the necessary permits for the mine, there was a comprehensive series of public meetings and dialogues with the various regulatory agencies. In addition to the normal environmental permits, the Cannon Mine was required to successfully apply for and obtain a zoning change and to comply with some 90 items of concern expressed by local citizens.

You mentioned conditions for mining at Cannon that went beyond the environmental strictures. Who imposed those conditions?

The community. Through the public hearing process, the mine had to address everything from paving streets to installing street lights, to replacing irrigation systems, to limiting truck traffic. We had to address odors, visual disturbances, how many people we would hire, the quality of our outdoor lighting. The list was almost endless.

In addition, a Citizen's Advisory Committee made up of interested neighbors under the leadership of the county planning director was formed. It met monthly with the mine management, to assure the community that all conditions of the permits were being met.

A month at a time, the community came to understand what Cannon is, what it did, and its economic and social benefits to the community. I'm proud to say that, on my watch, we were able to build a bridge of understanding with our neighbors and the community at large.

How many people work at Cannon?

The Cannon Mine directly employs approximately 175 persons, and also provides administrative space for the 20-person Asamera corporate staff. In total, some 200 persons are located at Wenatchee. The staff represents the best component of the entire enterprise.

When I was given the opportunity to run the Cannon Mine, I was also given the ability to recruit the necessary staff. Again, there was no magic involved in putting together the team that currently operates the mine. Taking a page from the Oakland Raiders' Al Davis, we set out to recruit the most talented and en-

thusiastic mining professionals that we could find, and didn't worry too much about pedigrees or cosmetics. The professional staff is the envy of many companies and is the principal reason for the mine's success.

The small, union-free work force at the Cannon Mine, coupled with a small corporate organization, provides short communications lines, a high degree of decision-making flexibility and low overhead costs.

How many mines does Asamera have?

The company currently owns two operable properties: Cannon and the Gooseberry Mine located approximately 48 km (30 miles) east of Reno, Nevada. Gooseberry is shut down due to a combination of low gold and silver prices, marginal ore grades and relatively high costs.

In the company's early years, pre-1985, it purchased two silver properties in Mexico, which have since been sold.

The Cannon Mine represented Asamera's first major capital expenditure in the minerals business, and the company raised 51% of the initial \$90 million investment.

A number of companies had come in and walked away from Cannon.

There has been sporadic exploration activity in the Wenatchee area, proximate to the Cannon Mine, for more than 100 years. From 1948 to 1983, a successful gold mining operation was carried out adjacent to the current Cannon Mine, and four other companies sponsored major exploration programs in the area. I am not including the multitude of junior Canadian exploration companies that came to the area during the period from 1983 to 1985, now known as the Wenatchee Gold Rush.

Asamera explorationists took the total data base available from all of these activities. In a short period of time, they designed the program that resulted in the discovery of what is now the Cannon Mine. The discovery was a combination of clever analysis of past work, careful planning of new drilling and perhaps a tiny bit of luck. The discovery launched Asamera and its joint venture partner, Breakwater Resources, into the AAA league of gold mining.

Talk a little bit about the mining method used there.

The method used at Cannon can best be described as overhand bench, cut and fill mining. The technique is designed to maximize extraction, nearly 100%, of

I am excited about the minerals business and its future. I look forward to an industry that will be a model for other businesses to follow, will be recognized by the citizens of the US for its progressive leadership and will be served by an SME made up of strongly committed members.

minable reserves while minimizing dilution and eliminating the possibility of detectable surface subsidence. The mine supervision likens the method to visualizing a loaf of sliced bread. Alternate slices, or stopes, are extracted and replaced with concrete. Then the remaining slices, or secondary stopes, are removed, using the concrete pillars for support. The majority of the latter slices, the secondary stopes, are backfilled with waste.

As it is, the priority given to the placement of cemented fill makes us more of a 'backfill mine' than a gold mine. It is a real challenge for the mining staff to coordinate the placement of fill and still produce 1.36 kt/d (1500 stpd) of ore, all within the limited confines of what are very small ore bodies. The successful application of the mining method has allowed the mine to operate close to residences and other structures with no visible effect.

It is interesting to note that the ore bodies outcrop on the surface. Had the discovery been made in an isolated area, open pit mining methods might have been used. But Cannon is located less than 91 m (100 yd) from the nearest residence and only (0.8 km) a half mile or so from the high school. So not much time was lost debating open pit vs. underground methods.

What about mine life?

As currently defined, the Cannon Mine is scheduled to exhaust its minable reserves in late 1995 or early 1996. The current operations support an aggressive exploration program. It has determined that the ore bodies are high grade pods located in an overall mineralized trend that has been found to extend for

several miles north and south of Wenatchee. It is highly likely that currently designed drilling programs will result in the addition of minable reserves to the present operation, and that exploration along the trend will discover ore bodies of size and quality similar to Cannon.

Asamera's exploration effort, both at the mines and at the corporate level, reflect the best exploration talents and methods. I like to tell my service club friends that the mine wasn't discovered by the Good Fairy and ore isn't mined by gnomes. It takes talented people and Cannon has them in abundance.

Asamera wants to get out of mining?

A little clarification is needed here. The minerals company as we now know it was formed by Asamera Inc., a Canadian oil and gas producer. Subsequently, Asamera Inc. spun off Asamera Minerals Inc. as a public company and retained 92% of the stock. Then, in 1988, Gulf Resources Inc., another Canadian oil company, purchased Asamera Inc., resulting in the ownership of Asamera Minerals Inc. Since 1988, Gulf Resources has been attempting to divest itself of Asamera Minerals Inc.

The question is often asked, why is Gulf Resources selling Asamera Minerals if it is successful? I can only repeat what Gulf has said, that mining is not a core business for them and that they wish to concentrate on the oil and gas sector. This is what prompted me to lead the team that is attempting to purchase Asamera Minerals from Gulf.

Any other comments?

As you may have observed, I am excited about the minerals business and its future. It is not hard to remain excited about something when your regular source of compensation has ended. So I am sure that many of our members are getting a little tired of excitement. I look forward to a minerals industry that in the future will be a model for other businesses to follow, will be recognized by the citizens of our country for its progressive leadership and will be served by an SME made up of strongly committed members.

I want to lead a Membership that is committed to its role in society and that is proud of its past, working hard on its present, and looking into the future with vision and high expectations.

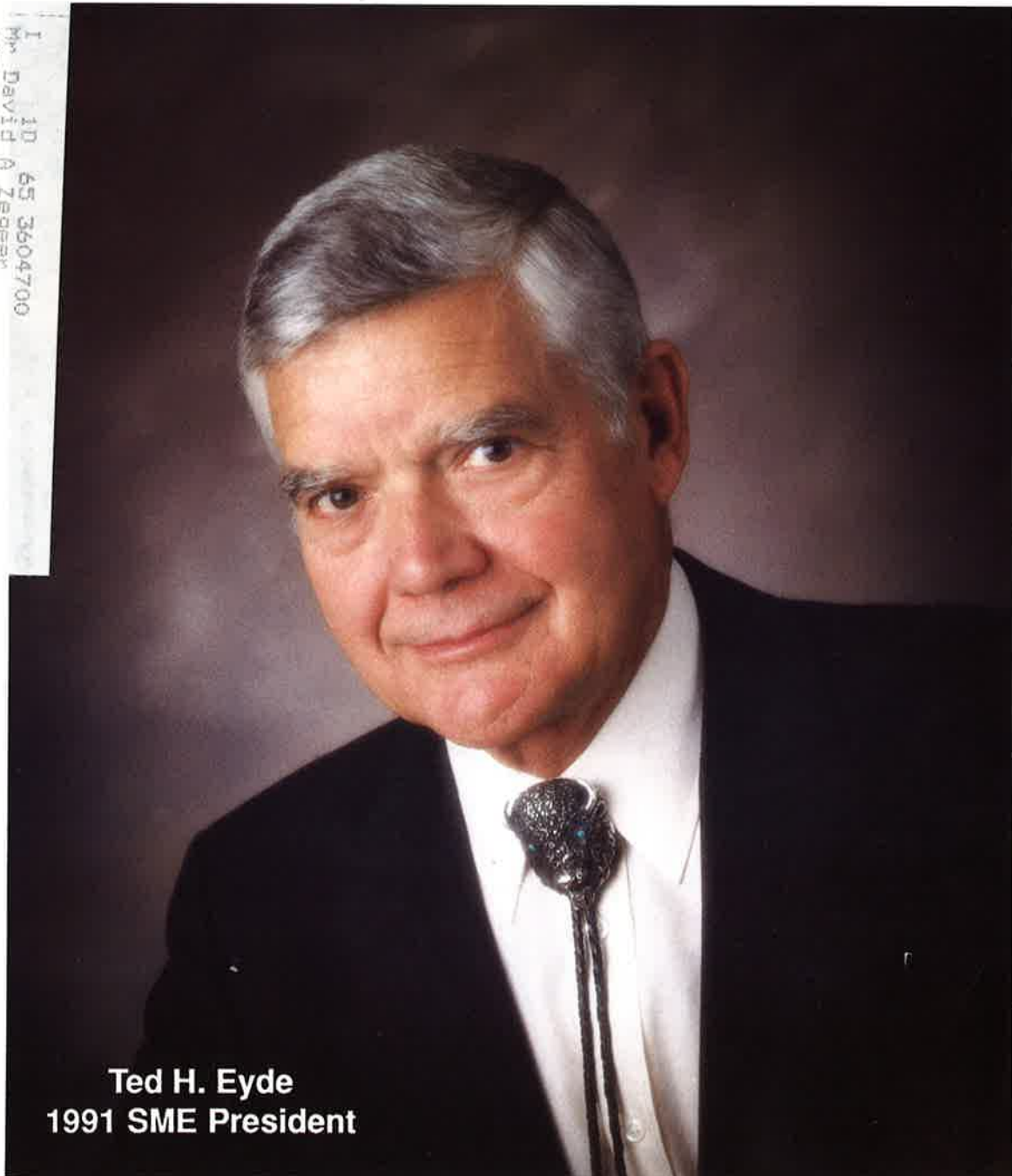
We should expect and demand that AIME and SME continue to be recognized as world leaders in advancing minerals technology. •

MARCH 1991

MINING ENGINEERING

A PUBLICATION OF THE SOCIETY
FOR MINING, METALLURGY,
AND EXPLORATION, INC.

ID 65 3604700
Mr. David A. Ziegler
625 Tally Road
Lexington, KY 40502



Ted H. Eyde
1991 SME President

Interview with Ted H. Eyde, 1991 President of the Society for Mining, Metallurgy, and Exploration

You have spent your entire 34 year career in the minerals industry. What is your assessment of it for 1991 and beyond?

The assessment from my crystal ball contains both good news and some not-so-good news. First, the good news **Mineral Resources, The Cornerstone** will be the theme of the 1992 SME. Annual Meeting and Exhibit in Phoenix, Arizona. The meeting theme focuses attention on minerals having been and remaining the cornerstone of civilization.

In the past, mineral deposits supplied the iron for plows, cooper for utensils, sand for glass and clay for bricks and tiles. Today, minerals provide the raw materials for everything from computer chips to lingerie. Clearly, modern civilization cannot exist without a productive minerals industry.

The developing countries; and, perhaps even more importantly, the former eastern block countries such as Hungary, Romania, Czechoslovakia, Poland and East Germany will require enormous quantities of metals and minerals. These will be needed to rebuild transportation and communication networks as well as housing and manufacturing facilities, while also supplying the industrial minerals used in agriculture and the manufacture of consumer goods. There is the potential for severe political repercussions in all these countries if the expectations for higher living standards cannot be achieved. Therefore, worldwide, the minerals industry will continue to be a growth industry.

What about the not-so-good news?

The not-so-good news for the minerals industry comes from the United

States. Few of the politician's and government administrators responsible for health, environmental and land-use policies recognize the strategic importance of a healthy and productive minerals industry. And, worse still, their decisions have been profoundly influenced by a relatively small core of environmental zealots. The zealots lead a much larger following of "concerned" individuals with a genuine concern for though often misguided understanding about man's impact on the earth's environment.

Many environmental issues such as acid rain, global warming, and the destruction of the ozone layer are based on incomplete, unreliable and inaccurate data. The data have been analyzed by computers using mathematical models that are, at best, only crude representations of all the variables that occur in the natural, global environment.

My suspicion is that, at best, -some and, at worst, a lot of data is being manipulated by scientists. They have replaced the scientific method that uses experimental data to form a hypothesis with advocacy science in which data is subtly manipulated to support a preordained hypothesis.

A recent *Nova* program that aired on



public television investigated the problem of dishonest science in government-funded research. My conclusion from the evidence presented on the program was that the competition for federally funded grants is a strong incentive to engage in questionable, bad or even dishonest science. This produces results that support the researcher's hypothesis whether it concerns global warming, acid rain, or depletion of the ozone layer.

How does this bad science affect the minerals industry?

Bad science affects everyone, not just the minerals industry. Perhaps the most

"Unquestionably the most pernicious threat to the minerals industry in the US is the vast body of often conflicting regulations promulgated by OSHA, MSHA, NIOSH and EPA, which establish exposure standards to mineral particulates . . . Bad science funded by federal grants has given us a \$5 billion annual bill to clean up and remove asbestos from an estimated 773,000 public and commercial buildings."

spectacular recent example of advocacy science and journalism was the "killer apples" scare. Alar, a chemical, approved by the Environmental Protection Agency, is used to promote ripening and increase the shelf life of apples. The Natural Resources Defense Council (NRDC) characterized alar as the most potent cancer-causing agent in our food supply.

The NRDC released an outdated animal study in which rats, fed the maximum tolerable dose, produced results that were interpreted to indicate the alar might be carcinogenic. The study was released to the media and became the subject of a *60 Minutes* program on CBS. This was done even though the NRDC knew that later comprehensive and exhaustive studies indicated that the cancer risk in using alar as directed is less than 3.5 excess cancer cases per trillion apple eaters/

Even though the EPA had approved alar and testified that it was considered safe, the agency succumbed to pressure from environmental groups and changed.

influenced by a public alarmed by actress Meryl Streep and the *60 Minutes* program, banned alar. The "killer apple" scare resulted in the destruction of thousands of cases of fresh and canned apples and juice. Not only were the needy deprived of these products but a large number of apple growers in the Pacific Northwest were driven into bankruptcy.

In 1989, SME President Robert Murray discussed the adverse economic impact of proposed acid rain legislation on high sulfur coal producers, utilities using high sulfur coal for power generation, and the consumers, of the electricity generated by these utilities.

Here again, based on incomplete and biased studies, environmentalists sounded shrill warnings of acid rain destruction of lakes and forests. And again, Congress was stampeded. This

time, it pulsed the The Clean Air Act before receiving the final report from the National Acid Precipitation Program (NAPAP). That study, if I remember correctly, was authorized by Congress and cost \$500 million.

The NAPAP study showed that the so-called acid rain problem is not as serious as the environmental lobby would lead us to believe. So again bad science triumphed. An industry coalition estimated the cost of The Clean Air Act at between \$1 and \$91 billion for emission control equipment, added operating costs and unemployment benefits. Companies don't pay taxes, people do. So consumers will pay the bill. And, perhaps worse still, the manufacturing costs of products exported will increase, making them less competitive in world markets.

What do you foresee as the greatest threat to the viability or the minerals industry in the United States?

Unquestionably the most pernicious threat is the vast body of often conflicting regulations promulgated by OSHA, MSHA, NIOSH and EPA, which establish exposure standards to mineral particulates. The problem began with asbestos. The cancer phobia in the United States and frightening statements in the media implied that one fiber of asbestos could kill. This resulted in most of the public considering asbestos a poison more toxic than strychnine.

Then, in 1978, Secretary of Health Education and Welfare Joseph Califano was quoted as saying that 76,000 asbestos workers were dying each year from asbestos-induced mesothelioma and pulmonary cancer. This estimate was 50% higher than the number of deaths in auto accidents and indicated a serious public health problem.

Dr. Irving Selikoff is Director of the Environmental Sciences Laboratory at Mt. Sinai Hospital in New York. In

1980, he gave the reduced estimate that 20,000 asbestos workers would die every year for the next 200 years from asbestos exposure. And in 1981, Dr. Selikoff cut his estimate even further, to 10,000 deaths a year.

Dr. Malcolm Ross of the US Geological Survey is one of the world's leading asbestos experts. Dr. Ross actually researched the vital statistics. In 1984, he reported that he could identify only 500 to 600 cancer and mesothelioma deaths a year that could be linked to asbestos.

In 1990, Dr. Bernard Gee, in the *New England Journal of Medicine* wrote, "The basis of this fear (of asbestos) is unreal, not founded in reality, a gross overreaction that's high in emotional content." He called the hysteria "paratoxicology."

Bad science funded by federal grants has given us a \$5 billion annual bill to clean up and remove asbestos from an estimated 773,000 public and commercial buildings. The EPA estimate of the total cost of asbestos removal under the Asbestos Hazard Emergency Response Act is \$50 billion, and it may be two or three times that much. These are funds that could be more wisely spent to educate our youth.

In July of 1989, the EPA promulgated regulations that would phase out and eventually ban the sale, use or importation of asbestos into the United States. Based on a review of cost estimates prepared by the Asbestos Institute, the EPA and several unpublished reports, I concluded that the phase out and ban would avoid five cancer cases in the following 30 to 50 years instead of the 1000 predicted by EPA. The cost would be \$4 billion rather than the \$2 billion estimated by EPA.

Banning asbestos may cause unintended consequences that may cost more lives than it saves. For example, because of the asbestos hysteria and the pending EPA ban, NASA and Morton Thiokol decided to replace asbestos putty used to seal the O-rings on the space shuttle's booster rockets. On the first 12 flights after the asbestos putty was removed, there were four occurrences of O-ring erosion.

In 1985, NASA engineers correctly predicted a possible launch disaster from seal failure. In 1986, the Challenger disaster confirmed these predictions. Dr. Ross of the USGS said, "There is no doubt in my mind that the Challenger disaster was caused by EPA's asbestos paranoia."

If this is the case, then the five cases of

Neighbor sparked Ted Eyde's interest in mining

Ted Eyde is President of GSA Resources Inc., a company that owns, manages and participates in ventures that explore for and produce specialty industrial minerals. The company produces zeolites used for ion exchange and adsorption applications and bentonites used as viscosifiers, sealants and desiccants,

Eyde began his career as an exploration geologist with Union Carbide Corp. He worked with Linton Carbide Ore Co. in Mexico and with Union Carbide Nuclear Co., and the Linde Co. on zeolite exploration in the western United States.

In 1965, Eyde was named Chief Geologist of Gentecnica S.A. in Madrid, Spain where he managed exploration projects for base metals and kaolin. In 1961, he joined the Minerals Division of The Superior Oil Co. and managed a porphyry copper exploration program in the southwestern United States. After the corporate restructuring of The Superior Oil Co. in 1976, Eyde founded GSA Resources Inc.

To most of his colleagues in the minerals industry, Eyde is known as Mr. Zeolite because of his long association with and extensive knowledge of natural zeolites, their occurrence and industrial applications. The EZ Chabazite Mine in Bowie, Arizona cast named after him. The initials stand for Eyde's Zeolites. Eyde commented, "My employer preferred naming mining claims after their geologists instead of giving them raises. Had anyone realized that the deposit was going to be the world's major source of the zeolite mineral chabazite, the claims probably would have been named after the company president. But, in retrospect, most mines and mineral deposits are named after people who are deceased and I am still living." Ironically, Eyde's company now owns and operates the Grace Mine, which adjoins the EZ Mine.

Eyde is a first generation American, whose father emigrated from Norway. His mother was raised in Vulcan, Michigan where her father, an iron miner who emigrated from Alsace-Lorraine, worked for the Penn Iron Mining Co.

In 1937, the Eyde family moved to Butte, Montana. There his father established a specialty sales and merchandise brokerage business. Butte at that time was the largest underground copper, zinc and manganese mining operation in the United States.

Moving to Butte certainly resulted in Eyde's initial interest in mining. But it was his next door neighbor, Al Fisher, who really sparked Eyde's interest in minerals. An assayer with the Anaconda Copper Mining Co., Fisher took the young Eyde along when he did assessment work on his

gold prospect near Wisdom, Montana. Fisher encouraged Eyde to pursue a career in the minerals industry.

During World War II, Eyde's father took over the accounts of many sales representatives who had been called into the armed forces. As a result, Ted and the family accompanied their father every summer traveling through almost every state west of the Mississippi River. His father worked to stimulate his son's interest in mining. Consequently, the family toured every mining operation close to their route of travel, from the Menominee Range, Michigan to Park City, Utah. As a result of these trips, Eyde wrote a paper entitled, "The Sapphire Deposits of Montana," It won honorable mention in the Westinghouse-Montana Science Talent Search.

As a result of all this encouragement, Eyde enrolled in the Montana School of Mines. He worked for the Anaconda Copper Mining Co. at the Belmont and Lexington Mine while he attended school.

"Had it not been for the Anaconda Company's part-time employment, I would not have been able to complete my education. And my wife had a scholarship from Anaconda that enabled her to get a degree in nursing."

In spite of its reputation for having poor labor relations, Anaconda helped thousands of students in Montana get college educations. In 1956, Eyde received his BS degree and in 1957 an MS in geological engineering from Montana School of Mines.

While in school, Eyde joined the Anderson Carlisle Society, the student chapter of AIME. After moving to Arizona, Eyde became active in the Tucson subsection of AIME. In 1974, he was elected chairman of that subsection, Eyde and the late Ben Dickerson were instrumental in the elevation of all the subsections in Arizona to section status in 1975.

Eyde is also past chairman of the Mining and Exploration Division. He has served on the SME Board of Directors and is a Distinguished Member of SME.

Eyde commented, "I believe that those of us working in the mining industry have a responsibility to encourage young people, and the younger the better, to follow careers in the minerals industry. The thrill and satisfaction of discovering a mineral deposit makes all the hard work worthwhile. I was interested in science. But had it not been for the encouragement of many people, my dream of being a geologist would never have been fulfilled. I had financial assistance from Anaconda. And my wife Maxine edited and typed literally hundreds of pages of reports and two theses." •

cancer avoided over the next 30 to 50 years by the asbestos ban has been more than offset by the lives of the seven astronauts lost in the Challenger disaster. Clearly the blame rests heavily on the bad science that created the asbestos hysteria.

Is that the end of the asbestos story?

Unfortunately, it is not. In the original 1971 standard asbestos was defined as chrysotile, crocidolite, amosite and "fibers" of actinolite, tremolite and anthophyllite, generally known as the ATA minerals. Mineralogists, the USGS and the US Bureau of Mines objected to the inclusion of the ATA minerals in the asbestos standards. Even so, in 1986,

OSHA expanded the standard to include the non-asbestiform varieties of ATA but agreed to no longer call these mineral particulates asbestos. This standard has been stayed several times to allow for the collection of more data. Imposition of this standard would put many industrial minerals operations out of business. It would also severely impact

the operations in at least 16 major metal mining districts.

From the asbestos ban and non-asbestiform ATA standards, the regulators moved onto the already most regulated mineral particulate, crystalline silica, classifying it as a probable carcinogen. This means that there is sufficient evidence of carcinogenicity in animals and limited evidence of carcinogenicity in humans to list it as a probable carcinogen.

The minerals quartz, cristobolite and tridymite are the principal forms of crystalline silica. Let's try to put this into perspective. The element silicon is the second most abundant element in the earth's crust. It is surpassed in quantity only by oxygen. An estimated 59% of the mass of the terrestrial crust of the earth is silica. And 95% of the earth's rocks contain silica as their principal component. In fact, between 17% and 21% of the earth's crust is SiO₂, at least 95% of which is quartz. All dusts and all soils contain free silica in one form or another. As an associate of mine has pointed out, when the wind blows, the air in most of the states west of the Mississippi River exceeds the proposed crystalline silica standard.

OSHA and EPA are going to have a hard time regulating Mother Nature.

That's true, But Mother Nature is not subject to criminal and civil liability for environmental crimes. The fact is that fines and jail sentences are becoming more common as environmental laws are enforced. Because of this, industrial minerals producers have labeled their products in compliance with the Hazard Communication Standard. Any mineral product containing more than 0.10% silica is labeled as a probable human carcinogen. This means that play sand, plaster sand, blacktop patching compounds, kaolin, bentonite, and even ground calcium carbonate are now labeled.

What will be the impact of all these minerals and mineral products being classified as carcinogens?

First of all, it is going to open the floodgates for lawsuits over the exposure of workers and consumers to minerals that are listed as probable carcinogens. Consider for a moment the potential for product liability lawsuits over exposure to crystalline silica that occurs in virtually all natural and man-made dusts. Second, it is going to result in

"I believe that SME as a professional society for the collection, interpretation and dissemination of technical and scientific information not only has a legitimate role but a clear responsibility to speak and be heard on issues involving the well being of a sound industry and of the nation."

more expensive mineral products. Third, it is going to reduce the awareness, let's say desensitize the user, to the hazards of products that really are dangerous or toxic. This means that in spite of all the money spent on regulation that may result in nearly all mineral products being labeled as probable carcinogens, we are no better off and a whole lot poorer than when none of the products were labeled.

The cost of regulating minerals is extremely expensive. James Dunn, a respected industrial minerals geologist, estimates that regulating the non-asbestiform ATA minerals could cost 21 times the gross national product of the United States. My estimate for the cost of regulating silica is that it could be more than 100 times the gross national product. The bottom line is that the United States cannot afford this type of regulation. Bad science and media-sponsored hypochondria have resulted in the diversion of an ever increasing share of gross national product to correct what are, in fact, trivial environmental problems.

Ayn Rand exhibited a remarkable degree of prescience when, in 1971, she wrote the essays published in *The New Left: The Anti-Industrial Revolution*. She put the current environmental hysteria into its proper perspective with this statement,

"Some 40 years ago Franklin D. Roosevelt exhorted this country to sacrifice for the sake of the underprivileged 'one third of the nation.' Fifteen years later, the sacrifice was stretched to include the 'under-privileged' of the whole globe. Today you are asked to sacrifice for the sake of seaweeds and inanimate matter."

Should SME provide factual information on the possible consequences of legislation and administrative rule making on the minerals industry?

Yes. In fact, I believe that SME as a professional society for the collection, interpretation and dissemination of technical and scientific information not only has a legitimate role but a clear responsibility to speak and be heard on issues involving the well being of both a sound industry and of the nation.

That is a pretty broad statement. Could you be more specific?

Of course. Pending legislation on acid rain, clean air, clean water, mine reclamation and revisions in the Mining Law would all adversely affect the mining industry. Enactment of much of this ill planned legislation could result in loss of jobs or severe setbacks to professional careers for SME members.

You may recall last year's SME's member meeting in Salt Lake City. Several members asked why SME was not more active in taking positions on legislation. At least provide the information needed for the membership to counteract legislation that adversely impacts the minerals industry.

As a result, the SME Board of Directors at its meeting in Reno, NV last September approved a formal Policy on Public Issues in the United States. In addition, the dues bill now has a space provided to make a voluntary contribution to the GEM (Government, Education and Mining) program. The GEM program provides information to the public and to the membership on issues affecting the minerals industry.

And perhaps most importantly, in January, Carl W. Haywood joined the SME staff as Manager of Public Information. Haywood was legislative assistant to former US Senator James McClure of Idaho. So SME now has the organization and staff in place to allow the Society to help educate the public and to take positions on minerals policy issues,

What are your priorities as SME president?

My first priority is for SME to take an active role within the guidelines of its Policy on Public Issues, to take positions on governmental policies that will affect the orderly development and production of the earth's mineral resources

The mineral professionals in SME have an ethical responsibility as well as an individual obligation to contribute their knowledge and expertise to ensure that an adequate supply of minerals is available for now and for future generation. To accomplish this, the SME membership must not be limited to just the development of new technology. We must also make our technical expertise available to, our elected representatives who set policies and to the public whose opinions and perceptions influence policies that determine whether the United States will continue to have an economically viable minerals industry.

Significantly, the AIME started the Technology Media Project entitled, "Transformations: Science, Technology and Society." The objective of the program is to develop a series of eight videos to promote technological literacy in the schools. The program will educate students in the fundamentals of science and technology and encourage them to follow careers in math and science. The hope is that young people who have a better understanding of science and technology will also realize that minerals are the cornerstone of our modern technological civilization.

My next priority is membership. Since 1983, SME has lost nearly 25% of its membership. Membership has now stabilized, but our members are getting older. Unless we recruit more young members, the Society will — like old soldiers — slowly fade away.

Today there are a large number of engineers and scientists from other disciplines working in the minerals industry. The gold and copper mining operations that use hydrometallurgy employ many chemical engineers who should, but often do not, belong to SME. This is also true of environmental scientists and engineers who work in mine reclamation projects.

At the section level, there are sales engineers and manufacturers representatives who attend monthly section meetings but do not belong to SME. My goal is that every member should sign up one new member. The Directors on the SME Board should set an example and each sign up at least two new members.

My next goal is to continue improving the scope and quality of *MINING ENGINEERING* magazine. The magazine has been greatly improved under the guidance of Lane White. In my judgment, more coverage of section activities and regional and topical meetings would encourage more readership.

"My first priority is for SME to take an active role within the guidelines of its Policy on Public Issues, to take positions on government policies that will affect the orderly development and production of the earth's mineral resources."

Section and topical meetings' participants like recognition in an international publication. So outstanding, timely technical papers presented at these meetings should be carefully considered for publication in *MINING ENGINEERING*.

Some of your other goals?

The SME President serves only a year. So there are very few things that he can accomplish during his term. However, there are several changes I believe must be made to make SME more responsive to the needs of the membership and the minerals industry. The Board of Directors should be elected by the membership just as the boards of directors of corporations are elected. This does not materially alter the status quo. The divisions would continue to nominate the directors but the membership would be able to vote for or against individual board members. This would make the board members more responsive to the membership.

The number of regional vice presidents should be increased from three to seven. Because of the diversity of the mining industry in each of the three geographic regions of the US, one vice president cannot adequately serve all of the sections in a region. The Society also needs an international vice president to be responsible for the sections outside of the United States. This will become increasingly important,

That would make an awfully large Board of Directors.

Yes it would. So I would reduce from six to three the number of directors representing the Mining and Exploration Division, I belong to the M&E Division, and I recognize that it is the largest division in the Society. But its influence is disproportionate to the other divisions.

In my judgment, each division should have the same number of board members. I also believe that the sections need more representation on the Board of Directors through six regional vice

presidents. This change would go a long way toward letting section members know that they are represented on the Board. This change would also reduce the time from when a member becomes active in the Society until he or she is eligible to be president. Currently, the process can take more than 20 years to go through the M&E Division and 12 years to go through the Industrial Minerals Division.

My final recommendation is that the Society for Mining, Metallurgy, and Exploration should be organized by discipline just as its name indicates. At present, two divisions are organized by commodity: Industrial Minerals and Coal. And two divisions are organized by discipline: Mining and Exploration, and Minerals Processing. The present organization probably occurred as a compromise intended to satisfy members who had opposing views on the way the divisions would be organized.

Reorganize into the Mining, Exploration and Metallurgy Divisions, with each division having a vice chairman representing metals, industrial minerals and coal. This would provide for a more responsive organization more crossover technology and better programming. It would also eliminate the confusion that often results from joint programming.

This is my wish list. I hope that in the years ahead these recommendations can be implemented.

One final question. Why do you always wear a bolo tie?

The main reason is I could never tie a necktie well. The knot was always crooked or one end of the tie always seemed to hang below my belt line. I am not the only person who has this problem. Just watch your local television newscaster. Even Dan Rather and Peter Jennings have the same problem.

The bola tie is the official tie of Arizona. Each bola tie has a story behind it. And finally, a bolo tie really reflects the personality of the wearer. My favorite tie is a silver bison head, which means I am bullish on the future of SME.

MARCH 1990

MINING ENGINEERING

A PUBLICATION OF THE SOCIETY
FOR MINING, METALLURGY,
AND EXPLORATION, INC.

DAVID A ZEGGER
625 TALLY ROAD
LEXINGTON KY

3604700

MAR 26 1990
0502



ROSHAN B. BHAPPU
1990 SME PRESIDENT

Interview with Roshan B. Bhappu, 1990 President of the Society for Mining, Metallurgy, and Exploration

Tim O'Neil, Managing Editor

You have spent your life in mining. Let us start with your thoughts on the current state of the industry.

The world mining industry is in a relatively healthy state, with higher than expected metal prices and production often at full capacity. There is considerable optimism that this favorable state of affairs will continue at least for the next two to three years. Though coal production has increased the past few years, coal prices remain low. However, mining of industrial minerals continues to be strong.

You live in Arizona. Copper is doing well. A much improved situation from the 60 cent copper we had a few years ago.

Copper mining has done very well in the last few years due to low inventories and continued demand for the metal. The United States is currently producing around 1.36 Mt/a (1.5 million stpy). This represents about 22% of the Free World's production. Since late 1987, higher copper prices have ranged from \$2.20 to \$3.63/kg (\$1 to \$1.65 per lb). The copper mining companies have shown good profits during the last two years.

Today, the US copper industry is operating efficiently due to sound management practices, use of nonunion labor forces by some of the mines, and favorable but fair labor contracts by unionized mines.

Copper mining companies are also investing in heap and dump leaching operations using solvent extraction-electrowinning, to produce copper at a much lower cost. It is estimated that nearly one-third of the copper produced in the US comes from such hydrometallurgical operations.

Some would say gold is where the real action is.

The mining activities in the precious metals field continue to increase, with more new operations coming onstream every month. However, it appears that the growth in this area will slow down somewhat in the future. There is the fear that worldwide production is unrealistically high and that the price of gold, currently about \$13.50/g (\$420 per oz), could drop below \$11.25/g (\$350 per oz). With gold, though, one never knows.

One precious metals expert, Timothy Green, said he thought that the gold prices would remain above \$11.25/g (\$350 per oz) for the foreseeable future. He made that comment at SME's 'world Gold '89' meeting in Reno last November.

It should be noted that a substantial amount of gold continues to be produced from heap and dump leaching operations using carbon adsorption-electrowinning. Using these techniques, it is possible to treat lower grade ores of 1 g/t (0.029 oz per st) or less. Moreover, several gold producers are treating refractory ores using the autoclaving tech-



nique. And, in some cases, even arsenical gold ores are being treated using autoclaves.

What about the future of the mining industry?

I am an optimist. I look at the bright side of things. In the past, some sectors of the US mining industry such as copper and coal experienced some tough times. Today copper and gold are doing very well. The future of both these metals and of the industry in general looks promising. In addition, the current happenings in Eastern Europe and

Russia, along with the stirrings for democracy in other parts of the world, should provide a favorable climate for the future growth of the mining industry.

We must keep in mind that countries have basically two resources, human and natural, and they are interdependent. When the human resource is allowed to grow in a favorable economic environment, there will be a corresponding growth in the development of the natural resources.

For some time, large numbers of people in Eastern Europe have been deprived of essential commodities and supplies produced from metals and minerals. Now they will have a need for these products. This should spur the development of the mining industry worldwide. So I look forward to a busy and thriving mining industry in the nineties and into the next century.

See any problem with a shortage of professionals to serve this thriving industry?

If the mining industry does indeed prosper, we are going to see a tremendous shortage of geologists as well as mining and processing engineers. There are fewer of these professionals than will be needed. And it will take several years for our mining colleges and institutes to start providing the necessary mineral scientists and engineers. This, in turn, will put a lot of stress on our mining companies and educators. However, we will have to do our best to provide the personnel to meet the increasing demand for future minerals personnel.

We must provide professional guidance to a new generation of mining engineers and develop appropriate educational and training programs, including continuing education programs. And SME can help provide the required leadership, programs, and essential services in these efforts and activities.

What about the role of the Federal Government in all of this?

The Federal Government does have an important role to play in the future of the US mining industry. We do not wish for the Government to be a sugar daddy to the industry. However, it should provide a favorable climate for the mining industry to operate at maximum efficiency. And the Government must provide attractive R&D incentives to

the industry. It needs to provide funding for basic research. And grants and scholarships are needed, to encourage young people to join the industry.

The Federal Government must also adequately fund US Geological Survey and Bureau of Mines' R&D activities that the mining industry cannot afford to finance. And the Government must encourage development of critical and strategic mineral resources, to prevent weakening of the country's defenses.

Most importantly, the Federal Government must recognize that the mining industry is a vital part of the country and its future. We need a realistic and a workable minerals policy that will encourage the growth of the industry. At the same time, SME and similar groups must provide the Government with correct and useful information on the industry, its potential, and its problems, so that the Government can take appropriate action.

You are involved with R&D work. Your view, from industry's side.

Research and development activities in the US mining sector have been quite strong and productive in the last two decades. This may come as a surprise to many of our members who have been told that the US is lagging behind in such activities.

It is true that mining enrollments in our colleges and universities have decreased during this period. Even so, the mining industry has developed many scientific and operational innovations. The industry has been aided by the creative research of mining school faculty members in various research centers and by several of our engineering and research organizations.

Some of these advances include the design of portable crushers, in-pit crushing and conveying, SAG milling, column flotation, heap leaching of gold, carbon adsorption-electrowinning of precious metals, bacterial leaching — especially dump leaching of copper, operational controls and instrumentation, improved understanding of flotation mechanisms, collectorless flotation, in situ extraction of metals, and computer-controlled, truck-dispatching systems in open-pit mining.

Though not publicized, the mining companies themselves, especially in the gold sector, are engaged in considerable R&D activities. Companies such as Newmont, Asarco, Kennecott, Phelps Dodge, Magma, Cyprus, Echo Bay, Freeport, and several others have ongo-

ing R&D programs. These have solved many operational problems and helped develop innovative flowsheets for new deposits. Such efforts have also resulted in improved equipment design to meet environmental regulations.

Such innovations have allowed US mining companies to compete in the world arena despite increasing labor costs and environmental controls. The US mining industry has nothing to be ashamed of. We must continue to encourage academic and operational research. Often the results are new, productive ideas that allow us to increase our productivity and lower our costs.

How about contract research, like Mountain States does?

The R&D efforts in the minerals industry have been reasonably steady for contract research. The surviving R&D groups like Hazen, Mineral Process International, Lakefield Research, Control International, and Mountain States R&D International all continue to do well. This is also true for mine planning and development groups such as International Mining Consultants, Modular Mining, and the like.

Since its spinoff about three years ago, Mountain States R&D International has experienced good growth. And we hope to do even better in the future. Our R&D services are requested by both large and small companies in the US. Larger companies need R&D help since many of them have disbanded their central research divisions. Smaller companies need help since they cannot afford a research staff.

Our services are also in demand internationally, especially in Brazil and in those countries that have unfavorable foreign investment climates. In these cases, the lack of new investments by leading mining companies has curtailed the influx of accompanying technology. So the demand for outside consultation and R&D help is high. Last year we established a cooperative laboratory in Sao Paulo, Brazil. And we have plans to open similar laboratories in other developing countries where we can fill increasing demands for our services.

Your view of the R&D work that is being done outside the US?

R&D activities in developed countries are strong. Work in geology, geotechnology, minerals processing, extractive metallurgy, and process control

Educator steered Bhappu toward career in mining industry

Since 1987, Bhappu has been president of Mountain States R&D International, Inc. From 1983 to 1987, he served as senior vice president - technology for Mountain States Mineral Enterprises, Inc. For two years before that, he was their vice president of marketing sales and corporate director of research and development. In 1972, Bhappu joined Mountain States Research & Development as a vice president.

Bhappu began his career as a teaching assistant and project engineer at Colorado School of Mines. He also worked as a resident metallurgist for Miami Copper Co. in Arizona. And he held various positions with the New Mexico Institute of Mining and Technology. These included senior metallurgist, research professor, vice president for research, director - in situ mining research center, and chairman, department of metallurgical and materials engineering. Bhappu also served as director of metallurgical research for National Science Foundation programs at the school.

Bhappu is a registered professional engineer in Arizona and New Mexico. He is also a special consultant to the United Nations for organizing mining and metallurgical, educational, and training seminars.

Bhappu was born in Karachi, Pakistan and raised as a Zoroastrian. The beliefs of this ancient Persian, monotheistic religion revolve around the importance of individualism and the maxi-

mum use of natural resources along with environmental awareness.

Bhappu received his Bachelor's, Master's, and Doctoral degrees in metallurgy from Colorado School of Mines in Golden. In 1957, he became a naturalized citizen of the United States.

Three people influenced Bhappu's decision to enter the mining profession. "My grandfather, Kawasji Bhappu, directed my thoughts toward engineering as a career. Kawasji selected refrigeration engineering as his vocation. Nearly a century ago, he built the first ice factory and cold storage in the Eastern world. He was also the first member in the East of the American Institute of Mechanical Engineers. He was a firm believer in hard work, integrity, fairness, entrepreneurship, and the importance of education."

The second person who influenced Bhappu's career choice was Dr. Manek Pithawalla, principal of B.V.S. High School in Karachi. Pithawalla was a geographer and geologist. "He stressed the importance of human and mineral resources of a country and advised young people to go into the mining industry. It appears that I was the only one of thousands of students who heeded his advice. He was a remarkable human being and educator. He was a scientist who inspired me to become a mineral engineer, a researcher, and an educator."

Bhappu's father, Boman, was the other person who influenced Roshan's career choice. "He was also a refrigeration

engineer. And he was instrumental in developing my moral character, zest for public and community service, belonging to and working for a professional society, statesmanship, and appreciation of business science and management. I was lucky to have such fine mentors in my early life."

During the last 17 years, Bhappu has had more than 20 assignments with SME. These include being the chairman of several working committees of SME and MPD, chairman of MPD, and chairmanships of the International Affairs Committee, the TMS Liaison Committee, and SME's GEM Oversight Committee.

During his career, Bhappu has written and had published more than 100 technical papers. He has also written several hundred unpublished reports for various clients and he several patents to his credit.

He was the coeditor of *Mineral Processing Plant Design* and *GOLD FORUM on Technology and Practices - 'World Gold '89.'* And Bhappu is the editor of SME's *Minerals and Metallurgical Processing* quarterly magazine.

In 1980, Bhappu was elected as a Distinguished Member of SME. In 1983, he received the Robert H. Richards Award from AIME for furthering the art of minerals beneficiation.

"I have enjoyed every moment I have spent in SME activities. I believe that you get much more in return than what you put into your professional society." •

are quite productive. Here I am referring to countries like Canada, England, Australia, Chile, and the Scandinavian countries, especially Finland.

Foreign mining companies such as Outokumpu, RTZ, CRA, BHP, Mitsubishi, and others have very strong R&D programs. They have up-to-date laboratories with advanced analytical, mineralogical, minerals processing, extractive metallurgical, and instrumentation and computerized control systems at bench-scale and pilot-plant levels.

These companies encourage in-house R&D activities and support such activities at their local universities and government research centers. It appears that such forward thinking investments are resulting in the development of innovative mining technologies.

In the past, US mining companies such as Kennecott, Anaconda, and Exxon also had up-to-date laboratories

and research centers. It is doubtful whether we will see such centers in the US in the future. It may be that there is no need to make such heavy investments in research centers. Even so, the success of our mining industry will depend largely on innovative technology and practices.

Our minerals scientists and engineers must be aware of state-of-the-art techniques. And we must use them to produce our metals and minerals at the least cost and in an environmentally acceptable manner. Here again, SME can play an important role in technology transfer, by collecting and disseminating to members up-to-date technical information.

Let's switch to SME. How long have you been involved with the Society?

Since I was an undergraduate student

at the Colorado School of Mines. We had an active student chapter. And I continued my interest in the Society during my graduate studies and during my first professional assignment at Miami Copper in Arizona from 1954 to 1959.

My Society activities increased during the 14 years I was with the New Mexico Institute of Mining and Technology in Socorro. The student chapter there was also quite active. And we had an equally strong section in the Central New Mexico section at Grants.

Those were the golden years of the uranium mining boom. We were involved in organizing several uranium symposiums, field trips, student programs, and the like. During those years, I served as the student advisor, chairman of the section, and as a member and then the chairman of the section delegates.

MINING ENGINEERING

MARCH 1989

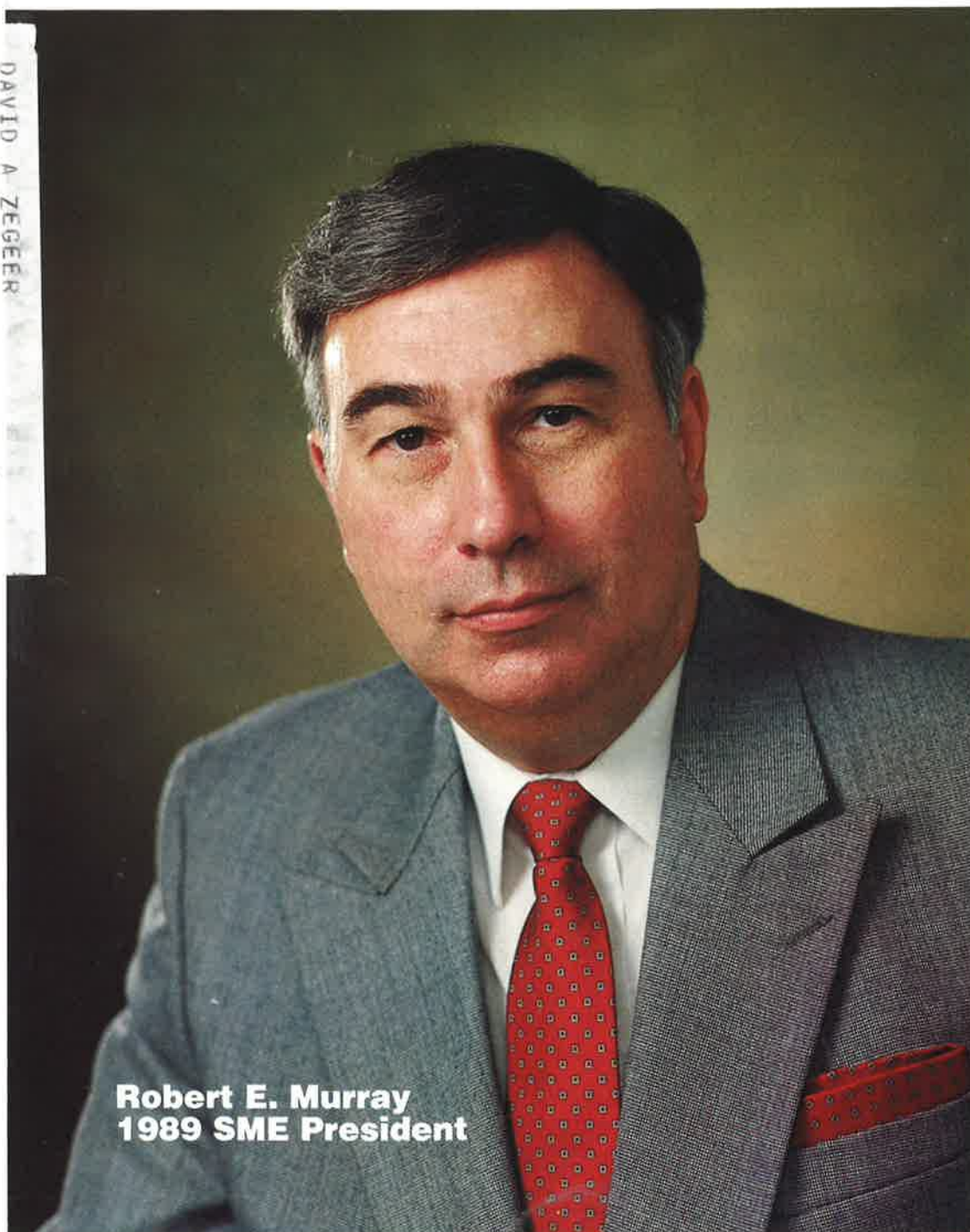
A PUBLICATION OF THE SOCIETY
OF MINING ENGINEERS, INC.

40th ANNIVERSARY — 1949 • 1989

DAVID A ZEGER
625 TALLY ROAD
LEXINGTON KY

3604700

40502



Robert E. Murray
1989 SME President

My involvement in the Society continued during my 14 years as vice president and general manager of Mountain States Research & Development, a subsidiary of Mountain States Mineral Enterprises in Tucson. And I have been active with the Society during these last three years when I was president of Mountain States R&D International, which was spun off from MSME.

Your thoughts on the current state of affairs at SME.

Financially, SME is healthy thanks to judicious cost cutting programs initiated by the SME Board and SME staff in recent years. Our latest balance sheet shows the highest income ever. However, we dare not lose sight of the fact that we belong to a cyclic industry and we may have to face lean years in the future.

So it is up to us — the SME Board, staff, and general membership — to see that we continue to remain financially healthy and provide quality services to our membership. We must look at the 90s as a challenge and as a springboard to propel SME into the 21st Century as a strong and viable organization ready to provide quality services to the mining industry worldwide.

To accomplish these objectives, we must continue to work on programs already in place. These include a flexible meetings policy with topical, regional, and specialty meetings; our technical programming; and our continuing education and short course programming. They also include such things as aggressive membership drives, GEM (Government-Education-Mining) activities at sectional levels, and working to improve the international image of SME.

As SME President, what are your priorities this year?

I have three priorities. First is my concern for the future and well being of US citizens because of the threats to the US mining industry. I believe that the US members of SME have an opportunity and responsibility to communicate to their neighbors the importance of the industry as it affects their lives. Communicate mining's message to your families and community members as well as local and Federal officials. The survival of our industry may depend on

such efforts. In this regard, we should work to strengthen the SME GEM program nationally and locally, to support these efforts. The SME Board and GEM Committee have been working toward that goal.

We do a good job of talking to each other about the importance of mining to our nation. But we do a mediocre job of passing this message to the nonmining community. SME members need to speak up on topics that concern their industry, their livelihood, and the security of the nation.

Realizing the need to act promptly, the SME Board last year approved seed funding of \$25,000 to initiate and formulate a realistic program. The GEM Oversight Committee has been active in coming up with a sound program.

Other industry groups also need to be involved here. SME efforts need to be complementary to those of the American Mining Congress and the state mining associations, which have the responsibility to influence a favorable political environment for the industry. Only in this complementary manner can we be effective and get the maximum return from our limited monetary resources.

Priority number two?

My second priority is to help SME become a more integral part of the world mining community. In the past, we have provided services to our membership abroad and have participated in a few international activities. Today, SME is looked on as a national organization with trans-national interests. In the coming decade, our Society needs to become more globally involved. We have the infrastructure and organization. What we need is the required interest, dedication, and programs.

I mentioned the greater opportunities worldwide in the growing minerals industry. This provides a unique opportunity for SME to increase its involvement in world mining. There is a demand for technology transfer. We must capitalize on this opportunity by providing attractive membership packages, cosponsoring international joint meetings and conferences, and offering short courses on selected topics.

In the past, our joint meetings with Japan and Australia have been successful. We should expand our joint sponsorship of meetings in other parts of the world. Our SME International Affairs

Committee needs to continue to find new ways of communicating with other mining societies. We need to come up with appropriate programs to achieve a greater international thrust for the Society.

And your third priority?

Involves finding ways of encouraging young people to join the mining industry. Recent studies have shown an alarming decline in the number of our younger members— about 77% in our under-25 age group. Mining school enrollments are down and departments have closed or merged with other engineering disciplines. If we wish to see a thriving mining industry in the 21st Century, we need to attract young people to our profession.

There are some programs in place designed to educate students and teachers about mining. Science teachers are provided with short courses in the summer, to teach them about the minerals industry. A speaker's bureau is used to provide personnel to present career talks to high school students. And special awards are given at local and national science fairs.

These efforts are not enough. We need more effective programs. And our programs should be expanded to high school and college students who have not yet picked a career.

The Society and its members must embark on a mission of recruitment. We must develop programs to reach the undecided high school graduates and college students. Show them the importance of the mining industry and the benefits of joining the it. We must review and modify, if necessary, our scholarship and loan programs at the undergraduate and graduate levels. And, of course, we need to support our mining schools and faculties.

We should work closely with school faculties and SME student chapters to encourage undecided students to join the profession. And we need to encourage our younger Society members to go back to their campuses to preach the mining gospel.

Most importantly, each of us must make a commitment to recruit one student to go into the minerals industry. It can be our son or daughter, a relative, neighbor, a young person in church, or a member of the local scout troop. If we do this, in a short period we could have 17,000 additional members — a praiseworthy goal for our membership. •

Interview with Robert E. Murray, 1989 President of the Society of Mining Engineers

Tim O'Neil, Managing Editor

You have 32 years experience in the coal business. What is your perception of the primary issues facing the United States' mining industry, and the coal business in particular.

Some of the issues are unique to our industry, or to a specific mineral sector, such as coal. Other problems, though, are shared with American business in general.

Today, all mineral industries in the US are market driven. And these same market forces appear to apply to all US commodity and durable goods businesses. Yet, in the world marketplace, the US continues to be less competitive with foreign commodities and goods. Some of the reasons for this include:

- Thirty years of congressional overregulation and overtaxation of US businesses, particularly the mineral industries.
- Deficit spending by the Federal Government, primarily caused by our mistaken belief that we must finance the defense of the Free World. Meanwhile, our allies, on a per capita basis, often provide very little for defense.
- A lack of corporate loyalty by many US businesses for their employees.
- And finally, the misguided notion that we can maintain our standard of living using only domestic service industries.

Elaborate on these reasons for the lack of US competitiveness in the world marketplace.

Governmental overregulation and taxation of the mineral industries, and particularly coal, have stifled the entrepreneurship that has always kept our country the world leader.

In the past year and a half, I have formed my own companies. We are attempting to provide good, high paying American jobs. But whatever success we have had has often been in spite of the efforts by Federal and state governments. They have tended to thwart the creation of these job opportunities.

I mentioned Federal deficit spending. In 1986, the US spent \$1141 per citizen for defense. Our European allies and Japan had per capita defense spending of only about \$475 and about \$163, respectively. The US spent more than twice as much per person on defense as did the European countries, and seven times as much as Japan.

With only 32% of the Free World population, the US provides all of the strategic nuclear umbrella, 63% of the naval tonnage, 91% of the sea-based jet fighters, and 39% of the ground forces, according to Pentagon figures.

To many of us, it was an outrage that the US kept a fleet of as many as 38 ships in the

Persian Gulf last year, to keep the oil flowing. That cost tens of millions of dollars a day. But some 60% of that oil went to Japan and 30% went to Western Europe. Only 7% of that oil went to the US.

The US pays for the defense of the Free World. Meanwhile, our allies, particularly Japan, have made the US the dumping ground for their products. These foreign products can usually compete in the US under more favorable circumstances than our products can compete in their countries.

Seven years ago, the West German standard of living surpassed that of the US. Last year, Europe surpassed the US as a producer of wealth. This year, the total Gross Na-



The possible enactment of additional air emissions legislation would further restrict the use of high sulfur coal. The passage of proposed "acid rain" legislation could increase energy costs by 20% to 30% in the Midwest. The result would be severe unemployment and loss of businesses.

tional Products of our allies will be about \$7.8 trillion, compared with \$4.7 trillion for the US. Yet the US spends 6.7% of its GNP for defense. The NATO nations and Japan average only 3.3% and 1%, respectively.

Further, in 1987, as many as 5.1 million US jobs were lost due to foreign competition, according to a study by the Economic Policy Institute. This issue strikes home for many Americans, who have lost jobs or seen their industries vanish because of foreign competition.

Instead of governmental spending on more restrictive regulations on industry and on the defense of the entire Free World, the US should start spending money for research and development, to create jobs and make American industries more competitive. Our Federal and state governments must take the wraps off entrepreneurship in the US, particularly in the mineral industries.

You also mentioned a lack of corporate loyalty.

This is something I have completely changed my beliefs on in recent years. I now think that many US corporations and their shareholders, directors, and executives are out of touch with company employees. Constant management turnover makes it difficult for US industry to compete in the world. And corporate ethics and loyalty seem to be relics of the past, replaced by a mentality that leaves little room for commitment and none for sentiment.

Corporate politics, mergers, acquisitions, and takeovers have resulted in "musical chairs" in American executive suites. According to a major US outplacement firm, more than 90% of these changes have nothing to do with the competence of the senior manager being replaced. Often, it is more of a reflection of moral bankruptcy on the part of the shareholders and directors and the incompetence of the new management.

The same outplacement firm now recommends that young middle managers change jobs every five years. American industry

cannot compete with such management turmoil and lack of continuity in its leadership.

No new products, talent, or wealth are brought to business or society as a result of many of these corporate restructurings. To the contrary, senior management is forced to abandon strategic long-term planning and think in terms of short-term gains. Meanwhile, the corporation is often depleted of its assets by the takeover artists, usually investment houses, to retire the debt incurred in the takeover.

We must somehow ensure that the shareholder, director, and chief executive will treat the manager and employee in an ethically and morally appropriate manner. We must also make certain that the assets of our businesses are not pirated away by investment people motivated to turn a quick profit.

And what of our domestic service industries?

I mentioned the trend in the US toward service industries and away from those producing goods and commodities. The effect on many US coal miners is a classic example. Many of these laid-off miners, for cultural and social reasons, do not want to relocate. Even if they did, many cannot afford to finance a relocation away from their economically depressed home areas. At the same time, these people still want to work. Those who do find employment are usually forced into jobs in low paying service industries.

Some, if not most, of the laid off miners become unemployed and go on the welfare rolls. Then these people must be supported by corporate taxes and by those who are still working. Again, all of this renders our industries less competitive.

Talk a little bit about the US coal industry.

One issue overshadows all others. The possible enactment of additional air emissions legislation would further restrict the use of high sulfur coal. The passage of proposed

"acid rain" legislation could increase energy costs by 20% to 30% in the Midwest, with resultant severe unemployment and loss of businesses.

The "acid rain" legislation advocated by Sen. George Mitchell (D-ME) in the last congressional session would have thrown 38,000 coal miners out of work in Ohio, Pennsylvania, Kentucky, Illinois, Indiana, and West Virginia. The Business Round Table has estimated that the total impact of Sen. Mitchell's bill would have been the loss of from 300,000 to 600,000 American jobs. Estimates of the cost of such legislation to the US economy range from \$6 to \$10 billion a year.

Would anyone benefit from additional air emissions or "acid rain" legislation by Congress?

Canada would benefit. And US low sulfur coal producers could possibly benefit.

The low sulfur coal producers in our country have advocated further air emissions or "acid rain" legislation. They want to market more of their product, at the expense of others in our industry. But low sulfur coal has just as much carbon as high sulfur coal. Reduce or eliminate the use of high sulfur coal and the next target appears to be the reduction of carbon dioxide emissions from low sulfur coal. Some say these emissions cause global warming, the so-called "greenhouse" effect.

In this regard, a study was just published in the American Geophysical Union's Geophysical Research Letters. It summarizes the research by three scientists with the National Oceanic and Atmospheric Administration. Examination was made of temperature and rainfall records for the past 100 years. The study concludes that "there is no statistically significant evidence of an overall increase in annual temperature or change in annual precipitation for the contiguous United States (between) 1895 and 1987."

This research seems to contradict and discredit James Hansen of the National Aeronautics and Space Administration's Goddard Institute. Hansen startled Congress with fears of global warming and the "greenhouse" phenomenon. Already, new legislation has been introduced that calls for restrictions on the emissions of carbon dioxide, chlorofluorocarbons, and methane.

Why would Canada benefit from the passage of "acid rain" legislation in the US?

For the past decade, our good friends, the Canadians, have strongly encouraged the

enactment of "acid rain" legislation in the US. At the same time, Canadian salesmen have been busy selling electric power in our country.

What Canada fails to acknowledge is the disparity between the environmental records of the two countries. At ratepayer expense, US electric utilities have installed 142 stack gas scrubbers since 1970. And 49 more are under construction or planned. Meanwhile, the first scrubber has yet to be installed in Canada. In fact, in the 1970-84 period, Canadian coal-fired SO₂ emissions increased 54%. Meanwhile, in the US, SO₂ emissions decreased 8% on a far greater generation base.

In addition, Canadian crown corporations, which are the major exporters of electricity to the US, receive subsidies that approach the value of the power exported. Typical subsidies include no-cost guarantees of debt obligations, high debt-equity ratios aided by government guarantees, freedom from taxation and from profit-making requirements, nuclear subsidies, direct grants, and the assumption of currency exchange risks.

These subsidies violate US trade laws. They should be eliminated or included in the invoiced cost of power exported to the US. In our research on this subject, we have become familiar with many examples of these subsidies to exported Canadian power. The subsidies are estimated to have a value greater than the stated cost of the power.

Many mistakenly believe that Canada exports only hydroelectric power. But in 1985, for example, one-fourth of Canada's exported power was coal-fired. And by the year 2005, this percentage will increase to between 29% and 33%, according to estimates by Canada's National Energy Board. Remember, Canada does not have the mined land reclamation laws that the US has. Nor does it have the already mentioned costs of scrubbing stack gases.

Canadian power and domestically generated electricity are not competing under equivalent circumstances. Canadian power producers enjoy financial benefits and environmental disparities over their US counterparts. Canada has been and is offering power to electric utilities throughout the US at 80% of avoided costs. Even though domestic operators reduce fuel and generating costs, this 5 to 4 ratio remains. At some point, this yields predatory pricing, again in violation of our trade laws.

Anything that can be done about Canadian power imports to the US electric utility industry?

Do not accept what Canada says the US

Robert E. Murray - A distinguished career in the coal mining industry

Robert E. Murray is President and Chief Executive Officer of a group of companies that produce, process, transload, and sell coal. They include Ohio Valley Resources, Inc., Coal Resources, Inc., The Ohio Valley Coal Company, Energy Resources, Inc., and others.

Murray was formerly President and Chief Executive Officer of the North American Coal Corporation, which he served for 31 years. He began his career by winning a five year company-sponsored scholarship to study mining engineering at The Ohio State University. While there, he was also a Departmental Assistant.

From Assistant to the Manager of Industrial Engineering and Coal Preparation at North American, Murray went on to serve in every mine management and supervisory capacity, from Section Foreman through Superintendent. In 1968, he was promoted to Assistant to the President of the company at the Cleveland, OH headquarters.

In 1969, Murray was elected Vice President — Operations. He was responsible for directing operations, coal sales contract negotiations, customer liaison, and acquisition of new properties. He was also responsible for personnel, administration, employee

relations, financing arrangements, and new construction projects at all company locations except the Ohio mines. During this time, Murray was also instrumental in developing the company's large lignite surface mines in the West.

From 1974 to 1983, Murray served as President of the company's Western Division, in Bismarck, ND. He also served as President of four subsidiaries in that state. In 1983, Murray returned to the Cleveland headquarters as Executive Vice President — Operations. He was subsequently elected President and Chief Operating Officer and then Chief Executive Officer.

During his mining career, Murray has received many awards. These include the Howard N. Eavenson Award from the Society of Mining Engineers' Coal Division, awards from the Independent Coal Operators Association, Rocky Mountain Coal Mining Institute, and the North Dakota Lignite Council. Murray has also been selected as a Distinguished Member of SME.

Murray completed the Advanced Management Program at the Harvard Graduate School of Business and is a licensed professional engineer. He resides with his wife and three sons in Moreland Hills, OH.

should do environmentally. Write our President and your Congressman. Support environmental equality in energy production between the two countries.

Support fair, not "free," trade negotiations as a way to remove subsidies from the cost of imported energy. Insist that domestic power generation be given a better chance through serious evaluations of alternative power sources in this country.

And beware of Canadian "low cost" electric power. It is not. Those are American jobs and the nation's wealth that are being exported when Canadian power is purchased at the expense of our domestic electric utility industry.

How about an alternative to further air emissions or "acid rain" legislation?

If scientific evidence eventually calls for further reductions in sulfur dioxide and other emissions from electric power generating stations, which has not yet been the case, then these reductions can be achieved through clean coal technologies. Such technologies hold the promise of achieving greater emissions reductions for a longer term at considerably less cost than "acid rain" legislation.

Since adoption of the Clean Air Act in the early 1970s, industry has invested \$250 billion in pollution controls. The Federal Government's Clean Coal Technology Program is a \$5-billion joint government-industry effort. It holds the key to reducing sulfur dioxide emissions while, at the same time, protecting the economy and jobs in vast regions of the US.

Today, with fuel adjustment clauses in electric rates and close regulation of power producers by state public utility commissions, an electric utility has more incentive to switch fuels, rather than boilers. Low sulfur coal is usually more expensive to mine and must be transported further distances. These costs, though, can be passed on to the ratepayer. But the retrofitting of a boiler involves capital expenditures that must be financed by stockholder equity or borrowings.

If there must be additional air emissions or "acid rain" legislation, utilities must have the incentive to switch boilers, not fuel. When fuel is switched, productive people become unemployed.

It was recently reported that the Bush Administration is considering an alternative to writing new rules on air emissions or "acid rain." It would allow states and even

regions and utilities to decide how to meet targets for reducing air emissions under the existing Clean Air Act.

White House Chief of Staff, John Sununu, and Counsel, Boyden Gray, are reportedly supporting a system in which each state would be given a target level for emissions of sulfur dioxide and nitrogen oxide. Each State could subdivide its target by region or utility system. "Emission trading" could be utilized to achieve those goals.

You have talked about "acid rain" legislation and the importation of Canadian power. Any other threats to the US coal industry?

One of the greatest threats comes from natural gas. Congress recently repealed the Fuel Use Act. This has opened the way for natural gas to be burned in large scale industrial and electric utility boilers.

Natural gas should be conserved for home heating and other special uses. Yet, governmental policies now encourage the squandering of this valuable resource in large boilers.

Meanwhile, natural gas producers have undertaken a national advertising campaign and are increasing their Washington lobbying efforts. Their goal is to increase their combined 23% share of the industrial, home heating, and power generation markets.

Let's talk a little about your present situation. In the past year and a half, you have gone from being president and chief executive officer of a major coal company to the owner of your own coal companies, Ohio Valley Resources, Inc., Coal Resources, Inc., and others. What has the change been like?

The past 18 months have been challenging, exciting, often traumatic, and, in many ways, rewarding. Survival is a tremendous motivator. It brings commitment to any business endeavor that, combined with energy, experience, and knowledge, can yield outstanding performance and results.

We have a wonderful organization of more than 400 dedicated managers and employees. We are all committed to a common purpose, first survival, then growth in coal.

Remember, though, when you form a new business enterprise, not only are your job and your employees' jobs at risk, so is everything for which we have put in a lifetime of work. I take very seriously this responsibility to my employees and family. And I have

achieved greater personal accomplishments than would have been possible in my stagnant corporate position with my previous employer. I should caution, however, that the risks of such an undertaking are not for everyone.

Whether a person operates in a large or small company and whether or not his personal assets are at stake, what counts most in the coal business is one's performance for and relationship with his electric utility customers. One must have a demonstrated record of excellent performance and low coal costs. One must also have the reputation for integrity and for service to the customer. Quite frankly, these were the only assets of our business undertaking in the beginning.

What counts most in the coal business is one's performance for and relationship with his electric utility customers. You must also have the reputation for integrity and customer service.

Tell us about your companies.

Our flagship is The Ohio Valley Coal Company, a subsidiary of Ohio Valley Resources, Inc. Ohio Valley Coal owns the Powhatan No. 6 underground mine, which operates in the Pittsburgh No. 8 Coal Seam in Belmont County, OH.

At the May 25, 1988, acquisition of the Powhatan No. 6 mine by Ohio Valley, the operation was producing 950 kt/a (1.05 million stpy) with a productivity of about 11.8 t/d (13 stpd) per man. Current output is more than 1.5 Mt/a (1.7 million stpy) and productivity averages about 19 t/d (21 stpd) per man. The additional sales have resulted from our incremental pricing in the very competitive high sulfur coal marketplace.

We do not yet have a longwall mining system at Ohio Valley to compete in the coal marketplace, although additional contract sales appear to be forthcoming that will pave the way for a unit. In the interim, we must strive for ever increasing productivity from our continuous mining units, which are utilized with roof bolting in a room-and-pillar system.

Ohio Valley has a "niche" strategy. It in-

cludes low overhead expenses and being very service oriented to our electric utility customers. By cutting costs and lowering overhead expenses, Ohio Valley can pass the savings on to its customers. This is especially important in today's marketplace, since current coal prices are as depressed as they have ever been — compared to production costs.

There are skeptics who wonder why a man would stake everything he has worked 31 years for on a high sulfur, landlocked, underground, unionized mine in eastern Ohio. The jury is out on the issue. But we believe that, with our total commitment and mining expertise, Ohio Valley will be successful.

We recently began operating our new harbor facility at Milepost 111 on the Ohio River. The harbor facility will be operated by our affiliate, The Ohio Valley Transloading Company. This facility has permitted coal shipments by barge from the Powhatan No. 6 mine. Previous deliveries were by truck or railroad, though the mine is capable of loading 11.8 kt (13,000 st) unit trains. The transloading facility will also permit the offloading of low sulfur coal from the Ohio River, for blending with production from the Powhatan No. 6 mine.

Our affiliate, Energy Resources, Inc., operates small surface mines in Clearfield, Elk, and Jefferson Counties, PA. At the time of the acquisition in May, 1988, these operations were producing about 225 kt/a (250,000 stpy). We have tripled our output to about 635 kt/a (700,000 stpy), with only a slight increase in the work force. This has helped us make the mine marginally profitable, which was our goal by this time.

Energy Resources now has the capability of loading 6.4 kt (7000 st) unit trains on the Pittsburgh & Shawmut Railroad and 11.8 kt (13,000 st) unit trains on Consolidated Rail Corporation. A large percentage of our production is trucked to the marketplace.

Our Coal Resources, Inc. holding company owns 27.2 Mt (30 million st) of proven, or 75.3 Mt (83 million st) of probable, low sulfur coal reserves in southeastern Ohio. And the company has an option on another 20.9 Mt (23 million st) of high sulfur reserves. The company is also involved in exploration and investigation of undeveloped and idle coal properties.

Your Powhatan No. 6 mine is a unionized operation. How have your relations been with the United Mine Workers of America, and how is employee morale today?

Since the inception of the Powhatan No. 6 mine in the early 1970s, labor relations have

often been tumultuous. The hourly employees were often labeled as "radicals." Today, more than 400 employees are on laid-off status. Even so, morale at Ohio Valley's Powhatan No. 6 mine is very high. This is evidenced by our 50% gain in production and productivity over the past seven months.

My management philosophy is to tell an employee what he must do and why, with emphasis on the "why," and then let him do it. We accomplish this through frequent communication meetings with all employees on all shifts. Our employees know what must be done and why.

The people in our Companies are talented, experienced individuals. When given the proper information and treated with respect, they will perform well, and often beyond one's expectations. Over the years, I have learned that all the average coal miner wants in life is the right to earn a satisfactory living in safety, and with honor and dignity. Ohio Valley's hourly employees, who are also UMW members, are well motivated and their morale is high.

Furthermore, Ohio Valley's employee wives have organized themselves into a group to combat further restrictions on the mining or utilization of our coal. Coupled with our very capable local union officials, they will be a potent force.

Another factor that has helped morale is that we have committed to give the Powhatan No. 6 mine a complete underground facelift. All equipment is being rebuilt or replaced. And the mine ventilation system is being completely renovated by sealing all old workings and developing new main entries. Our employees are aware of this commitment to the mine and their futures, and have responded positively.

Changing the subject, what are your priorities as President of the Society of Mining Engineers?

My priorities for the Society of Mining Engineers are to:

- Promote the continuation of regional and topical meetings. In the past, our Society was too rigid in its programming. Now, meeting topics and locations are generated in response to the needs and wants of our membership. I have been involved throughout the evolution of this concept. It is one of the key factors in the future stability and growth of our Society, and we must strongly support it.
- Stem the membership decline. During the industry downturn, member losses were fairly stable and consistent with historical trends. But we have been unable to recruit new members in sufficient numbers to off-

One of my priorities as President is to promote greater membership participation in the Society. More active members mean a stronger, more effective, and more responsive Society. Ultimately, each member benefits. He or she, in turn, becomes technically and professionally more knowledgeable and capable.

set these losses. The reduced numbers of student enrollments and new graduates are major contributing factors here.

Since 1983, our membership has declined by 23.1%, some 5835 members. Most alarmingly, our largest membership declines have occurred in the lower age groups, 53.6% in the 25 to 29 age group and 77.4% in the under 25 age group.

Again, since 1983, SME's Coal Division has experienced the largest divisional reduction, 29.3%, or 1439 members. However, the MPD and M&E Divisions are not far behind, with membership losses of 23.1% and 21.6%, respectively, during this period. Early membership results in 1989, though, are encouraging.

- Continue efforts to improve the quality of MINING ENGINEERING magazine. This monthly publication is often the Society's only communication with its membership. With the appointment of a new publisher, we have taken the first step. We must now increase our efforts to generate more advertising revenue, so that we have more resources to commit to this improvement.

- Make our members aware of the adverse effects on Society economics of "for profit" meetings sponsored by the other mining magazines and meetings entrepreneurs.

In the beginning, these program promoters, in true entrepreneurial fashion, were fulfilling a membership need. We were not presenting and discussing topics in a timely enough manner or in enough geographically desirable locations. Society programming has now addressed these issues. But the "for profit" meetings sponsored by other mining magazines and entrepreneurs still affect attendance at Society-sponsored meetings and our resultant financial strength.

Mining manufacturers and suppliers must also be made aware that people and income are being siphoned away from the Society when they financially support and provide advertising to "for profit" groups, in competition with the Society. Furthermore, senior

management of minerals companies must be made aware of the need to support the Society through their sponsorship of attendance at Society meetings, as opposed to the "for profit" variety.

- Promote greater membership participation in the Society and its management. This states the obvious, I suppose, but it's true. More active members mean a stronger, more effective, and more responsive Society. Ultimately, each member benefits. He or she, in turn, becomes technically and professionally more knowledgeable and capable.

- Deal with the question of the future of the American Institute of Mining, Metallurgical, and Petroleum Engineers, Inc. in a pragmatic and thoughtful manner. Since the incorporation of the Society of Mining Engineers, Inc., and other societies, their relationship to AIME has come under examination. The trend to restructure into smaller, more competitive units has resulted in more responsive organizations. This trend has generated separate incorporations, different technical meetings, new directions, and name changes in some of the member societies.

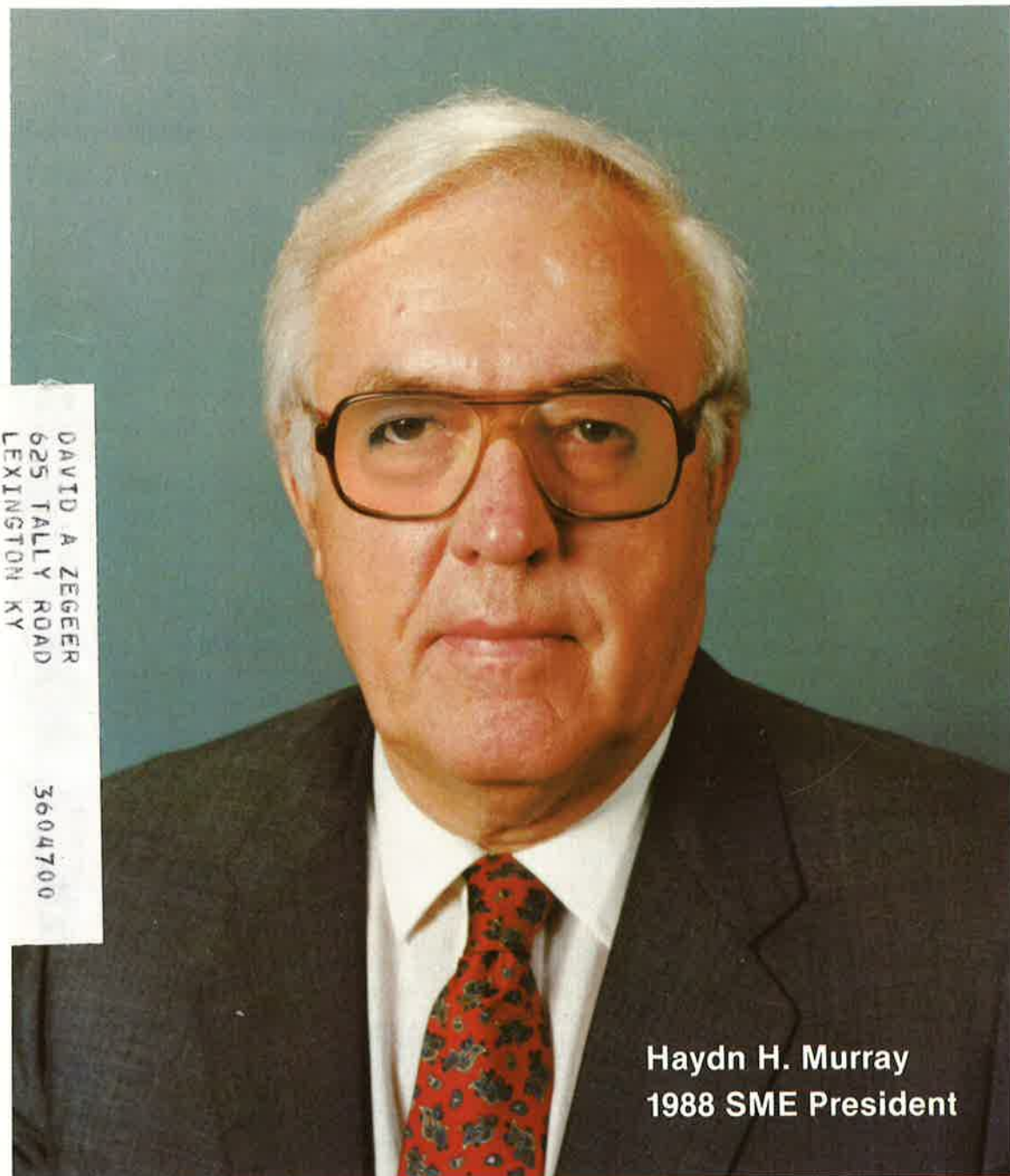
It is appropriate that the role of AIME now be closely examined. Of course, we must protect and maintain the history, traditions, and identity of AIME, as well as the member societies. However, we must ensure that this is accomplished in the most cost-effective way.

Article 3 of the bylaws of the Society of Mining Engineers, Inc. sets forth the special obligations of the Society to support programs and activities of AIME in recognition of its founding role. However, we must look at the cost/benefit ratio of all AIME, as well as SME, endeavors. The mineral industries, and particularly coal, have been devastated economically. As President of SME and a Director of AIME, I have an obligation to our membership. I must make certain that only essential functions are conducted by AIME, at the most economical location and in the most fiscally responsible way.

MINING ENGINEERING

MARCH 1988

A PUBLICATION OF THE SOCIETY
OF MINING ENGINEERS, INC.



Haydn H. Murray
1988 SME President

DAVID A ZEGEER
625 TALLY ROAD
LEXINGTON KY

3604700
40502

Interview with Haydn H. Murray, 1988 President of the Society of Mining Engineers

Let's start with your assessment of the minerals industry.

The mining industry, particularly the fuels and metals sectors, has experienced rough economic times over the past five years. Coal and metal prices were at a low ebb and personnel reductions were in vogue.

Now, I think, personnel reductions have bottomed. And, with gold leading the way, the metals are in a growth mode. Copper and lead prices are on the rise and one can feel again an optimism in the metals sector of the mining industry. Coal production continues to increase, though prices remain low. Coal prices will stay low until oil and gas prices increase, which they inevitably will.

How about your area — industrial minerals?

Most of the nonmetallics or industrial minerals have continued to experience good economic and growth conditions. The exceptions have been industrial minerals such as bentonite and barite, which are directly tied to the petroleum industry.

Kaolin, adsorptive clays, titanium dioxide, borates, silica sand, pigment grade calcium carbonate, and talc have all enjoyed continuing growth. Actually, 1987 was a record year for the kaolin industry.

So the past five years have not been doom and gloom for all of the mining industry, only for certain sectors. I mentioned the low coal prices. These are creating serious problems, particularly for

the small, independent producers.

Over all, though, the mining industry is in better shape than generally thought?

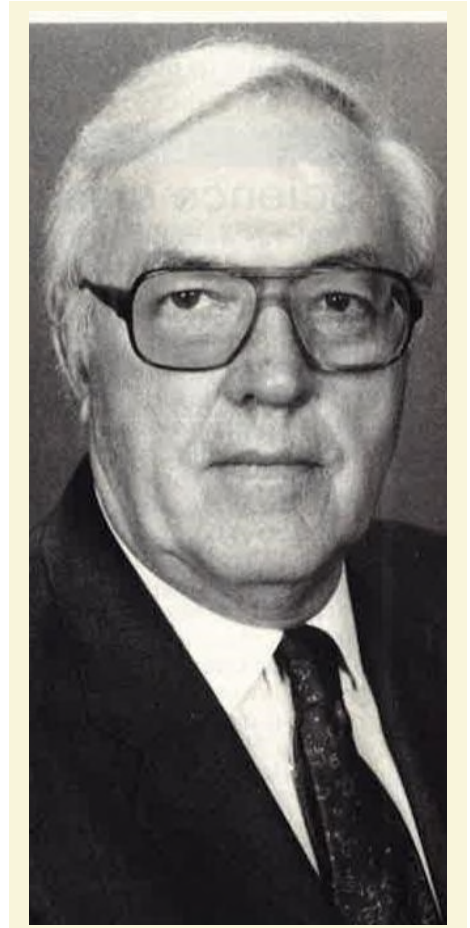
The mining industry is certainly not dead as was proclaimed a few years ago on the cover of *Business Week* magazine. I mentioned gold. The development activity with new gold properties is phenomenal. Large and small mining companies alike are developing new gold operations. This gold fever has put the entrepreneur back into mine development, which is certainly a healthy situation. New gold properties are being developed in every area of the Western world.

We know that gold prices are up.

In addition to price, the development of heap leaching technology has significantly reduced the cost of extraction. Heap leaching enables finely dispersed gold to be recovered with minimum capital investment.

New technological developments must occur in other sectors of the metals mining industry for North American mines to compete with third world mines, which have the advantage of cheap labor.

Same thing with coal. Coal prices today are lower than they were 10 years ago. This has forced coal companies to develop more efficient mining methods and to reduce costs wherever possible. When prices do increase, the US coal industry will be in a position



to take advantage of increased revenues and profits.

How about the comparative value of metal and nonmetal commodities?

In the developed countries of the world, industrial minerals values exceed metals values. Consider some figures from the US Bureau of Mines. In 1985, in the US, the value of raw nonmetals production was \$18 billion; the value of raw metals production, \$5.6 billion. A country is considered to be developed when the annual value of its industrial minerals ores exceeds that of its metal ores.

The future is bright for industrial minerals in the US, Canada, and Mexico. Most industrial minerals are functional. They are much more than just inexpensive fillers. Paper, for example, could not be color printed without being coated with kaolin or calcium carbonate. Plastic car bodies could not be produced without

The minerals industry faces some big challenges during the next few years. Among other things, we need to overcome high labor and environmental costs. We can do this by developing innovative and improved mining and processing techniques.

loading the plastic with an industrial minerals filler. The filler gives the plastic the resilience to resist high impact. Without the filler, the plastic shatters like glass. Paint, ceramics, ink, rubber, and many other process industries require quality indus-

trial minerals to make a satisfactory product.

Any comments about technology improvements in industrial minerals?

Innovative process technology has allowed some industrial minerals to improve quality and thus demand higher prices. For example, about 15 years ago, the kaolin industry developed the high intensity wet magnetic separator. This permitted the removal of significant quantities of iron- and titanium-bearing minerals. This, in turn, increased the whiteness and brightness of the product. Today, magnetic separation is a standard process technique in the kaolin industry, not only in the US but around the world.

Magnetic separation effectively increased kaolin reserves. The process allows marginal raw materials to be processed into quality products. It also permits US producers to make high quality products for export to Europe and

Science class, US army steer Haydn Murray to minerals

Murray was born in Kewanee, IL and grew up on a farm near Toulon, IL. As a high school freshman, he took a general science course and became interested in rocks and minerals. After high school graduation in 1942, Murray enrolled at the University of Minnesota, to study mining engineering.

Murray's father, grandfather, and great grandfather were farmers. His mother was an elementary school teacher. Murray is a Scotch name. As far as he knows, no one in his family had been associated with the minerals industry.

At the end of his freshman year at the U of M, Murray was drafted into the US Army. After basic training and an engineering studies program that was terminated, Murray was sent to Officers Candidate School. He graduated as a Second Lieutenant in the Corps of Engineers. Three days later he and his high school sweetheart were married.

As a member of an Engineering Aviation Battalion, Murray was stationed in New Guinea and later the Philippines. During that time, he became even more interested in geology as he investigated reefs and volcanic rocks.

After he returned to the US in 1946, Murray enrolled at the University of Illinois. In 1948, he was graduated with highest honors from there with a degree in geology and a minor in mining engineering. He followed that with a masters degree, specializing in igneous petrology, and a PhD, specializing in clay mineralogy.

Then, in 1951, Murray was hired as an Assistant Professor, in the Department of Geology at Indiana University and as the Clay Mineralogist for the Indiana Geological Survey. He taught clay mineralogy and sedimentology and investigated the clays and shales of Indiana.

In 1957, Murray joined Georgia Kaolin Co. as Director of Research. By 1962, he had risen to become Vice President of Operations. He was instrumental in expanding Georgia Kaolin's activities to include Wyoming bentonite as well as Texas bentonite, ball clay, and talc.

Under Murray's guidance, Georgia Kaolin conducted exploration activities in Mexico, South Africa, and New Zealand. New Zealand China Clay Co. was established and high quality ceramic kaolin and paper filler were mined and processed there.

In 1964, Murray was named Executive Vice President of Georgia Kaolin Co. He held that position until 1973. Then he returned to Indiana University as Chairman of the Department of Geology. He helped establish the university as one of the better training grounds for industrial minerals geologists. In 1984, Murray stepped down as Chairman of the Department of Geology, to devote more time to research and teaching.

Murray has received many awards and honors from various organizations. In 1976, he was named a Distinguished Member of SME. That same year, he received the Society's Hardinge Award for outstanding achievement in the industrial minerals field. Murray has also served on the SME Board of Directors.

Murray is the author of the chapter on clays in the third, fourth, and fifth editions of SME's *Industrial Rocks and Minerals* book. And he has written more than 150 articles, mainly on clays and industrial minerals. He has also worked as a consultant in many countries of the world evaluating and developing industrial minerals. ■

Japan. Technological developments such as this will help the US mining industry compete with the rest of the world.

What's ahead for mining?

The minerals industry faces some big challenges during the next few years. One challenge is the increased costs generated by governmental regulations. Many of the environmental restrictions placed on our mining industry have improved air, water, and esthetic values. But these same increased costs have placed us at a distinct disadvantage to many foreign producers. Again, what's needed to overcome high labor and environmental costs is to develop innovative and improved mining and processing techniques.

There is another challenge that faces the US mining industry. The public is not aware of the necessity and value of having a viable and profitable mining industry. Our high standard of living is largely due to our abundance of the necessary minerals.

These minerals are the basis of our construction industry, our process industries, our chemical industry, and our refractory industry, to name a few. We must educate the public about the need for mining and about its importance to their welfare.

We've mentioned some of the factors involved in the outlook for mining in the US. What about the international situation?

The international situation is more favorable for the US than it has been for many years. The low value of the dollar has helped the export situation. And fuel costs are low. So transportation costs have not escalated as they did during the 1970s. Even so, we should not rely on a weak dollar and low oil prices. We must depend primarily on domestic utilization to support our mining production.

US and Canadian labor costs are high compared with Mexico, China, Zaire and other underdeveloped countries. So we must continue to increase our productivity. Again, we must develop new and more efficient extraction and processing methods.

How best to approach this?

Government, academe, and the mining industry must work together to develop these new processes and extraction methods. We must develop more productive high capacity machines in order to lower the per-ton labor costs. There must be more communication among these three entities. We must lessen the mistrust that exists among them and together strive for a healthier mining industry.

Governmental agencies must provide seed money to develop innovative processes. Academe must provide research, facilities, and trained faculty and students. And industry must be the manager and provider. Industry must sustain and maintain these projects.

The federal government must provide legislation that will keep our mining industry healthy and competitive. Without a healthy mining industry, our standard of living deteriorates and our ability to defend ourselves is diminished.

Let's switch to SME.

SME is a healthy organization. We have not lost as many members as was anticipated. The downturn in mining over the past few years and our dues increase have not had as strong a negative impact on membership as we thought it might. That's encouraging. Our cost cutting actions have been beneficial too.

My goals as president are to focus on three areas we have been working on:

- To continue to implement our flexible meetings policy with specialty, topical, and regional meetings designed to take the Society to where the members are with timely and significant programs. In our initial year, we had two of these type meetings—in 1988 we plan to have four. I also plan to continue to push for ever increasing quality in all of our technical meeting programs, with special emphasis on the Annual Meeting.

- To continue with efforts to improve MINING ENGINEERING and

make it more useful to the membership.

- To develop more of a relationship with counterpart professional societies and institutes throughout the world.

- To strongly support continuation of the history and traditions of AIME and programs and activities that add to and utilize the strengths of AIME to advance the goals and objectives of the Institute and SME.

SME should be a catalyst to bring about better liaison between government and industry. And, under the leadership of past SME Presidents Bruce Kennedy and Al Weiss, we have established an international advisory committee. This committee must continue to focus on how we can interact and better communicate with foreign mining societies.

I believe we can get more student members to join SME. The membership committee should try to get more budding geologists and mining engineers enrolled as student members. These are the people we will need in the future.

What about your own experience as an SME member?

I joined SME as a graduate student and have benefited in many ways. I have heard many educational and stimulating papers. And I have benefited from the friendships, associations, and contacts that I have made over some 37 years of attending SME annual meetings.

For me, there is no other professional society that serves the needs of those in the industrial minerals field as well as does the SME Industrial Minerals Division. A professional in the minerals industry owes it to himself and to his company, university, or government to become associated with SME.

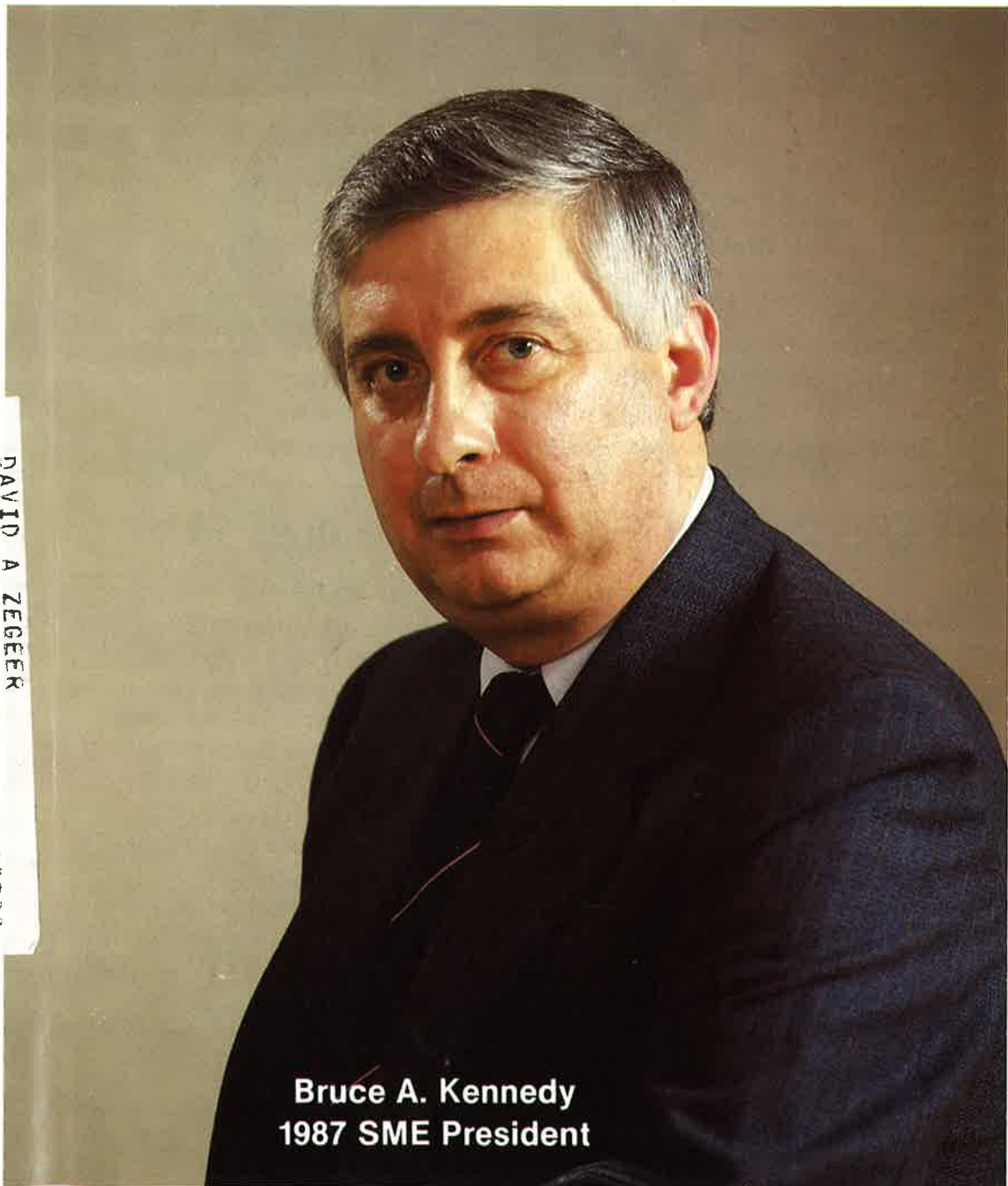
Mining Engineering, the preprints, and the books from SME all disseminate the latest technology and information of interest to the mining professional.

Becoming an active member of SME pays dividends. You get out of SME what you put into it. Over the years, I have put a lot into SME, but I have gotten back much more. ■

MINING ENGINEERING

MARCH 1987

A PUBLICATION OF THE SOCIETY
OF MINING ENGINEERS, INC.



Bruce A. Kennedy
1987 SME President

DAVID A ZEGER
625 TALLY ROAD
LEXINGTON KY

3604700
40502

Interview with Bruce A. Kennedy, 1987 President of the Society of Mining Engineers

Tim O'Neill, Managing Editor

How did you first become interested in mining? Could you tell us something about your career in the minerals industry?

Almost by accident. I was raised and educated in India and then England. I came back to England at the age of 11 to finish my schooling. As a teenager, I always had a leaning towards things mechanical, though engineering as a career concerned me since it seemed so compartmentalized — mechanical, civil, electrical and so on. I felt those fields were too narrow and confining.

By coincidence, one of our neighbors was the Chief Consulting Metallurgist for Goldfields of South Africa, based in London. In discussions with him, he pointed out that mining engineering encompassed many engineering disciplines and might be the answer. After a number of visits to mines and a great deal of research, my mind was made up.

There had been no mining tradition in our family whatsoever. Consequently, my choice of mining engineering raised quite a few eyebrows. Even in those days, the early sixties, the British were still very class conscious and associated certain industries and jobs with various classes. There was little doubt that many people in England looked down on mining, especially coal mining, which was the largest part of Britain's mineral industry. I was so interested and involved with what I was learning that those concerns went right over my head.

I was fortunate to be accepted by the Royal School of Mines, Imperial College of Science and Technology, University of London, the best mining university in

Britain. The Royal School of Mines was, and still is, heavily oriented to hardrock mining. A prerequisites for a mining engineering degree in those days was summer work in the industry. I managed to work in a British coal mine, a tin mine in Cornwall, and in a gold mine in the Timmins, Ontario, area of Canada.

Upon graduation, I joined the Anaconda Co. in Butte, MT, working in both the underground and open pit operations. Two-and-a-half years later, I was transferred to the corporate engineering-research group in Salt Lake City, UT. In addition to working in the US, my job also took me to Latin America, Mexico, Canada, Africa, and Europe.

Then, in 1971, Anaconda's Chilean operations were expropriated by the Allende government. I was part of the Anaconda team preparing responses to the Chilean government. However, it was all for naught at that time. I decided that it was time to seek other avenues of employment. For a number of years, I had been in communication with friends who worked for a company called Golder Associates, a geotechnical consulting firm. I joined Golder Associates in March 1972 to build a mining and geological consulting group to complement the existing geotechnical group. My 10-year involvement with Golder Associates was both a business and technical challenge, full of excitement and hardly even a dull moment.

Initially, I moved to Golder's Vancouver, British Columbia, Canada office I was to spend half of my time on mining/geotechnical projects and half my time on business development for mining jobs that would be the basis for

spinning off a separate office. Within a year or so, we had developed enough work to justify setting up a separate office in Seattle, WA. We did this in 1973 and then in 1978 I moved to Denver, CO, to start a new office there.



Golder's work was international in scope with jobs in such diverse places as Australia, Argentina, Bolivia through to Zambia. The breadth of exposure — business, technical, and cultural — in that 10 years was second to none.

I left Golder in late 1981 to become President of Thyssen Schachtbau of West Germany's US subsidiary. This company represented a different facet of the minerals industry, construction and contract mining, which I had not been involved in before. I was with Thyssen nearly three years and during that time, greatly expanded my knowledge and experience in many facets of business.

How did you come to join Asamera?

When I resigned from Thyssen, I ended up juggling a number of possible job opportunities. Asamera was searching for someone to direct its mineral activities and a close friend and fellow SME member passed on my name. I was looking for a job that was a real challenge and, in the current climate in the industry, it is rare to come across a company that wants to aggressively build its minerals component.

I am responsible for all aspects of Asamera's minerals sector from grass roots exploration, acquisitions, through to development and production and to the marketing and sale of the final products.

Our primary interest is in precious and strategic minerals. However, we are also looking at other mineral commodities.

With the increased use of composites, plastics, ceramics, fiberoptics, etc., have nonmetallics become more attractive targets than many metals?

I think that's quite true. There are a number of industrial minerals that are exceedingly interesting targets for an aggressive minerals company. Many of our own SME members do not realize how enormous and important the industrial minerals business is. It is interesting to note that despite the cyclical swings of the metals and coal industries in the past 10 years, the industrial minerals business has quietly continued to grow at a steady rate year by year.

Much of the US mining industry is still in sad shape. My impression, though, is that mining companies outside the US — Asamera is one example — view the long-term US mining situation, more favorably than do some US mining companies.

I believe that there is some truth to that statement. Asamera's attitude is very simple. We are a natural resource company — oil, gas, and minerals. It is our

A well conceived, imaginative, innovative, and obviously well managed exploration program must be the backbone of any successful natural resource company.

opinion that when times are bad in the industry, this presents an opportunity to acquire properties or companies that can be managed back to health in time for an upturn. This may be a contrarian view but has proved successful before.

The seemingly good marriage of capital and equity, oil and mining, in the US didn't work very well. But it seems to be working for Asamera.

We've been able to make it work so far and hope to continue doing so. When the major oil companies got into minerals they made a few classical mistakes. These included large and unnecessary overheads and a belief that money could cure any problem. Worst of all, they did not listen to their best technical people.

By comparison, Asamera works with an absolutely minimal overhead and has tried to use certain technical and financial support groups on a mutual basis among oil, gas, and minerals. There are many elements or geophysics, geology, economic evaluation, and country-risk evaluation, for example, that are common to both the oil and mining industries. Above all, one must never lose sight of the fact that people are the key to any success. It is therefore essential to build and nurture a first class team of professionals if you are to succeed.

It would appear that Asamera puts a greater emphasis on exploration for oil, gas, and minerals than many other companies.

That is quite correct. We start with the very basic tenet that if

you do not explore for natural resources, they certainly will not come seeking you out. Too many companies are very fickle with their exploration efforts and it is usually the first area to suffer in any cutbacks. A well-conceived, imaginative, innovative, and obviously well managed exploration strategy and program must be the backbone of any successful natural resource company.

Over the years, your professional duties have become decreasingly technical and increasingly managerial in nature. You have long been involved with various SME boards, committees, and task forces and consequently it has been difficult for you to attend technical sessions, for example, at SME meetings. Has it been difficult to stay technically current?

Yes, when you are in a managerial position it is always difficult to stay current technically. I believe, however, that it is imperative to do so. There are many ways to solve this problem. If you are in a senior management position, the key to a successful company is to hire the best team of technical people available. When you have a team around you with a world reputation for technical expertise, it is amazing how much of that technical knowledge rubs off.

Much of what you've done in your career has been economic and financial in nature. Do you have a degree in finance as well as engineering?

No I do not. However, I have been very lucky to have worked in a number of environments where I have had to learn those areas on the job. For example, at Golder Associates, a company totally owned and run by the employees, the company's success or failure had a direct effect on one's own pocketbook. This was a good incentive to learn the business and finance side of things.

Let's switch tracks a little. What about the state of the mining in-

dustry? Do you see much improvement in the next few years

I hate to sound negative, but I really do not see any dramatic improvement in the near-to medium-term. In certain specific areas, there is a lot of activity. However, many major segments of the industry will never recover. Professionals in the minerals industry are going to have to be far more flexible than they have been in the past and be able to tackle a much wider range of jobs. This will require a major change in the mental set of many of our colleagues.

What about the current oversupply of many commodities? Do you see that as being a long-term problem?

The supply of many mineral commodities developed in the 1970s, and I think the problem will haunt us for decades. That is why Asamera, for example, has no desire to be a single-commodity mineral producer. We wish to diversify our base. We are interested in having a large number of small to medium sized producers of different commodities. If one commodity is down, we hope others will counterbalance it.

Conventional wisdom has been that the amount of gold mined will have only minimal effect on price. With so many gold operations worldwide coming onstream, is that still true

A lot of people believe that gold, because of what it is, sells itself. This is a fallacy. Historically, there may have been less of a need to market gold. However, this is no longer true. Today, every commodity must be marketed in some way.

Gold supply figures do not show that much growth. Much of the new production is replacing production that is phasing out or is getting too costly. For instance, in South Africa, the largest free-world producer, some of the mines are exceedingly deep, approaching 4600 m (15,000 ft) in some instances. The deeper their mines get, the higher their costs

will be and the more difficult it will become for them to remain competitive. In addition, a volatile political situation could result in reduced mine production or in higher labor costs.

You are a longtime SME member. Your comments about the Society at this time.

There are some things that need to be changed and we will

must push forward with its goal to increase the international involvement of the Society. A great many of the new technological advances in the industry will be developed in other countries, where the mineral resources occur. For example, there is little doubt that advances in copper technology will occur in places like Chile and Zambia where the industry will continue to flourish. SME should be a part of that international picture.

International joint meetings, properly organized, are essential

There is no doubt the US mining industry is shrinking in size and I believe it will shrink further still. SME must push forward with its goal to increase international involvement with the Society. A great many of the technological advances in the industry will be developed in other countries, where the mineral resources occur.

be addressing some of these factors in the coming year. I think our current name, the Society of Mining Engineers, is very narrow and does not really represent who we really are. We not only represent mining engineers but also exploration geologists, mine geologists, mineral economists, mineral processors, metallurgical engineers — a broad spectrum of professional specialties. I think this fact must be recognized in our name and I much favor the proposed name change to the "Society for Mining, Metallurgy, and Exploration."

to technology transfer and exchange. Such meetings can be organized so there is not a tremendous cost to the SME. Our joint meetings in the past, for example with the Japanese, have been very successful and we are now looking at the possibility of a joint meeting with the Chinese in 1988. I think we should consider expanding such joint sponsorship of meetings to other areas such as Latin America.

Any other thoughts and comments about the current status of the Society?

We must never lose sight of the fact that we are a volunteer professional society whose success is directly tied to the input and involvement of its members.

We must also recognize the economic and business environment in which we are currently operating. It is essential that we trim our sails to fit this environment. At the same time, we must continue to provide services to our members, the most critical of which is the dissemination of technical information.

SME's membership base is in the US. Given the shrinking US mining industry, do you see continuing decreases in SME membership in the coming years?

I believe that if we are not successful in achieving a greater international thrust for the Society, we will see a continued decrease in membership. There is no doubt, the US mining industry is shrinking in size and I believe it will shrink further still. The SME



Presidents 1977-1986
VOL. 29 – VOL. 38

1986 SME President A. Tobey Yu

March 1986: VOL. 38 NO. 3 - A. Tobey Yu: SME can foster engineering innovation and creativity, help rally the mining industry

1985 SME President Thomas V. Falkie

March 1985: VOL. 37 NO. 3 – 1985 SME-AIME President Thomas V. Falkie urges creative marketing of mineral commodities, more financial sophistication

1984 SME President Frederic L. Kadey, Jr.

March 1984: VOL. 36 NO. 3 – 1984 SME-AIME President Frederic L. Kadey, Jr. Sees Industry Upturn, Urges More Member Participation

1983 SME President Louis Kuchinic, Jr.

March 1983: VOL. 35 NO. 3 – 1983 SME-AIME President Louis Kuchinic, Jr. Stresses Better Communications, Information Exchange, Long Range Planning

1982 SME President Dr. Maurice C. Fuerstenau

March 1982: VOL. 34 NO. 3 – Interviewing the 1982 SME-AIME President Dr. Maurice C. Fuerstenau

1981 SME President Alfred Weiss

March 1981: VOL. 33 NO. 3 – An interview with 1981 SME-AIME President Alfred Weiss

1980 SME President Nelson Saveringhaus, Jr.

March 1980: VOL. 32 NO. 3 – An Interview With Nelson Severinghaus, Jr. SME-AIME President Outlines Directives for the Decade

1979 SME President Robert Stefanko

March 1979: VOL. 31 NO. 3 – An Interview With 1979 SME President Robert Stefanko

1978 SME President Robert S. Shoemaker

March 1978: VOL. 30 NO. 3 – An Interview With 1978 SME President Robert S. Shoemaker

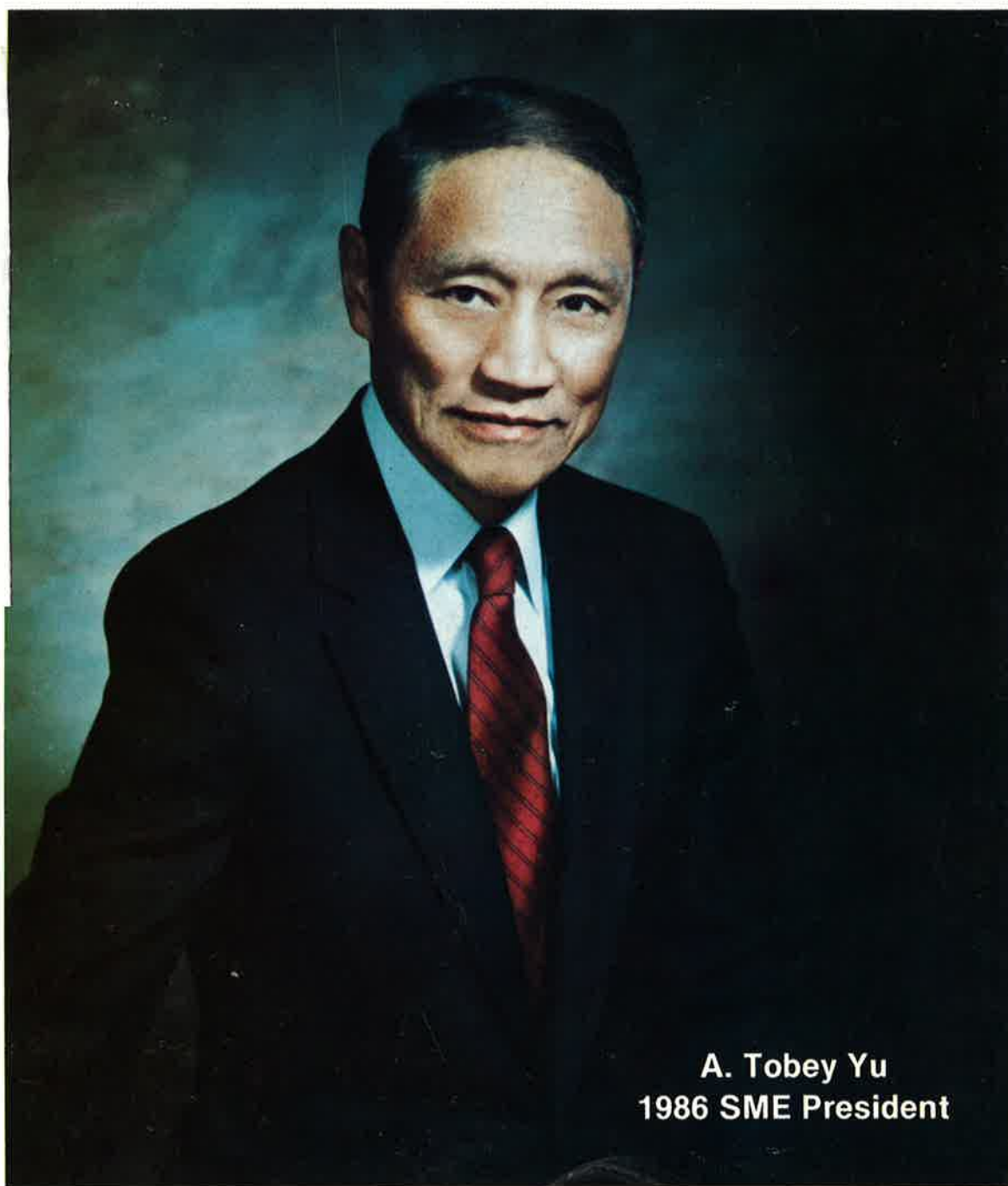
1977 SME President Donald O. Rausch

March 1977: VOL. 29 NO. 3 – An Interview with 1977 SME-AIME President Donald O. Rausch

MINING ENGINEERING

MARCH 1986

A PUBLICATION OF THE SOCIETY
OF MINING ENGINEERS, INC.



A. Tobey Yu
1986 SME President

5604/00
LEXINGTON KY

MAR 25 1986
40502

A. Tobey Yu: SME can foster engineering innovation and creativity, help rally the mining industry

Tim O'Neil,
Managing Editor

It appears we are seeing permanent shrinkage in some sectors of the US mining industry. Your thoughts.

Shrinkage yes, but I seriously doubt its permanency. Let me give you some of my thoughts.

To put matters in perspective, the recent recession was not an accident. It was a direct result of overexpansion during the past three decades. Triggered by the post World War II recession, this virtually unchecked growth was later fueled by the belief that the world was about to run out of many essential materials. In fact, the worldwide annual economic growth rate of 5.7% in the 60s, dropped to 3.6% in the 70s, and 2.2% since 1979. Meanwhile, billions were spent to build mammoth plants and facilities, not only in mining. The overexpansion has resulted in an oversupply of virtually everything—oil, farm products, all sorts of commodities, even high tech goods, such as computers, television sets, VCR's — you name it. According to Brookings Institute, the US now has its largest unused production capacity since 1930.

The problem is compounded by the mounting debt of the Third World countries. They need to pay for the debt by pumping production in spite of the drop in metal prices — 15% in 1984 alone. For example, in 1980 copper sold for \$3.33/kg (\$1.50 per lb). Copper is now down to about \$1.33/kg (60¢ per lb.). But, during that time, Chile's copper production increased 80%.

The US is also hurt by low-grade ore bodies, high labor costs, and a regulatory infrastructure that



Third World countries do not have. Also, the US business system emphasizes quick returns by maximizing short-term bottom line profits; a built-in myopia you might say.

So, it is not a pretty picture.

We are in an economic trough. We may be there a little longer. But overcapacity will be gradually eliminated. This should bring supply and demand more closely into

balance. And, in the cyclic industry that is mining, we should ultimately see the need for more raw materials. Though these cycles seem inevitable, their timing and duration are impossible to forecast.

Meanwhile, maybe the Federal Government should be helping distressed industries like mining. It helped Chrysler. It helps regions hit by natural disasters.

Short-term protectionist measures might provide a breathing spell while the mining industry works to correct its problems.

The mining industry, though small in numbers, affects many other areas. This Administration, for example, is keen on not weakening the country's defenses. Strategic and critical minerals, even base metals such as copper, iron, and steel, are important for the defense industry. Is it safe and realistic to consider importing our

proach is to accept the fact that the fate of the minerals industry is in our own hands. We can make things happen. We can be instrumental in making things turn around.

Speaking of technology, basic research is its foundation. Unfortunately, Washington's budget priorities have continued to weaken our technology in this regard. As citizens and as those who really understand the significance and importance of basic R&D, should

Professional groups like SME foster needed engineering innovation and creativity. SME can help rally the minerals industry. That will be one of my chief messages as president.

supplies and minerals needs? I don't think so.

You are a worldwide traveler. Respond to this. Seems to me the US mining industry is less inventive and less willing to adopt and adapt new — or even proven — technologies than are some other countries. I cite, for example, ventilation technology in South Africa, coal technologies in Germany, Swedish equipment advances.

We have a huge human resource pool, thanks to the worldwide "braindrain" to the US and the education we can provide people. It defies logic how we can lag behind other countries in technology. Clearly, complacency has taken its toll! But a little adversity toughens the soul. Bad times often stimulate new ideas, new approaches; particularly, history shows that we as a nation seem to thrive and excel in crisis.

What made our nation great is our ingenuity, creativity, technology, and pioneering spirit. We have lost some of that spirit. We need to reevaluate our priorities. There is more to this country than just "self" and "here and now." Individually and as an industry, we need to take the long view. We also should remember that pervasive pessimism feeds itself and will only make things worse!

Professional groups like SME foster needed engineering innovation and creativity. SME can help rally the minerals industry. That will be one of my chief messages as president. Really, the responsive and responsible ap-

we not be still more active in the political process and do our share in persuading our legislators?

I might mention here that Orba's experience was similar to what has happened in this country. Our business was good. For a number of years, work rolled in. We did not have to do any marketing. We were complacent, spoiled. We were profitable, but we could have done better had we lived leaner and worked harder on business development.

Shortly after we opened the door for business, in three years Orba grew from three people to more than 150 people. Then, we lost a major contract and had to lay off some people. When the coal boom subsided, we really had to scramble. We were not all that invincible after all. As I say, in many ways our experience reflects the industry and the country.

Tell me about Orba, how it got started and what it does.

In a sense, Orba was born at the foothills of the Andes in South America. I was technical director for the Cia Minera Sante Fe iron ore operation in Chile. We had our own mines, plants, railroads, and ports. We also had what was at the time the world's longest overland belt conveyor system — 13 km (8 miles) long. Later on, we even had our own ships. The grade of ore was so good we shipped it to virtually every steel mill in the world.

We had people from all over the world selling equipment to us. But when we had a problem and asked

these people for help, no one was interested. Their reason for being there was to keep their factories busy. So we had to solve our own problems.

I thought, if we have certain problems, others must have similar problems. I also thought that someday someone ought to form a company dedicated to helping people move bulk materials efficiently and cost effectively. Whatever it would take — problem shooting, designing, building, operating. A company should be able to furnish the full range of services in this narrow niche. That was the concept behind Orba.

Then what?

In the early 1970s, I went to Columbia Business School. I met two gentlemen, one a brilliant business strategist and then an SME member, the other a financial genius. We decided to form a company after we finished school.

We brought our idea to *Fortune's* Business Hall of Famer Royal Little, who made the \$16 million Textron company into a multi-billion dollar enterprise. He liked our business plan and encouraged us to proceed with it. In 1972, Orba — the first company dedicated solely to full service in bulk materials handling — was formed. Little bought 50% ownership of the company, in return for providing financing.

Remember this. Once geology is done, mining is basically an earth moving proposition. In fact, whether ore is economic depends on whether you can economically break it, move it, and process it. And for each dollar spent on raw or processed materials, 50 to 70 cents goes for handling and transportation. Orba is dedicated to helping people reduce that cost.

We also operate three coal transshipment terminals. They have a combined throughput capability of some 22.7 Mt/a (25 million stpy). That makes us one of the largest operators of coal transshipment facilities in the world.

Let's talk about SME. Any objectives as president?

Mining is severely affected by world events and recession. I see our members suffering and feeling depressed; some to the point of losing perspective, faith, and even

hope. I would like to meet and talk with them, rationalize with them, tell them this is by no means the end of the world. I would share with them my realistic assessment and reasons for optimism.

As a 27,000 member society, we have people of diverse backgrounds and often conflicting visions or issues. With what I have been through in my life and career, I would like to make maximum use of my own truly diverse experience to help reconcile any differences and get us to work together for the common cause — making the Society better and ever more capable of serving our members. In fact, this very diversity provides us with a greater wealth of talent and strengths. If properly channeled, these can do all of us a great deal of good in reaching our common goals.

SME Directors and Officers have dual and sometimes conflicting responsibilities; to maintain and enhance SME's leadership role in technology; and to manage SME's funds in a business manner, to ensure its long-term financial viability and stability.

SME enjoys an excellent reputation. In these difficult times, it

needs continued strong leadership to fulfill these dual responsibilities. As SME's President, I would like to do my share to help foster and encourage our technological advancement — one of the keys to get our industry going again. But we must not jeopardize the soundness of SME's financial status as a going concern and a sound, lean, and effective business entity.

What about the future of SME?

I am very bullish in spite of current problems and setbacks. We have loads of talented and dedicated people. The key of course is how we can pull all this talent together and manage it the right way. It is not going to be easy for a volunteer organization. It is a true challenge and also an opportunity for us.

Let's back up a little. How did you come to be an SME member?

I did not get my academic training in mining and geology. In fact,

when I started work at the Sante Fe projects in Chile, I didn't even know the difference between a hematite and a magnetite.

On vacation and any spare time I had, I read as many mining books as I could. But you can only absorb so much from books. The solutions to many operating problems cannot be found in books. I needed contact with talented, experienced mining people. SME was identified to me as the appropriate entity. So, in 1960, I joined.

Sometimes it is difficult to tell a person: Join the Society, take the time, attend the meetings. The rewards exceed the costs and time commitments involved. Have you found that to be the case?

Absolutely. One of my first company assignments in the mining industry was to evaluate several types of mining shovels we had to buy. I knew nothing about shovels. Books and vendors helped. But my best teachers were those people in the Society.

Summer job leads Tobey Yu into a materials handling career

Orphaned when he was very small, Yu was raised in China by American Methodist missionaries. "I don't remember exactly what they taught in Sunday school or what they preached in church. One thing, though, has lived with me all these years. I watched these missionaries leave the comfort of their homes in the wealthy nation of America to go to another country, a strange and sometimes hostile environment. These missionaries put up with hardships because they dedicated themselves to a mission, for a cause.

That missionary zeal influenced a lot of people, including me. So I believe in doing something for SME and for the world, however little this achievement may be. If everyone contributed just a little bit, it would be a much better world."

While in China, Yu was picked as one of 700 students to come to the United States for an education. "It happened toward the end of World War II. Chiang Kai-shek wanted to rebuild China after the war. President Roosevelt saw empty classrooms in this country. And he realized the probable pro-American feeling of Chinese students educated in this country.

There was a public examination which several thousand students took. I was one of those fortunate enough to pass. The exam was a mix of technical and humanities topics.

After the war, the Bamboo Curtain dropped on China. We could not go home. That was disappointing. Matter of fact, my degrees were in mechanical and civil engineering. I had hoped to use these to help rebuild my homeland.

"I stumbled, you might say, into the materials handling field. I was teaching at New York University,

in the engineering school. At my summer job, I looked at some drawings from Hewitt-Robins of a traveling stacker, a traveling shiploader for a Brazilian manganese operation. I thought, gosh, this fits perfectly with my educational background. It involves structural and mechanical training."

So Yu applied for a job with Hewitt-Robins. And thus his entry into mining. "At the time, Hewitt-Robins did a lot of work for the mining industry, for the steel industry." Yu was promoted to vice president of operations for Hewitt-Robins before forming Orba.

Orba cofounder Yu is now chairman of the company. And for more than 30 years, Yu has been active as an educator, engineer, and manager in mining, processing, transportation, and materials handling.

Under Yu's direction, Orba and the companies he has worked for have designed and built more than 200 projects. These include the world's first modular iron ore beneficiation plant and the first modular shiploading system. Other projects include a patented system to modernize pocket docks and the first massive, western coal transshipment facility at Superior, WI. Orba has received six national engineering achievement awards.

Yu received his MS in engineering from MIT, his PhD in civil engineering from Lehigh, and his MBA from Columbia. Yu has authored and co-authored more than 150 publications. And, in addition to his NYU teaching, Yu also taught at Cooper Union. Yu is a licensed professional engineer in five states. Yu is listed in Who's Who in Finance and Industry, Who's Who in the East, Who's Who in Technology, and Who's Who in the World.

When we had a problem with impurities in the ore, SME's member friends were instrumental in steering us to the right labs to have our samples tested as well as to the right ore processing experts to advise us. Some may say, "I see the value of pining the Society and attending the meetings, going to the technical presentations, and making contacts. But I really don't see the value of taking the additional time to become involved in the infrastructure of the Society itself. I'm not sure that it is cost-effective or professionally time effective."

When you are involved with the Society's work, you gain much greater exposure to influential mining people than can be had by simply attending the meetings. You establish better rapport with your contacts. Then, in time of need, you have a much larger pool of talent to tap. These contacts provide their own Insights and, often, direction for other contacts to help with your problems.

Involvement in SME activities also provides company exposure. I often tell people, you never know where business comes from. That's very important. Though maybe not immediately apparent, active participation in SME is both time and cost-effective.

When I first started my own business, I went to see Charles Brinkerhoff for advice. This well known and respected mining leader literally roiled out the red carpet. In spite of his busy schedule, he spent a whole morning with me giving me a complete rundown of who's who in the mining industry.

That surprise you?

Of course. He was so kind, so helpful to me. He introduced me to many other heads of mining companies. I would never have expected that. I could name many other SKS: members who were equally helpful and generous within their time.

Other SME items. Any thoughts on a dues increase?

I have mixed feelings. Like most businesses, SME has experienced considerable belt tightening the past two years. There have been budget and staff cuts. This will continue in 1986.

At the same time I recognize that many SME members and their companies have also gone through difficult times the past few years. Even so, it has been six years now since dues were increased. Inflation and the ever increasing cost of running any business would seem to indicate a possible increase at some point.

What about the need for SME to thrust itself more internationally?

Mining is becoming more and more international in scope. Obviously, then, an international thrust for SME would help. It respond to

For the future, I see more emphasis on a systems approach by operators and engineers, with ultimate goals in mind. There will also be continuing ecological concern.

the needs of the members. It would also allow a better exchange of ideas with mining counterparts in other countries.

Mining is historically an international game. It used to be that mining engineers, once graduated, worked for awhile outside the US. I would not be surprised to see that job pattern reemerge.

Any comments on SME programming?

I feel strongly about good quality SME programming. I have worked on Society programming committees. The heart of the Society's business is its programming and a lot of effort goes into it.

Still, there is room for improvement in the quality of papers if we want to maintain our status as the leader in the minerals industry. I think we have put too much emphasis on paper quantity, not enough on paper quality. The program coordinating committee is a step in the right direction.

Sometimes the criteria for technical presentations are not adhered to. The papers may be too

long. The accompanying graphics material may be inadequate for reproduction and presentation.

You are a member of other professional societies, how does SME compare?

Very well, in many respects. For example, I often tell others that SME's staff functions like a well oiled machine. Everything runs like clockwork.

SME paper quality is in the midrange, better than in some societies, not as good as in others. Some professional societies screen their meetings papers and attendant artwork, I don't think we need to screen slides and drawings. But I have often seen slides that were unreadable when projected. Their quality is sometimes not all that it should be. It is a difficult problem in a volunteer organization like ours.

I remember one professional organization invited me to give a talk. I became indignant, though, when they wanted to screen my slides. I felt it was an insult. But that was the organization's procedure. In fact, the organization wanted to charge me for screening my slides.

You have 30 years experience in materials handling. Some of the changes you have seen.

The dramatic increase in size and capacity. When I started, a 0.9 m (36 in.) wide conveyor was a good sized belt. It would run at 1.5 to 2 m/s (300 to 400 fpm) and deliver 907 t/h to 1.8 kt/h (1000 to 2000 stph). Today's conveyors can deliver up to 36.3 kt/h (40,000 stph). Coal conveyors can deliver up to 10 kt/h (11,000 stph); iron ore conveyors, up to 30.5 kt/h (30,000 stph). Conveyor speeds of 5 m/s (1000 fpm) are common. Conveyors in Germany reach speeds of 10 to 15 m/s (2000 to 3000 fpm).

Storage pile sizes have also increased. At the Superior, WI, terminated two Springs ago, we had close to 3.6 Mt (4 million st) of coal on the ground. I think that was the largest ever single stockpile of coal. In Japan, there is a coal silo with 136 kt (150,000 st) of storage capacity.

Automation is also of note. Years ago, sequential interlock for bulk materials handling was state-of-the-art technology. Today we have

microchips and programmable controllers. One operator in an air conditioned control room can run an entire plant and diagnose faults without having to step out of the control room.

Computers are obviously helpful in modeling, operations, and maintenance. With continuing computer evolution, capabilities here are virtually limitless. We shall see, perhaps, even more dramatic improvements in the future.

What of the future?

I see more emphasis on a systems approach by operators and engineers, the ultimate goals in mind. In the past for example, engineers and operators sometimes liked to view the hardware as a new and intriguing toy. With a systems approach, the hardware is only justified if it serves an economic purpose. Simple rather than state-of-the-art hardware may better serve a given operation. A simple component may be easier to design, build, and maintain — more economical in the long run.

There will also be continuing ecological concern. When I started in mining, ecology was not an issue. Operations were smaller. There was not that much earth to be moved. The environmental factor had not yet come to the fore. Now, whether mine or transshipment facility, you must be aware of clean air and clean water. Dust prevention and control as well as leaching and drainage problems must be addressed.

Dust control for example, does more than comply with agency regulations and improve the appearance of an operation. It aids in the welfare of the operator and, on occasion, conserves valuable product by minimizing losses.

What else, for the future?

Shore-based unloading rates must catch up to ship loading rates. We have noted that you can load up to 30.5 kt/h (30,000 stph) for iron ore, 10 kt/h (11,000 stph) for coal.

By comparison, on the Great Lakes, self unloaders routinely unload at 9 kt/h (10,000 stph). For shore-based equipment, the best unloading rate is only about 1.8 kt/h (2,000 stph).

The whole bulk materials handling world is working on this problem. The technology is available. It is a question of economics. No one has been able to build a machine that can economically unload a ship front shore at rates comparable to loading equipment.

We have mentioned real. What is the effect on the US export market of a lack of deep draft port facilities?

There was a detrimental effect on export volumes during the 1979 and 1981 crisis. We were not able

Shore-based ship unloading rates must catch up to ship loading rates. The whole bulk materials handling world is working on this problem. The technology is available. It is a question of economics.

to respond to world coal needs during that time when crises developed for other suppliers in Australia, Poland and South Africa. At one time, if you recall, there were more than 200 ships off the East Coast waiting to load coal.

But, even with deep draft ports, we would not have been able to adequately respond. Many of these ports were built earlier without using a systems approach. They could not have handled the traffic.

For example, at the time the Norfolk, VA, terminal had the fastest, shiploading capability. They had two shiploading towers. Each was rated at 9 kt/h (10,000 stph) for coal — the highest in the world. Yet Norfolk had to trickle coal into the holds of ships when blending was required. At best, Norfolk was able to average 1.8 to 2.7 kt/h (2,000 to 3,000 stph).

The port at Norfolk was built in the 1950s without considering the entire materials delivery chain. There was no ground storage. The port was viewed as just a link between the railroads and ships. There was no consideration given to the materials storage, processing, or distribution functions.

However, the overall loading problems for export coal have been resolved. And there should be no problem in the foreseeable

future. We have built many good, and currently under utilized, port facilities along the east coast and the Gulf. Plus, right now, our export coal is often too expensive to be competitive.

There has been discussion about how many deep draft ports we need, where they should be located, who should have governing responsibility. What do you think?

That is a can of worms. I am a member of the American Association of Port Authorities. They have debated this issue. Much has been written. I am not sure we want to

get into that. Let us just say that subject is still under discussion.

Though pipelines have some cost advantages, the railroads have been able to squelch any growth in that area. But what about the pneumatic Tube Express for conveying material. Has that concept ever gotten beyond the prototype stage?

No it has not, unfortunately. At one point, there was almost a deal with US Steel. But US Steel got cold feet and the deal fell through. So a customer for this technology is still being sought. The technology of the pneumatic tube has many merits. Here again, the question is economics.

A curiosity question Orba gets involved with projects outside the US. Are different languages a problem in these technical projects?

No, I don't think so. I think engineering itself is a universal language. So is the numbering system. Obviously, knowing the language helps you understand people and their cultures. Also, we do have a multi-lingual staff which does help when needs develop. •

MINING ENGINEERING

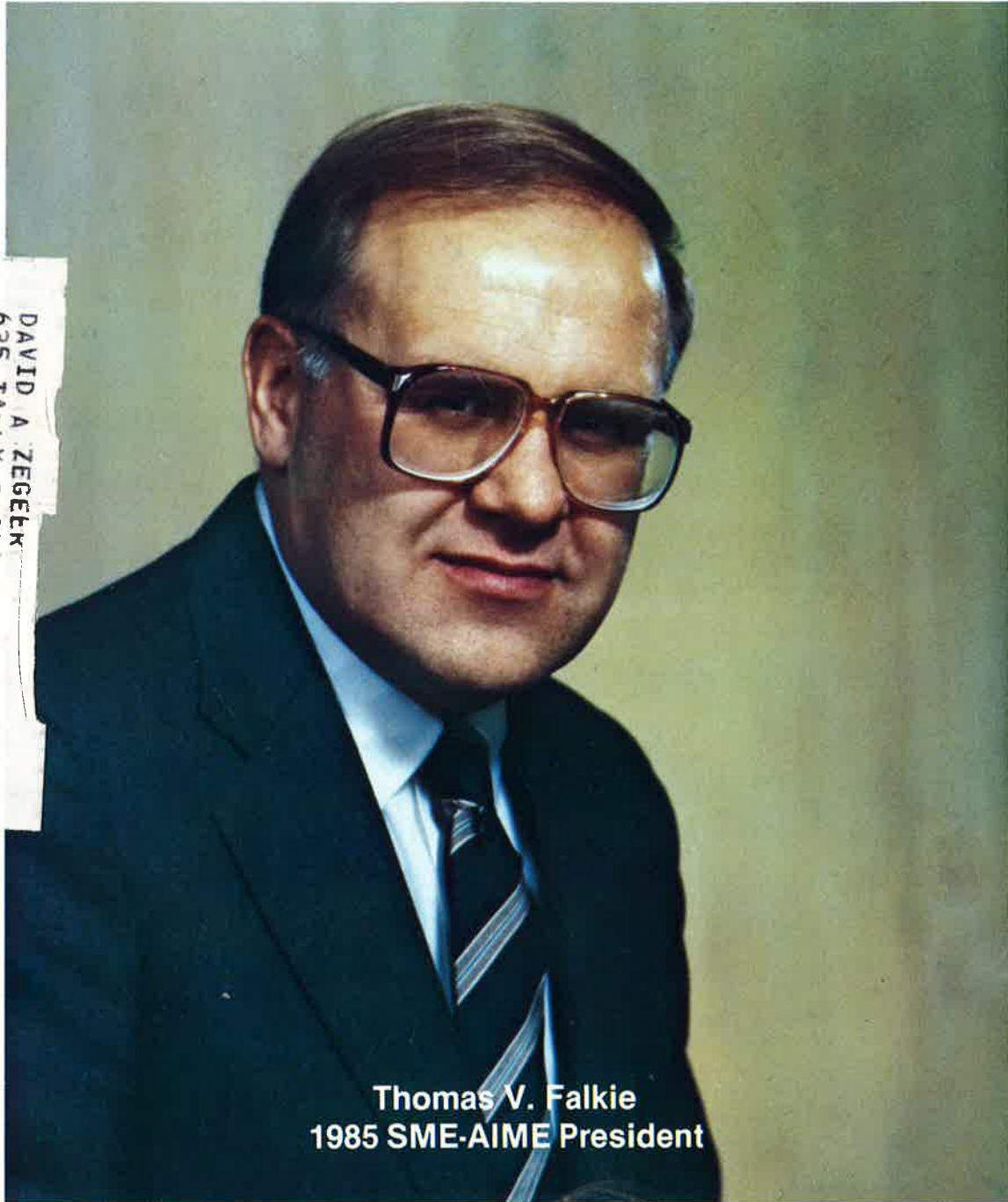
MARCH 1985

A PUBLICATION OF THE SOCIETY
OF MINING ENGINEERS OF AIME

DAVID A. ZEGLER
625 TALLY ROAD
LEXINGTON KY

3604700

MAR 30 1985 02



Thomas V. Falkie
1985 SME-AIME President

1985 SME-AIME President Thomas V. Falkie urges creative marketing of mineral commodities, more financial sophistication

Tim O'Neil, Managing Editor

**Let's start with your assessment of
the minerals industry.**

Mining is a cyclical business. The ups and downs are usually rather severe. Mining people tend to be overly optimistic when times are good and overly pessimistic when times are bad. Right now, for many, times are bad. But we must be careful not to overgeneralize here. Things are not bad in all sectors.

I don't want to preach doom and gloom. Too many people are doing that. Look at the (Dec. 17, 1984) *Business Week* article, "The Death of Mining."

Keep in mind a lot of businesses go through these shakeouts from time to time. We have seen this in the steel industry and to a certain extent in the automobile business. Autos have recovered; steel has not — yet.

Mining people tend to be overly
optimistic when times are good and
overly pessimistic when times are bad.

By the same token, I do not want to be overly optimistic about what is going on in the mining industry. These are tough times. The industry is not going to be the same in the future as it was in the past. Some mines that have closed will probably not open again in my lifetime. The domestic mining industry is going to face a lot of competition in the next few years.

**Anything the minerals industry can do to reduce the
severity of its cyclic swings?**

There's no clear cut answer. Mining has become even more capital intensive. And mining companies can no longer finance mines from internal cash flow. The sheer complexity of government regulations and the logistics of developing a mining property require many years. These factors will tend to smooth out the cycles somewhat.

But the developing countries are operating with a different set of rules. Because they start and run their mines for reasons other than return on investment, they tend to worsen the cyclic swings.



What about jobs in mining?

Job opportunities in the minerals industry will vary among mining sectors. However, in my opinion, the next few years will be rather flat in total. Increased coal and industrial minerals production will come largely from existing mines. Metals mining, obviously, does not show great promise in the near future.

That doesn't mean there won't be jobs, however. Retirees will have to be replaced. And the mining industry will need to improve its technology, to remain competitive.

This means that SME members must keep up with advances in technology, information, and management. They (and the industry) are going to have to become stronger in finance, marketing, and international capabilities. There will be more international joint venturing using our technology and management know-how.

SME has a definite role to play in all of this with its continuing education efforts, meeting and convention programs, and publications.

The industry has been accused of not adapting to new technology.

That's not so. The industry uses whatever technology is available. It's true there haven't been a lot of dramatic breakthroughs. But the minerals community deserves more credit than it gets for technology development.

In the past 15 years, there has been notable progress in mining, processing, geology, and extractive metallurgy. And SME has been a leader in disseminating the technology through its programs, publications, and continuing education efforts.

And what of the mining schools?

As we have learned over the years, the prosperity and health of our mining schools tend to be cyclical too. I hope I am wrong, but it appears there is going to be a shakeout of mining schools over the next several years. SME is concerned about this. We may not be able to prevent it from happening, but we want to make go-no go and curriculum decisions based on facts, not fiction. We want the schools to be high quality.

We are paying increased attention to our mineral schools. First, we have beefed up our mechanism for watching over the accredita-

tion process and thus the quality of our schools. Secondly, we now have an education coordinator on SME's staff. She acts as the focal point for the Society's education activities.

If nothing else, schools, industries, and government agencies now have a person to contact regarding problems, data, and information relating to the mining education community. The education

Job opportunities in the minerals industry will vary among mining sectors . . . But that doesn't mean there won't be jobs. Retirees will have to be replaced and the industry will need to improve its technology, to remain competitive.

coordinator can initiate appropriate action with SME's staff, divisions, committees, and Board of Directors.

The outlook for mining students?

It is no secret that there are now fewer jobs for new graduates. In previous up-and-down cycles, supply and demand alleviated shortage and oversupply problems. There is some evidence that mining school enrollments are now dropping. This means that supply and demand will converge in the near future. It's a good news, bad news situation.

Would you tell your son or daughter to pursue a career in geology, mining, or metallurgy?

Yes I would. The minerals industry is an exciting field. I wouldn't trade mining for anything else. But I know that some of my colleagues will have a different viewpoint on this.

We'll talk about your field, coal, in a moment. But first, if you would, any further comments on industrial minerals?

Each industrial mineral is sensitive to its individual sector of the economy. Some are doing well, others are not. Because they are market oriented, industrial minerals producers must constantly develop new uses and markets. For example, lithium producers have high hopes for lithium batteries and increased use of lithium in aircraft.

The marketing orientation of industrial minerals — could that sort of specificity be applied to coal or metals?

To a certain extent, coal already is market oriented. In the past, many of the metallurgies have been commodity oriented and have marketed themselves.

We now need a little different orientation, in this era of excess supply. We need to be concerned with marketing and end-use products. And we need newer approaches in the financial end of the business as it pertains to marketing.

Any additional comments about the metals producers?

Metal mining companies face two different types of problems. Downsizing, substitution, and recycling have combined to slow the growth rate for many metals. And domestic producers face severe competition from developing countries. These countries sometimes have better ore bodies, always have cheaper labor, and are often subsidized by their governments. They make the rules to their own advantage, even if their mines don't make a profit. They also have different approaches to government regulations. In addition, the dollar is overvalued. This hurts us as exporters and encourages importing.

A shakeout is underway among domestic metal mining companies. I am not as pessimistic as many in the minerals industry. I think the metals "recession" will end — probably in the late eighties or early nineties. Then we will again have a strong, viable metals mining industry in this country. But it will be restructured and probably smaller.

Okay, how about the coal business?

On the negative side, there is overcapacity. There are fewer metallurgical coal markets. And there is increased foreign competition for overseas markets. There are also concerns about the high value of the dollar and worries about railroad freight rates.

On the positive side, coal use by electrical utilities and industrial users is increasing. Worker productivity has been increasing. In addition, we continue to see improvements in the technology of coal mining, processing, and use. There has also been progress in worker health and safety as well as environmental control. US coal production achieved a record high in 1984.

The coal export market?

In 1984, an estimated 72 Mt (79 million st) of coal was exported from the US to Canada and overseas. That's off from 100 Mt (110 million st) of exported coal in 1981.

There are several reasons for the decrease. The strong dollar makes us less competitive in anything we export. And the US coal industry has some real competition from countries like Colombia, Canada, South Africa, Australia, and Poland. Also, the costs of getting the coal to our ports have been going up.

We probably will not have much growth in coal exports until the 1990s.

Would more deep draft ports help US coal exports?

They would help, but right now they are not a major factor. I mentioned the strong US dollar. That is the major factor limiting export growth for the short-term. Some countries can produce coal more cheaply than we can.

What about western coal producers. Can they compete domestically and in the export markets?

For the near future, it will be tough — but not impossible — for them to compete on the export

Tom Falkie: A diverse and distinguished career

Since 1977, Tom Falkie has been President of Berwind Natural Resources Co. in Philadelphia, PA.

From 1974 to 1977, Falkie was Director of the US Bureau of Mines, US Department of the Interior, in Washington, DC.

From 1969 to 1974, the new SME President was Professor and Head, Department of Mineral Engineering, The Pennsylvania State University, in University Park, PA.

From 1961 to 1969, Falkie held various technical and managerial positions with International Minerals and Chemical Corp. in Illinois and Florida.

Falkie received his BS, MS, and PhD degrees in mining engineering from Penn State University.

Falkie is a Distinguished Member of SME. He has served on the Board of Directors of both SME and AIME. He was an AIME Vice President from 1977 to 1979.

Falkie was a Henry Krumb Lecturer in 1977. He has authored many publications and made many presentations on minerals and energy topics.

Falkie was born in Mt. Carmel, PA. He and his wife, Jean, live in Newtown Square, PA. They have five children. Falkie's son, Tom, is a member of SPE of AIME.

But for a college scholarship from his father's sometime adversary, Tom Falkie could easily have wound up in a career other than mining. Though Falkie grew up in a mining family, his own future in the minerals industry was anything but a given, at the time.

Falkie's father was a coal miner. He mined anthracite coal in Pennsylvania and was active in the United Mine Workers. But the anthracite industry was experiencing what some mining districts are currently going through — no jobs.

When Falkie was in high school, he had a good academic record. But, as graduation approached, Falkie's father did not have a job. So Falkie, desperately wanting to go to college, applied for whatever scholarships he could find.

Eventually, Falkie managed to get into the running for a scholarship from the Reading Anthracite Co.

Years earlier, Falkie's father had worked for an affiliated company as a miner. He had also been the head of the mine's union committee. And Ed Fox, a past president of SME, was mine superintendent at the time. Falkie said that his father and Fox "would fight like cats and dogs."

By the time Falkie was competing for Reading Anthracite's scholarship, Fox had become president of the company. Falkie was picked as one of the finalists for the Reading scholarship. He remembers his father telling him he didn't have much chance of getting the scholarship. "The way I used to fight with Ed Fox, don't be disappointed if you don't get the scholarship," his father said to him.

But Falkie did indeed get the scholarship, "And that's why I went into mining." If Falkie had gotten a scholarship in some other area, he says, he would have taken it. "Ed Fox was a big man and I'm eternally grateful."

"You have to remember the mentality of the miners in that economically depressed area. They would work one day, but maybe not the next. If they were laid off, they might get jobs for a short time at another mine. But that mine might go out of business, too.

"So all through high school I had it beaten into me to get away from the mines. I got that from my dad, too. 'Find something else to do, go to college, pick a different career.' But that mining scholarship was the best thing that ever happened. Now, I can't imagine myself being in a different career."

As noted, Falkie has had the good fortune to have had a number of high level jobs in industry, government, and academia during his professional career. Though not many people have those kinds of opportunities, it has not been all gravy.

Moving was a pain and sometimes the pay was less than overwhelming. "Some of those jobs weren't all that monetarily lucrative, like the university job and the government job," Falkie says. As for the moving. "Sure, it was a hardship for my family and me. But moving is part of the mining business. Most of us have moved around a number of times."

"But I'd do it all over again. And I'm glad I stayed active in SME-AIME." ■

market. But domestically, they can ship competitively to the Midwest, the West, and some of the South. Though Western coal has slightly lower Btu values, mining costs are often lower than for Eastern coal. One big thing for Western coal producers is to get their transportation costs under control.

Why does the Interstate Commerce Commission seem to have such a consistent bias against coal producers. Is the railroad lobby that strong?

The overall picture for coal?

I think the coal business will grow slowly for the remainder of the 1980s, then take off again in the early 1990s. By then, few new nuclear power plants will be coming onstream in this country.

In the 1990s, growth in the economies of the world should be such that oil prices will start to go up again. Plus — and even the economists aren't sure here — the value of the dollar can't stay as high as it is forever. I figure these three factors will work together and we will

Governmental and regulations.

laws

No one can argue against the concept of health and safety or environmental laws. But we do argue against adversarial regulation. Such misdirected and sometimes unnecessary regulations detract from needed mandates. And we argue against trade policies that allow our money to be used to finance foreign competitors who are subsidized and price their products unfairly.

One positive example of government's role, and I hope it works, is the recently concluded "Import Surge Control" arrangements with major steel supplying nations.

From a professional viewpoint, the US Bureau of Mines, US Geological Survey, Mine Safety and Health Administration, Office of Surface Mining, Bureau of Land Management, and several other government agencies are important to us. Each has a different role. All have SME members on their staffs. In fact, the government would be wise to pay more attention to its minerals professionals. We would have better and more effective regulations at less cost to the government and to the mining industry.

There are literally hundreds of governmental agencies as well as congressional and legislative committees that deal — directly or indirectly — with mining. Many ... are antagonistic to mining and to industry ...

The short answer is yes. The ICC has always been partial to the railroads, as has the Department of Transportation. I think the coal industry basically knows the Staggers Act was a mistake. We went along with it. We assumed the ICC was going to be impartial and do what the Act said. That has not been the case.

The US had record coal production in 1982. It was close to that in 1983. And you noted that coal had another record production year in 1984. That sounds like the current performance by coal is pretty good.

Well a growing industry is nothing to sneeze at. But the coal business is not good if you look at it in terms of return on invested capital. Prices last year were too low, even though the volume was up. And they have dropped in recent months. The reason is too much capacity.

You look at coal company per-share earnings for 1984, and they look pretty good. But how do the earnings compare to the money invested? You would have a tough time justifying new mines based on today's pricing. Sure, the dollars look good, especially for those who already have the money invested and depreciated. But, from the standpoint of return on investment, coal performance is very mediocre at the present time.

see some real growth again in the US coal industry.

Let's talk about governmental impact on the minerals industry.

Local and state governments, along with the Federal Government, have impacted the minerals industry more than most factors. Regulatory laws, trade policies, tax structures, and land-use planning: There are just a few areas of governmental impact that have affected the health of our industry.

There are literally hundreds of government agencies as well as congressional and legislative committees that deal— directly or indirectly — with mining. Many of these are antagonistic to mining and to industry in general.

It's ironic and tragic that the greatest industrial nation on earth is the only industrial nation whose law makers and news media are antagonistic to industry.

Many in our industry feel that government excesses have contributed greatly to the current poor health of parts of the minerals industry. Others want government to help bail out the industry, with import quotas and the like.

In my view, government does have a legitimate and important role in the minerals industry. It is a role somewhere between the extreme positions of "hands off" and "bail me out."

Some of the key legislative issues in mining, as you see them.

How long a list do you want? One issue involves acid rain and the push to reduce sulfur and nitrogen oxide emissions. This could have an effect on metal and non-metal production, as well as the coal industry. There will also be vigorous debate about the Staggers Rail Act and its implementation by the ICC.

Coal leasing, import quotas, the Clean Air Act, and a host of other issues will get a lot of attention. But many of them will get little action, in the coming year. The biggest issue, though, is tax reform. This issue is bound to have a profound effect on the minerals industry.

You mentioned acid rain.

Many questions need to be raised and answered about acid rain. Is acid rain increasing or not? Is it causing acidified lakes or not? What would happen if scrubbers were mandated? What happens to electricity costs and

who pays? What about the dislocations between high sulfur and low sulfur operations? What might happen to coal cleaning? And what about smelters, autos, and other industrial plants?

From a scientific and engineering standpoint, I am not convinced acid rain legislation is needed. But Congress may pass an acid rain bill. If they do it too soon, such legislation would be a political solution to a technical problem. We've seen this type of thing before. Such legislation usually goes overboard and takes a toll on the economy of the country.

You were director of the US Bureau of Mines. Looks to me like the Bureau budget gets smaller and smaller and morale gets worse and worse. Seems like it is becoming more of a nonfactor in the industry by the year.

The Bureau is still an important factor in the industry. But the Bureau's budgets have been cut and they are losing people. I'm concerned about critical mass here. And apparently morale is not as good as it should be.

There are several reasons for this. The Bureau's work is extremely important to the country, and to us in the minerals game. But it doesn't have the general public appeal of going to the moon or dealing with volcanoes and earthquakes. And the Bureau, of course, no longer has enforcement responsibilities for any regulatory legislation. That's the way it should be. But it still makes it tougher to focus attention on the Bureau's valuable work and accomplishments.

Even when I was director of the Bureau, the government asked for better minerals data at the same time it was cutting the Bureau's budget. The Bureau's mineral data and analyses are used worldwide. I don't know what we'd do without them.

Another part of the problem is that the Bureau does vital research, but for a relatively small constituency, the minerals community, which has little political clout. This research is important to the country. But ask people who it was that developed much of the basic titanium metallurgy or did the early work in scrap recycling. They don't know and they don't care.

There is another factor. It used to be that many congressmen and

senators from mining states had a genuine interest in the US Bureau of Mines. You don't find much of that anymore.

Some questions about SME. You have been active in the Society for more than 30 years. Some of the changes you have seen.

During the past decade or so, AIME and SME have undergone important changes. These have occurred along with changes in the minerals industry itself and changed needs and interests by individual members as well as constituent societies. AIME membership has increased from 51,690 in 1974 to 100,147 in 1984, nearly 100 per cent growth in the last 10 years.

AIME membership has increased nearly 100 per cent, to more than 100,000 members in the last 10 years. And, in the last decade, SME membership has increased by nearly 50 per cent, to more than 27,000 members as of January 1985.

We have also seen a transition from a centralized AIME to a strongly decentralized AIME, and from autonomous, constituent societies to separately incorporated ones.

Because of these changes within and without the Society, SME undertook and recently completed a long-range planning effort. Jack Havard, a past president of SME, directed this effort. The Long-Range Planning Commission made recommendations affecting virtually every area of Society activity — programming, publications, membership, meetings, and education, to name a few.

These long-range planning recommendations have been discussed in previous issues of *Mining Engineering*. The SME Board of Directors approved many of these changes. Outgoing SME President Fred Kadey and the board have begun to implement them. A few of these recommendations, along with some other important issues, will need special attention during the coming year.

Like what?

First, the Board has established that, beginning in 1987, our Febru-

ary or March meeting will be SME's main meeting. It will include our Technological Information Exchange Exhibit. This leaves open the question of what to do about SME's Fall Meeting. Should we continue to have one Fall Meeting? Should we go to regional or topical meetings in the fall? Or should we have some other scheme for the Fall Meeting?

During 1985, we must firmly establish our format for the SME meetings in 1987 and beyond. In doing this, we must keep in mind the desire to "take the meetings to the membership." Specifically, we must decide, in detail, what to do in the fall of 1987.

Secondly, there is the question of the AIME meeting. For many years, the AIME Annual Meeting has been held at the same time

and place as the SME and TMS (The Metallurgical Society) winter meetings. This will continue until at least 1986. After that, it is unclear what format will be used for the AIME meeting. There has always been interaction between SME and TMS at this meeting. I think SME and TMS should examine their long term relationship beyond 1986.

Third, the Long-Range Planning Commission and the SME Board have determined that the Society should increase its international focus. We are now studying how best to do this. We want to avoid stepping on the toes of our colleague societies and institutes in other countries.

Fourth, SME's President is chairman of the Board and the Board must always watch Society finances. Except for 1978, when SME had a one-time relocation expense, the Society has been able to show an operating surplus for each of the last 12 years. But the past few years have gotten progressively more difficult, because of poor economic conditions in the mining industry. I might also note that SME dues were last increased in 1981.

You mentioned AIME growth, What about SME growth?

Since 1974, SME has grown from 18,329 members to 27,209 members, for an increase of nearly 48 per cent. Not surprisingly, though, membership totals have dropped off slightly the past two years.

In any event, I think SME's growth during the next several years is going to come not so much from industry growth. It will come from getting people to join SME who should be members anyway.

We will have some growth internationally, too. China is one example. It seems to me there will be growth in Chinese production of minerals, coal, and oil. Right now, China is making deals with US mining companies, equipment companies, coal prep plant builders, and engineering companies. The Chinese will look to us for technology and management expertise.

In addition, I think we should have more contact with long-established mining societies and institutes in various foreign countries. But, as I noted earlier, we must exercise some care here, to be cooperative and not intrusive.

What about your involvement with SME?

I started in SME in 1953. I was a sophomore in college. The SME contacts I developed with my fellow students I use to this day. After I finished school, I stayed active in the individual chapters of SME-AIME, no matter where I lived. These contacts have stayed with me, too.

If I hadn't been active in SME through the years, I would never have been named head of the Mineral Engineering department at Penn State University. I would never have been named head of the US Bureau of Mines. It's just that simple.

When I became director of the Bureau, I was not that active politically. I wasn't even a registered Republican at the time. I was called based on the fact that a dozen or more people across the country had given the government. recruiters my name. Many of these recommendations came from people with whom I had been active in SME.

And without the Penn State and Bureau jobs, I would not have the job I have now (as President of Berwind Natural Resources Co.).

Any day-to-day benefits, from being involved with SME?

In my business, there isn't a week goes by that I'm not faced with some kind of technical question or problem. We may have a

I know that travel costs are always high on the list of cuts when times get rough. But ...

it is wrong to stop all participation in professional and technical meetings ...

Just one idea picked up . . . from a paper or in a conversation ... could dwarf the cost of attending the meeting.

question about a particular mining practice. Or we may need to see a piece of equipment operating in someone's plant. I can call an SME acquaintance and usually get some help. That might not otherwise be the case.

Join SME, go to meetings, meet people, get active on committees. It widens your horizons. It benefits you and it benefits your company.

Ask any of the SME Board of Directors or chairmen of our committees. Have they benefited personally, have their companies benefited by their being active — underline active — in SME? They will tell you, to a man, the same kind of story I have.

The bottom line is that SME helps active members and their companies.

Any personal goals as SME president?

In addition to those already mentioned, all incoming SME presidents have membership on their laundry list of objectives. I would like to expand that to include *membership participation* in the Society's activities. Because of conditions in the minerals industry, SME has lost some members in the past two years. But, as I said earlier, I still think there are

many people who should belong to the Society and do not. Our membership committees do a good job. But the responsibility for signing up qualified nonmembers really lies with the sections and with us as individual members.

You mentioned membership participation.

I know that travel costs are always high on the list of cuts when times get rough. But, in my opinion, it is wrong to stop all participation in professional and technical meetings. It is wrong because it impedes an individual's professional development. And it is wrong because it results in companies, schools, and agencies becoming more inwardly focused. Instead, they should be attending and learning more about cutting costs and improving efficiencies and technologies.

Just one idea picked up at a technical meeting, from a paper or in a conversation, could lead to a cost reduction that dwarfs the cost of attending the meeting.

I may be swimming against the tide, but I hope to convince some of my colleagues in management that it is really shortsighted to prevent attendance and participation in professional society activities. I believe that most Society members can say that SME has helped their careers. In my case, I know it has.

Any final thoughts?

SME is a strong, viable, organization. It is run by volunteer members, not by its staff and not by mining, equipment, or service companies, minerals schools, or government agencies. Indeed, we have a good mix of members employed by all of these organizations. In all respects, SME is a healthy society. And we are responding to changes in the world and in our minerals business.

I might add that SME is a unique professional and technical society. Our "turf," so to speak, "follows the flowsheet" of finding, developing, mining, and processing minerals. Society membership encompasses many professions in geology, mining, metallurgy, and mineral economics. We cover the minerals community and, in a sense, are a "one industry" professional society. ■

MINING ENGINEERING

MARCH 1984

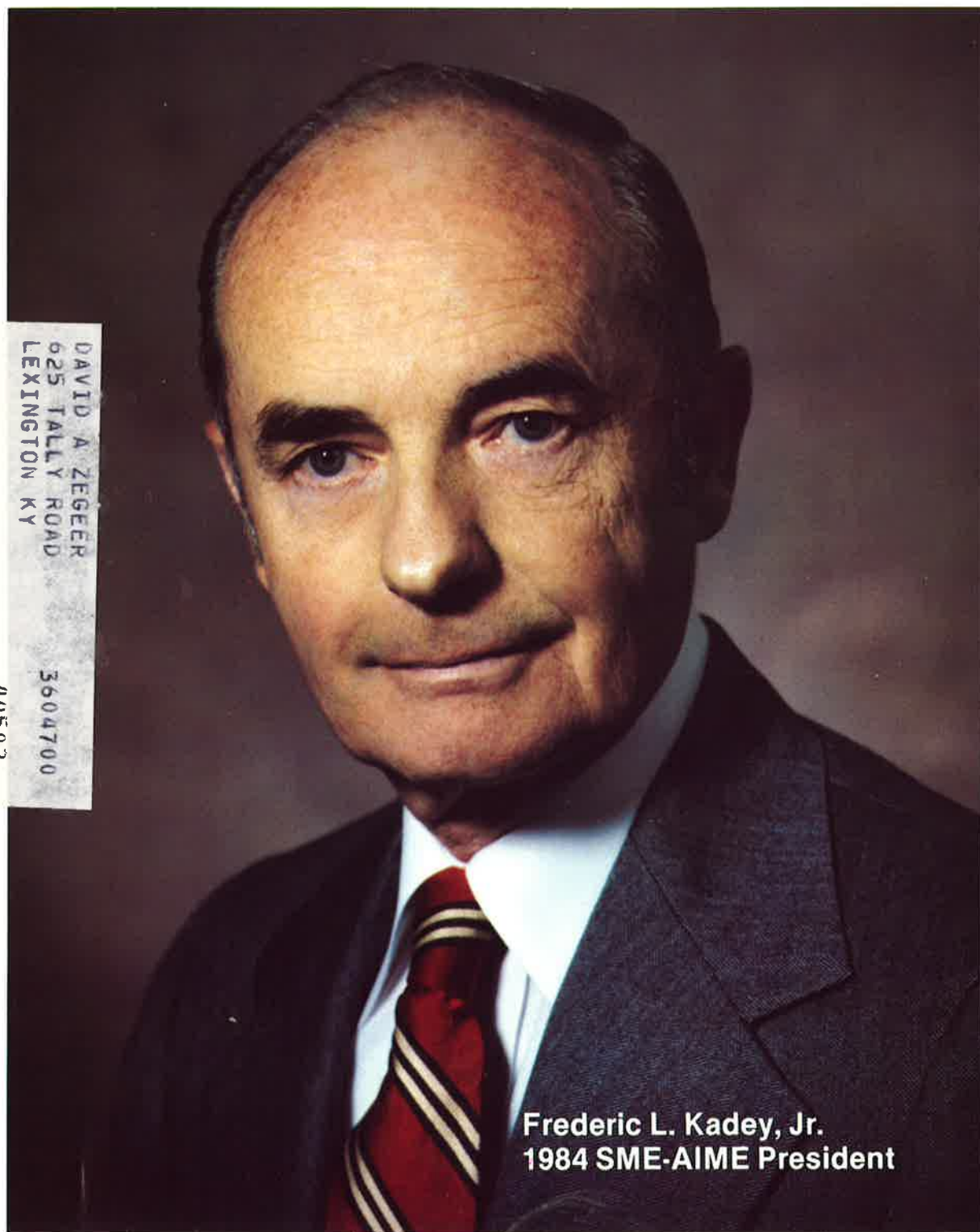
A PUBLICATION OF THE SOCIETY
OF MINING ENGINEERS OF AIME

DAVID A ZEGEER
625 TALLY ROAD
LEXINGTON KY

3604700

MAR 28 1984

40502



Frederic L. Kadey, Jr.
1984 SME-AIME President

1984 SME-AIME President Frederic L. Kadey, Jr. Sees Industry Upturn, Urges More Member Participation

Comment, if you would, on the current economic situation in the minerals industry.

There is no doubt that this worldwide recession has reduced the need for just about all minerals. Everything we use in our economy is derived from the ground. We are obviously affected if fewer autos are produced, if less steel is needed.

The economic downturn in the minerals industry tends to lag the general economy. I think that same lag will be true as the economy improves. Slowly but surely the minerals industry will pickup.

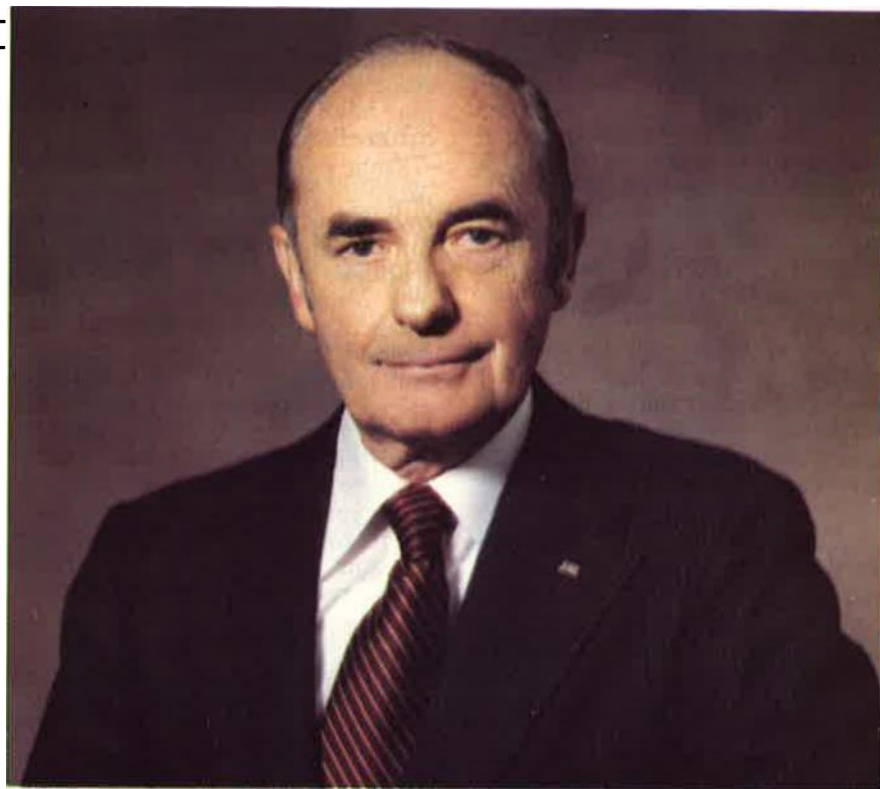
I'm basically optimistic. I think that with the economic upturn we will see the minerals industry improve — mines and mills reopen, people called back to work, exploration budgets increased, that type of thing.

Is the economic upturn here yet or is it still some months into the future?

The indicators for economic recovery are certainly present. You can't open a newspaper or turn on the TV without hearing something about this. And I think the optimism is valid, though — since this is an election year — there are probably some political overtones to it. One item that comes to mind is that 1983 was the best year for auto production since the 1970s. So there are some obvious increased minerals needs, at least in that sector of the economy.

It seems that industrial minerals don't have quite the cyclic nature that you find with some of the metals.

I've thought about this. I don't



know whether I have a good answer. There are some 70 or more industrial minerals. They are spread out over a broad range of the mining spectrum and cover a tremendous number of applications and markets. If you select any one industrial mineral and its application, you may find that it has problems as serious as some of the metals. Likewise, some markets for specific industrial minerals have fewer problems.

Each mineral—metallic as well as nonmetallic — has its own cycle, its own set of problems and opportunities. But, with some exceptions, most industrial minerals have more diverse applications than do metals. This tends to

lessen the cyclic impact of the economy on many industrial minerals.

There are also significant differences in the applications and marketing of metals and industrial minerals. Metals specifications are easily and universally defined. With industrial minerals, the suitability of each for a single application depends on empirical tests. These determine product performance in a specific application for a particular purchaser.

For example, a specific grade of diatomite from one producer, once tested and accepted into the paint formulation or the beer filtration of a manufacturer, can-

not easily be replaced by a competitive brand. Generally, the quality and performance of an industrial mineral additive in a manufacturing process is more important than the price because the price is only a small part of the product's total cost. On the other hand, deficient quality of the mineral additive will degrade the entire product and reduce its value.

During a recession, people drink almost as much beer — filtered with diatomite — as normally, but they are less likely to buy a new automobile that uses steel, aluminum, and lead.

I understand from my colleagues that lead is having some other problems. The development of unleaded gasoline and the use of less lead in paints has cost that metal a large share of those markets, a market share that has not been replaced.

By contrast, the industrial mineral kaolin is in a better position to take advantage of new technology. When used as a paper filler, kaolin stands to gain tremendously from the increased paper use generated by the computer industry.

I repeat, though, that when discussing cycles you must consider separately each metal and each industrial mineral. You cannot group them and say they have or have not done well.

What about the ability of the minerals industry to come back to what it was in the late 1970s?

"... the changes in the minerals industry will be permanent, more related to new technology than to the economy."

The future of some industrial minerals may be brighter than it is for some base metals. Other materials are being substituted for some of the metallics. Fiberglass-reinforced plastic and aluminum, for example, are being used for steel in some automobiles. I don't see that type of thing happening as much with some of the commonly thought of industrial minerals. Even so, some industrial minerals may have to find new markets and different applications.

Since I've been involved with industrial minerals, there have been two new commodities come onto the market. One is perlite, introduced right after World War II. The other is the recently introduced natural zeolites. Perlite has eroded certain market applications for diatomite. But it has also carved out some new markets for itself. The same is true of natural zeolites, though this group of minerals is still in its infancy. Zeolites have yet to attract sufficient R&D effort to develop substantial markets or applications. The Japanese are using natural zeolites but

they haven't caught on yet in the US.

I think many of the changes in the minerals industry will be permanent, more related to new technology than to the economy.

The minerals industry has some obvious challenges it will have to deal with.

Some of the challenges are external, some internal. One of the challenges that concerns me is what we can do about the attitude of the public and the news media toward the minerals industry. Mining no longer enjoys the lore and glamour it did in the 19th century.

I highly endorse the work that the GEM Committee and the Mineral Information Institute (MII) are doing to educate the public about mining. MII, for example, is putting together a series of articles on mining called, "What's below the earth below." These will appear in airline magazines. Rather than just seeing a hole in the ground, passengers will be informed about the value to them of open-pit copper mines. There will also be logs that pilots can follow, to inform and educate passengers about items mineralogical in nature.

I recall being at a dinner party and having a discussion about mining with a young lady who expressed concern about the effect of open-pit mines on the environment. I pointed out to her that the

Fred Kadey: From Physics to Geology in One Afternoon

Unlike many former SME presidents, Fred Kadey's involvement with the minerals industry was not a choice based on family mining history or background. He comes from a long line of teachers and ministers, and his parents assumed that he too would probably be a teacher. His mother and sister had been teachers and one brother became an Episcopalian cathedral dean.

But Kadey is a Welsh name. He says that perhaps in his ancestry there was a miner or two who may have served as a precursor to his eventual minerals career.

Kadey was born in Toronto, Ontario, and grew up in Buffalo, NY. He did well in high school physics and math, but does not recall any high school career guidance that even touched on employment opportunities in the earth sciences. Then, at the end of the Depression, Kadey had the opportunity to enter Rutgers University on a partial scholarship. He jumped at the chance, thinking a physics career might be rewarding.

The turning point in Fred's career came during his sophomore year when he took an elective in geology. He became absorbed in the course and found it much more meaningful and interesting than physics. He therefore arranged a conference with Dr. Helgi Johnson, chairman of the Rutgers geology department. The conference was meant to last only long enough to acquaint Fred with career opportunities in geology. Instead, the conference lasted all afternoon. When it was over, Kadey had been converted to a geology major.

SME's new president recalls that his first real challenge in the minerals industry was having to explain this career change to his two apprehensive parents. A geologist! Visions of their son spending the rest of his life in the boondocks, hammering on rocks. "That was more than 45 years ago. But I think that today a similar view of geologists still persists in many minds," Kadey commented.

By the time he graduated from Rutgers with a BS degree in geology, World War II was on. The military draft was in progress and Kadey wound up in the US Army field artillery as a geodetic surveyor. He served in Africa and Europe and took part in four amphibious landings. He is entitled to wear the Croix de Guerre for his part in instructing the French Army in American artillery methods.

After military service, Kadey was accepted into the graduate school of Arts and Sciences at Harvard University. He recalls his post-war years, 1945 to 1947, as most rewarding. In 1946, Prof. Louis Gratton — from whom Kadey had taken a mining course — persuaded him to join AIME. The same year, he was appointed a teaching fellow in mineralogy. He got his MA in geology from Harvard in 1947. That was a good year for job hunting and Fred decided that it was time to start making a living.

The most appealing job offer came from US Steel Co. In Pittsburgh, PA, to work in the company's research laboratories. The work involved petrographic study of reactions

land area taken up by the US highway system is about twice the area of all US open-pit mines that have been opened since the Revolutionary War. She replied, "Well, of course, we all know we need highways." It was pointed out to her that if we didn't have open-pit mines, we wouldn't need the highways.

So educating the public about mining needs to be a continuing area of focus for those of us in the industry. And a public more enlightened about mining would certainly have some carryover value when legislators consider and act on mining legislation and regulations.

What about worldwide challenges to the US minerals industry?

The increasing cost of transportation, most significant in the case of industrial minerals, is going to have an increasing impact on the distribution and marketing of mineral commodities — on our ability to export against foreign competition.

There is another consideration here. The US has provided technological and economic aid to less developed countries. And, through the World Bank, these countries have been loaned money to develop their natural resources. With cheap labor, these countries can then produce minerals for the US marketplace more cheaply than we can produce them. This, I'm afraid, will be a continuing and complex problem to deal

with. It may hinder some of our mineral commodities from ever returning to their previous high levels of production.

Your plans and focus while you are SME president.

I think it is my basic responsibility to help initiate needed programs and procedures throughout my term of office. It goes without saying that I will support and continue any programs already started and, hopefully, see some of them through to completion.

Nevertheless, I realize that SME presidents have but one year in office. There is only limited opportunity to start, follow through, and complete projects. You depend on the officers who precede and follow you doing a good job. And you depend on the continuity provided by the Society's Executive Director and his staff.

I think communications with SME members is an important point. We have nearly 30,000 members. I daresay that only about a third of them have ever been to an SME meeting or taken part in an SME continuing education course. Other SME members are active in local section activities. We communicate with the rest of our members through *Mining Engineering*. Though readership studies show general satisfaction with the magazine, I believe that we need to do everything we can to make sure the magazine remains a good communications tool for members, particularly for those

who don't have an opportunity to attend meetings.

When I speak of communications, I do so with some experience. In 1946, I joined AIME because my professor asked me to. I didn't join because of any benefits he pointed out to me. But when I started to work in industry, I began to go to meetings and to meet people. To me, that is one of the most delightful and important aspects of a technical society. The friendships and associations that are generated can be lifelong and valuable. This is communications at its best.

I am also going to do my best to promote increased SME membership and a reduction of nonrenewals, particularly among student members, the potential SME leaders of tomorrow. If we do not grow, we stagnate.

How does SME fit into the mining industry picture?

Our main purpose is to promote the professional development and well being of our members, hence the mining profession. The Society also seeks to advance the state of knowledge connected with economic mineral production. By doing these things, the Society promotes the highest professional standards for those working in the mining industry, for the benefit of all people.

I think we are doing an excellent job of this by being a forum for technology transfer. SME gives people the opportunity to present

among slag, refractories, and metal in open hearths, blast furnaces, and metal mixers. It was while in Pittsburgh that Fred met Brenda, his wife-to-be. They were married in 1950.

Kadey then received an employment offer from the Johns-Manville Research Center that involved moving to New Jersey. There he did research on many industrial minerals. These included perlite, diatomaceous silica, and a group of synthetically-produced calcium and magnesium silicates that use diatomite as **the source** of reactive silica.

Dr. A. B. Cummins, Manville's manager of research who hired Fred, cultivated and supported his interest in SME. (Cummins was to become SME-AIME president in 1960.) And, because of Kadey's geological background, Cummins promoted his increasing involvement in the company's exploration programs for diatomite, perlite, and other industrial minerals.

Fred began to appreciate that his research background, his laboratory evaluation of industrial minerals—the product development and application research—was most helpful in his exploration activities.

Part of the training that Manville's exploration geologists now receive includes time spent at the Manville Research Center working with commodities for which they will later be exploring, Kadey notes.

Dr. Cummins encouraged Kadey to attend SME meetings, give papers, chair sessions, and take part in committee work. Kadey said he now realizes the value of all this in a young person's professional development. And, while with Manville, he made sure that the geologists he supervised had the same opportunity.

About 25 years ago, Fred gave his first paper at an SME meeting. It was on diatomite. There followed other opportunities to give papers at Society meetings, and he was asked to organize and chair meeting sessions on industrial minerals. As he became more active in the Society, SME's new president served as Hardinge Award committee chairman, as both program and division chairman of the industrial minerals division, and as SME Program chairman. In 1981, Kadey was one of the few selected each year as a Distinguished Member of SME.

Kadey spent 32 years with Manville. From 1972 to 1982, he was exploration manager for industrial minerals. He had worldwide responsibility for Manville's industrial minerals exploration activities. He planned and managed sampling and drilling programs. He was also responsible for evaluating deposit quality, calculating ore reserves, and recommending properties for acquisition.

Manville is the world's leader and largest producer of diatomaceous silica and perlite. To maintain that position, Manville continued industrial minerals exploration in all market areas of the world. Since retiring from Manville, Kadey has opened an office in Denver as an industrial minerals consultant.

Kadey is a member of the Mineralogical Society of America, a fellow of the American Association for the Advancement of Science, a charter member of the American Institute of Professional Geologists and a past president of AIPG's New York section, and a National Defense Executive Reservist—Metals and Minerals Branch, US Department of the Interior.

new technology and to take courses, though the courses are not as well attended as we would like them to be. *Mining Engineering* and our book publishing program are also of much technological and informational help to our members and to the mining industry.

Your comments on SME's long-range planning effort (see *ME*, Feb. 1984 Drift, p. 118).

I think it is one of the most exciting projects that I have seen undertaken in SME. Any growing organization has to pause from time to time. It must look at its current position and determine where it should be headed. That's really what our long-range planning effort is all about. It is an attempt to look at each facet of the Society and to see whether it should be changed and how it might be improved.

Our initial examination indicates the Society is strong, well managed, and doing a good job of fulfilling its purpose. The intent of the Long-Range Planning Commission is to better prepare the Society for the needs and challenges in the years ahead. There will, as a result, be important changes presented to the membership for ratification: incorporation, a possible name change, more democratic selection of directors and officers, a greater role in minerals education, and a changed meetings schedule, among other things.

You mentioned the possibility of a name change for the Society. Among SME members, there are differing views on this item.

That's true. There is some disagreement about the need for a name change. Some members feel that the name "Society of Mining Engineers" does not represent all the professionals — geologists, metallurgists, and other geoscientists — who comprise our membership.

There is also the view that a name change is not as important as the "goods and services" that the Society supplies its members. The thinking here is to keep and preserve a historically valuable name. Though I personally favor the latter viewpoint, I will, as SME President, support whatever the consensus turns out to be.

I remember the American Insti-

tute of Professional Geologists wrestling with the same problem for the same reason — whether to change its name. It almost split the group. Eventually, a few years later, we ended up with the original name again. As it will be with SME, the proposed AIPG name change was dealt with democratically, with membership input. Winston Churchill once said, "Democracy is the worst form of government, except for all the others."

Professional development, job opportunities, advancement. How would you advise a young person considering a career in mining or geology?

I would certainly advise that person to go ahead and plan on such a career. Right now that may not sound like such a wise thing to do. But keep in mind these economic downturns are cyclic. I saw the same thing happen in the ceramics industry, in the 1940s. Cyclic fluctuation in industry — not just mining — is common.

In fact, maybe now would be the right time for someone to start a mining career. Go to a good mining school. By the time a person graduates — what with people currently getting discouraged and leaving the field — there will probably be a shortage of miners. An expanding economy will require increased mining activity.

Besides that, there will always be opportunities for well-trained students. The industry now needs more than just a geologist, for example, who can go out and measure the attitude of the beds and map geologic features. Doing only basic geology or mining work is no longer adequate for the professional in the minerals industry. We need trained and imaginative people who can help gauge the economic and operational ramifications of the minerals reserves on which they are working.

There is another point. Today's student in any of the mineral or mining disciplines has an advantage. The academic training being given now is much more comprehensive than it ever was when I was in undergraduate or graduate school.

Are we making specialists out of students? Should we be?

We may be, but I think our society is getting to the point where one has to be a specialist. I must

admit I have mixed feelings about this. Years ago, you didn't have the subdivisions of geology that you have now.

Another aspect of this is that there is an ever increasing need for continuing education. And this is true not just in mining. There is more material to deal with, more information to absorb. Things change more quickly. I've been told, and I believe it, that unless you spend about 10% of your time keeping up with current literature, and in refresher courses, you can be replaced in 10 years.

As technology becomes more complicated, the need for continuing education becomes greater. It becomes evermore important to keep current in your professional field. Take continuing education courses, either on your own or as provided by SME.

What about the benefits of SME membership, as far as you're concerned?

I think the benefits of SME membership go way beyond the exercise of going to meetings simply to hear the papers. A boss once told me that if that was all a person wanted to go to the meetings for, he should read the abstracts instead.

The friendships, associations, and contacts you make at meetings are much more important. In many ways, I get a lot more out of having dinner with someone at one of our meetings. When I see that person from time to time, there is an informal technical exchange that you do not pick up in the meeting sessions themselves.

It is man's nature to associate with those with whom he shares some commonality — his profession, his concerns, his interests. A professional in the minerals industry owes it to himself to become associated with SME. It is an organization dedicated to disseminating new mining technology, dedicated to the continuing education and well being of those in mining. As I've noted, the Society also provides an opportunity to share — formally and informally — knowledge and professional information with colleagues.

I might make one other comment. The best advice that I could give a young person who is just joining SME is to go to one of the meetings. At least go to the local section meetings. Meet people, get involved. It pays off. You'll get out of SME what you put into it — often much more! ■

MINING ENGINEERING

MARCH 1983

A PUBLICATION OF THE SOCIETY
OF MINING ENGINEERS OF AIME

DAVID A ZEGEER
625 TALLY ROAD
LEXINGTON KY

3604700
40502

A color portrait photograph of Louis Kuchinic, Jr., a man with dark hair, wearing a dark suit, white shirt, and striped tie. He is sitting and leaning forward, smiling at the camera. The background is a dark, mottled brown.

Louis Kuchinic, Jr.
1983 SME-AIME President

1983 SME-AIME President Louis Kuchinic, Jr. Stresses Better Communication, Information Exchange, Long Range Planning

Tell us how you became involved with SME.

In 1962, George Keller of US Steel was secretary of the Society's Coal Division. Keller and I worked in the same office. He asked me to take his place as secretary, so he could accept the Coal Division chairmanship.

Initially, I had no idea of the secretarial responsibilities or SME's organizational structure. Since I won't accept a responsibility unless I intend to become completely involved, I learned all I could about SME and AIME—how they functioned, their goals, and the people who managed them. This helped me perform my secretarial tasks more efficiently, and there were a number of them. Among other things, we rewrote the bylaws, wrote procedures and descriptions for all officers and committee chairmen, and organized the files during my tenure.

After 10 years as Coal Division secretary, I assumed the Division's chairmanship. Because of my continuing interest, I also became involved in the Pittsburgh section activities and became chairman in 1971. I remained active in the Pittsburgh section until I left there in 1979. I like to think my SME experience has given me insights into all facets of our professional society, as well as our sister societies and AIME.

From your own multifaceted background—coal, iron and steel, oil and gas—comment on SME's role as a professional organization and what your involvement in the Society has meant to you.

There are technical, scientific, and professional benefits from membership and participation in SME. Some of the benefits are more obvious than others.

My involvement with SME has given me a lot of professional stature, as well as a lot of personal satisfaction. It has helped me to be recognized by my peers, both inside and outside the Society. It also has helped me grow and become a better manager as the result of my society work and association with others in my field.

I feel SME can be of some help to the mining industry during its recovery from the current recession. Though I think the mining industry will come back strongly, it is

going to take some time. And it is going to take some ingenuity by a lot of professionals who know the mining business.

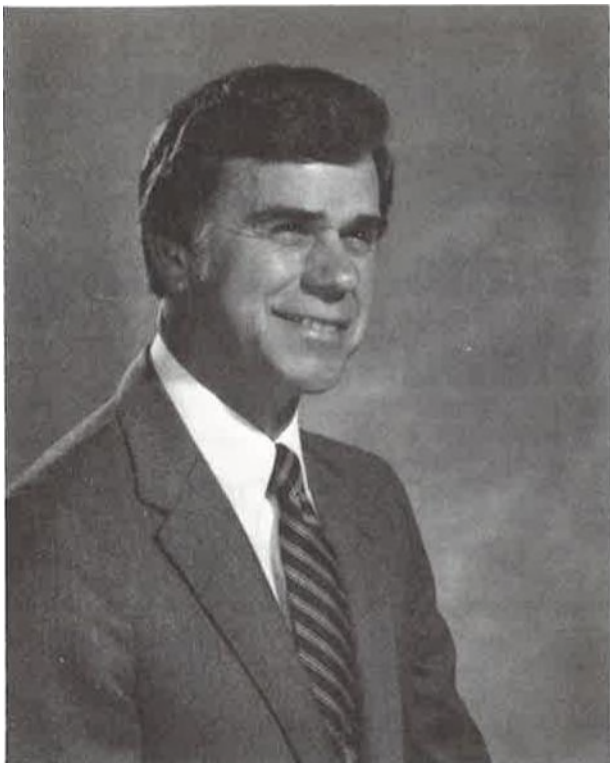
All segments of the mining industry—coal, iron ore, zinc, lead, copper, industrial minerals—have many of the same problems. Minerals oversupply as well as worldwide competition and price cutting are examples of these problems. SME can provide a forum for professionals to exchange technology and ideas to help deal with the industry's problems. Through Society association, members speak, communicate, and work together to keep informed of the newest technology and trends in the industry. I've found the Society's assistance very helpful via information and technical exchanges at meetings. And, of course, the continuing membership interaction the Society offers is quite helpful.

Through SME, you get to know many people in the mining industry. They are available for assistance and ideas when you have a problem. Of course, you are expected to return the favor. Actually, in SME, what you in effect have is access to a major consulting service upon which you can call when you need help. And for only \$40 a year, it's so inexpensive.

You have been involved with SME and AIME for 20 years. Comment on the changes you've seen.

I think there is confusion about the roles of AIME and its constituent societies. AIME was started in Wilkes Barre, PA, in 1871 by a group of mining engineers. Little did they dream that AIME would grow into an organization of more than 80,000 members embracing mining, metallurgy, iron and steel, and petroleum.

As each discipline with its own interests grew into separate societies, managing such a diverse group under the AIME umbrella became unwieldy and difficult. But by adopting a corporate structure, each society now has its own management organization, with AIME as the unifying forum. AIME now represents the four constituent societies in common interest areas, with each society representing its own members in other areas of unique professional interests. Over the years, this structure has tended to isolate the societies from each other.



Kuchinic: A Profile

Kuchinic was born and raised in mining camps in the Pittsburgh, PA, area. His father, grandfather, and uncles were coal miners. He felt destined to be associated with mining. But Kuchinic also had a strong interest in architecture.

Finances were slim. After Kuchinic graduated from high school, he decided to join the Navy to earn eligibility for college through the GI Bill. After his Navy discharge, Kuchinic decided that mining was a more practical career than architecture. So he enrolled as an undergraduate in mining engineering at the University of Pittsburgh. He was a commuter student there and graduated in three years.

Jobs were scarce for new mining engineers when Kuchinic graduated, so he began work as a contract laborer at Consol's Mathis mine. Here he gained "hands on" experience in how to mine coal by timbering, roof bolting, and operating a continuous miner. After a few years, Kuchinic was promoted to a supervisory position.

The SME president's next position was with US Steel Corp. in Uniontown, PA. He began as an industrial engineer and progressed to mine superintendent, first at the Leisenring mine and then the Robena mine. In 1962, Kuchinic was transferred to US Steel's Pittsburgh headquarters as an assistant to the vice president of coal operations. Here he had the opportunity to learn about steelmaking, fabrication, chemicals, mining, and transportation as well as functioning in a corporation setting.

In 1979, after 26 years with US Steel, Kuchinic accepted an offer to be vice president of mining with Penn Virginia Corp., which is headquartered in Philadelphia. He was also elected president of Penn Virginia Resources Corp., a subsidiary company that monitors corporate mineral interests of some 454 Mt (500 million st) of coal, as well as timber, oil, and gas, in West Virginia and Virginia.

As a result of Kuchinic's involvement in trying to exploit company oil and gas reserves, Penn Virginia, in 1981, acquired Controlled Resources Oil and Gas Corp. of Kentucky.

Kuchinic is now president of Controlled Resources and Wise Oil and Gas Exploration Inc., a company formed to explore and develop oil and gas fields in southwestern Virginia.

Kuchinic finds the oil and gas industry similar to the coal industry. Both explore for reserves, cope with nature to win energy, and present materials handling problems. Though mining is his first love, Kuchinic finds the oil and gas business just as interesting and challenging.

"One of my goals will be to improve the communications of SME with its members, as well as with local sections."

But, I now see the emergence of a cooperative spirit, not only within the individual societies, but also among the societies as they work toward strengthening AIME. The societies recognize that they do have similar problems and that, by working together, common solutions are found.

There is now greater camaraderie among our members, greater recognition that we strive for the same goals, be we mining engineers, mineral economists, metallurgists, geologists, or other mining professionals.

Speaking of change, any feelings about the possibility of a name change for SME to more accurately reflect its membership or to be more inclusive?

I think we have to come up with a name that encompasses more of the disciplines that are involved in mining, including geologists, process metallurgists, and economists, among others.

This is a sensitive area, one that has been the subject of much discussion. It is difficult to get a consensus on this. A name that includes all disciplines is not practical. It is equally difficult to come up with a short, more workable name that people can relate to and be comfortable with. One suggestion that has been made is 'Society of Minerals Engineers,' or possibly 'Society of Minerals Engineers and Scientists.' In either case, the acronym SME would continue. I'm sure the long range planning committee is addressing this problem now.

Any goals or thoughts on your SME presidency?

One of my goals will be to improve the communications of SME with its members, as well as with local sections. An improved communications flow back and forth would help keep everyone better informed. By being better informed, the members hopefully will become more interested and active in the Society.

As a professional society, SME could have more impact worldwide in technology and information exchange. Books, meetings, the magazine—all these things, help. Maybe we also need to give some thought to translating some of our publications into other languages to make them more accessible. Certainly the technological information provided by SME through its members could be of help to many individuals and nations in the world as they seek to develop their mineral resources.

Since there have been many diverse ideas as to how SME should proceed, it was decided that SME should have a long-range plan. The first step has been taken. A

long-range planning committee has been formed, headed by former SME president Jack Havard. The group will study all aspects of the Society, from philosophy to organization. Their target date for completion is early 1984.

From this in-depth study, a long-range plan will be developed to provide for present and future member needs. This plan should also help the Society in its efforts to achieve greater recognition as a professional organization providing a forum for the professionals in the minerals industry and offering a more lofty forum from which members of the mining community can speak.

I also feel that our members must take greater pride in their profession. Engineering is not a prestigious profession in America today. We must work through our professional societies to educate the public that engineering is a profession comparable to law and medicine and should be accorded the same respect. Once we gain this respect, we will be more able to enlighten and influence the public and government.

Speaking of long-range, what is the possibility that the US mining industry will return in a permanently shrunken form, part of the fading scene of 'smokestack' America's economic picture?

The US has been blessed with an abundance of mineral and energy supplies and has been a major exporter for many years. Since World War II, the underdeveloped countries began to exploit their minerals and energy sources and have become competitors in the market place. As a result, we must analyze supply and demand on a worldwide basis. Other countries now want a piece of the action. US industry will be forced to settle for a smaller share of the market.

We must recognize this and tailor our industry and our marketing efforts accordingly. We must become more competitive and develop better technology, service, and managerial expertise. I think the US mining industry will continue to grow, but not as rapidly as in the past.

In my recent travels, people seem upbeat about the economy. It seems to be turning around. The auto industry is starting to call people back to work. So is the steel industry. The stock market appears stronger and interest rates have become more stable and realistic.

I now think we will see a long, slow recovery. Since the minerals industry usually lags the recovery, it will build more slowly and cautiously this time than it did in the past. Not as many employees and management layers this time around. Long term, the next several years, I expect the same kind of slow, deliberate growth.

We will always have a mining industry. Without it, you have no raw materials and feedstocks to aid economic growth. Despite economic, political, and regulatory pressures, the US mining industry will remain viable.

In the context of that answer, what are your thoughts about job prospects for mining students?

The next several years will be very difficult for mining graduates. Prior to the current recession, most everyone was forecasting a shortage of engineers interested in the mining industry. But the recession has changed that.

"We must work through our professional societies to educate the public that engineering is a profession comparable to law and medicine "

Today, there are many experienced mining people available. Many graduates will now be forced to accept lower job and salary levels. Advancement could be slower.

When I graduated from college, I faced the same situation. Entering the mining industry at a lower level isn't all that bad. You can gain a lot of valuable experience and expertise in mining that will be most beneficial as you accept more responsible managerial positions in the future.

This situation could also help the industry in later years. Graduates may continue toward masters and doctorate degrees and into research. Some may decide to remain as teachers and professors, thus alleviating the present and projected teacher crisis. Older, experienced engineers may also elect to return to school to further their education and teach. This would strengthen our mining schools and increase the technical competence of the graduates through a better education.

You have 26 years experience in the US iron and steel industry. This past year, it operated at 40-45% of capacity. Many of its mines were shut down and workers laid off. What do you see as the future for that segment of the mining industry?

I have some concern about it. I think the steel industry has learned some hard lessons. They gave away too much in contract negotiations, priced themselves out of the marketplace.

The steel industry is now shutting down its obsolete facilities, taking steps toward modernization, and improving its use of equipment and raw materials. The steel industry must become lean and increase its productivity.

Reduced iron production, decreased coke rates, and increased use of electric furnaces means that the metallurgical coal segment of the coal industry will never return to its "hay" days.

The one hope for US metallurgical coal is that, since it is the best in the world and if it can be mined and transported to foreign markets competitively, it could regain its productive level of 73 Mt/a (80 million stpy).

Your thoughts about the impact on the mining industry of the Reagan administration, Department of the Interior, and the US Bureau of Mines.

The Reagan administration has taken a more rational approach than the previous administration, when environmentalists ran the Department of the Interior and other federal regulatory agencies. Many of the regulations were expensive and wasteful. The money could better

have been used to improve productivity or open new mines.

The Reagan administration, for example, has tried to simplify safety and environmental regulations to help mining companies do a better job while not penalizing them unfairly when their efforts fall short.

As for the Bureau of Mines, it unfortunately has been relegated to a very minor role in its activities within the mining industry. The US Bureau of Mines is no longer able to help operators with day-to-day problems, as they once did.

You have mining and energy experience. Any comments on the merger activities between these two fields in recent years?

The oil companies, in developing their long-range strategies, recognized that oil and gas reserves were being depleted more rapidly than new reserves could be found. Since coal is also a source of energy, they opted to acquire additional energy reserves in the form of coal, oil shale, and uranium. These reserves represented an energy inventory that could be developed, when needed. And it was a good deal for the mining companies, too, since many were having severe cash flow problems.

The oil companies soon learned that operating in a tightly regulated industry required considerable patience and money. In the oil and gas business, you drill a well, then determine its economics. If it is not economic, it is plugged, and you move to the next location.

In developing a mineral reserve, it may take years of planning, environmental studies, and construction before the first pound of product is recovered. By that time, the economics may have changed substantially. The oil companies were not prepared for this type of investment strategy.

The more progressive oil companies are now integrating minerals-oriented people into top management. They have learned from their mistakes.

What about US coal use and export?

Coal still has tremendous long-term potential. We've talked to reaching a 0.9 Gt/a (1 billion stpy) capacity. The industry already has that capability. The problem, though, for the next several years will be excess capacity.

We can look for continued growth in steam coal consumption, especially in the export market, if we don't price ourselves out of the business. Our major competition is Australia and Africa. The US has learned to mine coal while protecting the environment, but at a price. Australia and Africa will eventually have to do the same thing because their people will not continue to stand for environmentally unsound mining practices. Europe has tremendous coal reserves, but they are unaffordably expensive to mine. I think the European coal mining industry will continue to decline as we supply more and more coal to that market.

Coal will continue to be a major energy source for the next 50 to 100 years. Its use will grow slowly. We need more research to get rid of its pollutants, better techniques for coal preparation, cleaning, blending, and burning. Unfortunately, our government has been remiss

in not providing the funds to push along some of these efforts.

We are aware of the impact of energy on the world economy. You have been associated with energy production throughout your career. What is your outlook for the energy industries?

As the result of several factors, energy during the past decade has been one of the most volatile and unpredictable industries in the economy. The principle reason was OPEC's decision to restrict oil production and increase oil prices, triggering worldwide inflation.

As a result, everyone became very energy conscious. Rather than continuing to grow at 5-8% a year, energy consumption rates began to decrease. In fact, in 1982, there was actually a decrease in energy consumption, which has created excess capacity within the energy industry.

I am no economist, but I think energy will continue to be a cyclic industry as long as the general economy continues to be cyclic. Therefore, predicting long-term energy growth over the next decade is almost impossible.

If economic indicators are correct, the current energy oversupply will not last beyond 1984. The coal, oil, and gas industries should then once again become profitable. The coal industry has survived several of these major downturns. Each time, however, it becomes more difficult for the smaller, independent producer to remain in business. This is the reason many of the coal companies are now oil company subsidiaries. The coal industry will continue to grow, however, since it has the largest energy reserves.

Other energy sources, such as solar and fusion, need much research and development, possibly into the 21st century, to become economic. I do not think solar power will be a major source until a way is discovered to economically convert it directly to electricity. Meanwhile, we need to use our conventional energy sources more wisely, discover new reserves, and develop improved recovery methods.

What about the use of coal oil and natural gas as fuel sources?

The current dilemma within OPEC has caused a temporary drop in oil prices that has had similar effects on coal and natural gas prices.

But I feel that this is only a temporary situation, and prices will begin to stabilize as the world economy turns around. My guess is by early 1984.

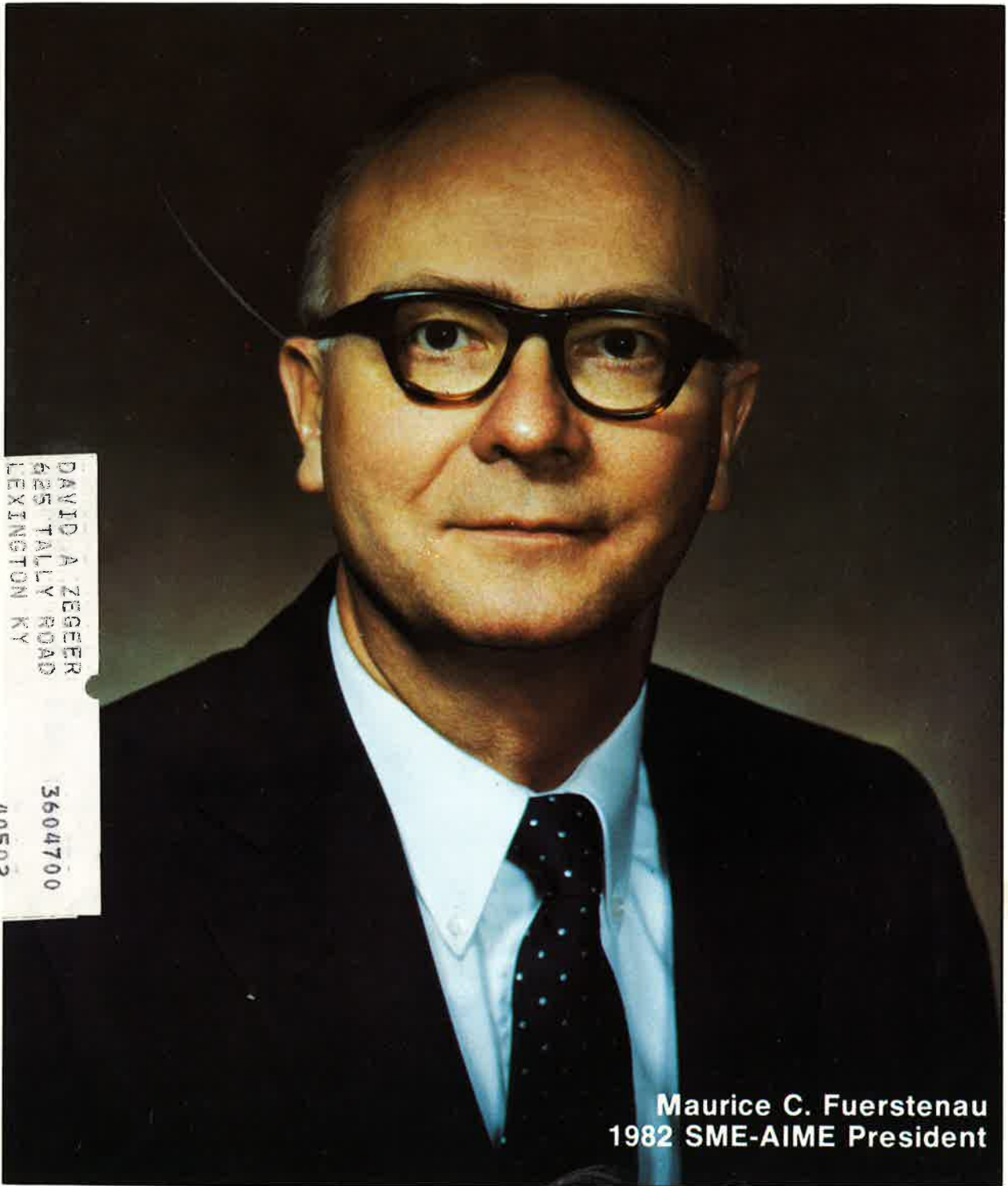
Purchases of energy are going to be more selective. Although price per delivered Btu will continue to be the controlling factor, other factors such as guaranteed source of supply, uniformity of quality, and effects on plant operation and maintenance costs will become more important.

As the result of the wide fluctuation of prices and availability of supply, most companies now are installing multiple capacity boilers to provide additional flexibility. This means that the customer will be getting more for his energy dollar. The competition among fuels will continue to be fierce. ■

MINING ENGINEERING

MARCH 1982

A PUBLICATION OF THE SOCIETY
OF MINING ENGINEERS OF AIME



Maurice C. Fuerstenau
1982 SME-AIME President

DAVID A. ZEGGER
625 TALLY ROAD
LEXINGTON KY

3604700

40502

Interviewing the 1982 SME-AIME

President

Dr. Maurice C. Fuerstenau



Dr. Fuerstenau, would you briefly describe how you chose the minerals industry as a career and reflect upon some of your experiences.

My boyhood years were spent in Rapid City, SD, where the South Dakota School of Mines and Technology is located. Enrolling in the mineral industries at the School seemed the natural thing to do, especially after two brothers had preceded me there in these disciplines.

Following graduation in 1955, I entered the graduate program at Massachusetts Institute of Technology. While at MIT, I obtained my master's and doctorate under the direction of Professor A. M. Gaudin, one of the giants of the mineral industry. During that time I worked on projects ranging from sedimentation sizing and flotation to my thesis topic of modeling the thickening unit operation. Professor Gaudin was an immensely creative person, always full of new ideas and constantly suggesting new concepts to explore. What a privilege and outstanding opportunity it was to work for this gentleman.

My first position upon graduation from MIT was with the Beryllium Corp. in Reading, PA, where I worked as a research engineer. Following that, I joined Roshan Bhappu at the New Mexico Bureau of Mines, and we collaborated on a number of projects, the most notable of which was silicate mineral flotation. This period turned out to be especially productive professionally.

In 1963, I joined the Department of Metallurgical Engineering at the Colorado School of Mines and taught there for a number of years. From 1968 to 1970, I taught at the University of Utah and, in 1970, I accepted the chairmanship of the Department of Metallurgical Engineering at the South Dakota School of Mines and Technology. During these years I have taught literally hundreds of undergraduate students while approximately 60 persons have obtained their master's or PhD under my direction. Observing the professional careers of these former students provides a tremendous amount of personal pleasure and satisfaction.

I very much enjoy teaching and research, the stimulation of the university environment, and the fringe benefit of being around young people. This has really been an outstanding period of my life.

You have been an SME-AIME member for the past 25 years. Would you give us an assessment of the Society as you start your presidency in 1982?

Growth and vitality have been synonymous with SME in the last several years. For example, membership has expanded from 15,778 in 1971 to 24,840 in 1981. Including students, membership is presently 28,404. In that same period, annual revenue has increased from about \$750,000 to \$3 million. Fur-

thermore, dues revenue now amounts to only about one-third of the total revenue of the Society. Publications and meetings account principally for the additional \$2 million. Also, during that time net worth increased from about \$100,000 to \$1.7 million. A very major part of the \$1.7 million is the headquarters building that was completed in 1979. The organization's vitality is also demonstrated by the fact that more than half the cost of the building was defrayed through contributions from SME members and the companies that employ them. The base of the Society is sound.

You have been in minerals engineering education for many years. What are some of the current problems facing minerals education and what are their impacts on the mining industry?

The most significant problem in minerals engineering education today is attracting and retaining outstanding professors in our colleges and universities. According to the American Council of Education, 10% of all engineering faculty positions in 244 universities are presently unfilled. This amounts to about 1600 positions. A breakdown of faculty positions in mining, metallurgy, and geology is not available, but it seems reasonable to expect a similar or greater percentage of unfilled positions in these disciplines. This situation is

. . . there is concern about whether the industry can assimilate 700 mining graduates per year. Most would feel more comfortable with 500 graduates per year.

the result of the relatively low salaries and benefits being extended to faculty members as well as high workloads and the tightening of research funds. For example, the average salaries of the three grades of professors of mining, metallurgical, and geological engineering at 16 colleges and universities are: assistant professors (\$25,200), associate professors (\$29,100), and full professors (\$39,300). The average salary for May 1982 graduates will be approximately \$26,500, while PhD's who graduated 10 to 15 years ago are earning \$45,000 to \$50,000 annually in industry. So the root of the problem is easy to see.

This situation will get worse in the future because the number of American students who would normally pursue graduate study with a teaching career in mind has been reduced significantly. The number of earned doctorates in engineering has decreased from a high of 3,724 in 1972 to 2,751 in 1980.

A solution to this very serious problem lies in support of the mineral engineering programs at the various colleges and universities by the private sector. At this time public colleges are no longer state-supported but are really only state-assisted. In many instances the states simply cannot put any more resources into their higher education systems. If educational quality is to be maintained, the industries benefiting directly from these programs will have to provide financial support to the colleges for these areas.

This fact has been recognized by a number of companies, and one in particular stands out. The Exxon Foundation has supplied \$10 million for junior engineering faculty salary support grants and \$5 million for teaching fellowships at various colleges and universities.

What is the outlook for students?

With the turned-down economy, engineering students are finding

the job market much more acute this year than in the past. The good students who present themselves well are not experiencing any great difficulty, but the average students, especially those who do not present themselves well, are having to pursue employment with diligence.

In 1980-81, undergraduate enrollments in mining engineering, mineral processing/extractive metallurgy, geological engineering, and mining technology at the 22 colleges and universities that supply enrollment data for the Educational Statistics Committee of SME were as follows:

• Mining Engineering	2,815
• Mineral Processing/Extractive Metallurgy	412
• Geological Engineering	1,339
• Mining Technology	1,063*
*15/17 schools reporting	

Enrollment is given for both mineral processing and extractive metallurgy since, with many schools, the curriculum is not divided into mineral processing or extractive metallurgy.

Approximately one-fourth of the students graduate each year, and 722 persons received their BS degrees in mining engineering in 1980-81. After visiting with industrial managers, placement directors, and department heads of various colleges throughout the country, there is concern about whether the industry can assimilate 700 mining graduates per year. Most would feel more comfortable with 500 graduates per year.

Geological engineers can enter either the mining industry or the petroleum industry and there are only about half as many students enrolled in geological engineering as mining. So there does not appear to be as much concern about potential oversupply here as there is in mining engineering.

In the case of mineral processing/extractive metallurgists, demand still exceeds the supply.

Some department heads say mining technology students from their colleges have little difficulty

finding work; others, from different schools, say employment opportunities are limited this year. College location appears to be an important factor.

As mining school enrollments approach the limits needed by industry, it is especially important for students to perform at the upper level of their abilities and to develop effective communication skills. Frankly, the most important course that they will take while in school is technical communications. An average student with excellent communication skills will find a favorable employment market. On the other hand, students with poor communication skills will find obtaining employment difficult and their professional careers stunted regardless of their academic performance. A case in point is a young mining engineer of whom I am aware. He was being groomed for an outstanding position in the headquarters of a major coal company and lost this opportunity simply because he could not write. The most sought after graduates are those who combine excellent academic performance with superior communication skills.

Lastly, in view of the advantages and growing need for professional registration, I recommend that students take the EIT examination during their senior year. Concepts in mechanics, thermodynamics, and electrical theory are much fresher at that time than they will be five to 10 years after graduation.

What is your view on the need for continuing education in the mineral engineering profession and what is being done to strengthen this activity in SME?

I have been concerned about continuing education opportunities for the professional development of our members for some time. The reason for this is that the professional half-life of a

mining engineer is approximately eight years, due to the rate at which technology is advancing. This means that half of a mining engineer's training is obsolete in eight years. To stay current an engineer must continue his education by reviewing literature, attending technical meetings, or by taking formal instruction, including short courses.

SME-AIME has had a continuing education program for presentation of short courses since 1977. However, attendance at these short courses has never been large—only 78 persons at the 1981 Annual Meeting in Chicago and 150 people at the 1981 Fall Meeting in Denver. Such low attendance is cause for some concern since, with a membership of almost 25,000, it is reasonable to expect that many hundreds of our members should be taking advantage of short course instruction annually.

In view of the need and the attendance pattern, reviews are presently underway in SME to find ways of strengthening the existing program. One thought is to teach courses as often as deemed necessary by taking them to the membership at various locations in the country. At the present time, a course is usually presented only once at either of the national meetings. What is really needed to make this program successful is a full-time educational activities staff member at SME Headquarters whose primary function is continuing education. Continued growth in membership will help realize this addition to the SME staff.

In 1979, administration of the Professional Registration Examination in Mining/Mineral Engineering was assumed by SME. What is the status of registration in the Society and what support is SME providing?

Since the Society has been involved such a short period of time, it is not known how many of our members are registered. This information is presently being gathered along with other directory information and will be compiled this summer. It is probably safe to assume that the percentage of members that are registered is relatively low, for two principal reasons. First, companies stand in lieu of the individual for the most part and, as a result, pressure to attain registration is largely ab-

sent. Secondly, specialty registration examinations such as mining/mineral processing have been available only in recent years. Prior to this time, the examination was weighted heavily toward engineers in the construction-related fields. I should mention that, unfortunately, there is an effort underway in various places to discontinue specialty examinations. SME is adamantly opposed to this proposal, and I have met with the presidents of the other professional societies that will be affected by such a policy, to attempt to negate this proposal.

Professional registration is advantageous, and our members are encouraged to become licensed. With the broadening of the legal responsibility by the courts for any accident or process, registration has become more necessary. For those engineers who are going to interface with the public, registration is required.

From the standpoint of administering the examination, SME has the broadest interest of the profession and has the responsibility to ensure that the registration examination is meaningful and representative of the profession. This is most certainly the attitude that prevails at SME.

To assist persons preparing for the registration examination, the Department of Mining Engineering at The Pennsylvania State University has presented review courses for a number of years. For the past two years, short courses have been presented at the SME Fall Meeting and the Annual Meeting by Penn State personnel. It is not possible, of course, for all who wish to take the examination to attend the short course review sessions at the national meetings. In this view, the Professional Registration Committee and the Educational Publications Committee of SME are publishing a booklet entitled, "*A Study Guide for Registration of Mining/Mineral Engineers*," which will be available shortly.

As SME-AIME president, what will be some of your thrusts?

As indicated earlier, one of the most critical problems facing the industry is the drain of present faculty and the limited production of future faculty because of the salary and workload conditions that exist in our colleges and universities. Again, it is not realistic

to expect the various states to put more money into these programs than they presently do. If strong programs are going to continue, contributions from the private sector are going to be necessary, and it is my intention to bring top level management of mining companies and universities together this year to discuss this impending crisis.

Next, the Society experienced a 6% net increase in membership this past year, and another of my thrusts will be to sustain growth in 1982 by at least this percentage. If our membership continues to grow at this rate for the next several years, membership will be about 40,000 in 1990. Such growth will strengthen SME significantly by increased participation in the Society's technical programs and publications. Further, improvement and expansion of member service activities will be possible.

Another area of emphasis will be that of publications, the cornerstone of our professional society. Book publishing activity is at an all-time high and is meeting a great need of our membership. By way of example, 11 new titles were published in 1981, and 26 new books have been approved by the Publications Board for publication.

In the case of the Transactions, many members are pleased with the policy and procedures used for technical paper publication, but concern has been expressed by some segments of the membership on these points. Since the permanent recording of technological information is vital to the future of our industry, I feel that it will be desirable to review both the policy and procedures for publication in the Transactions to either confirm the present policy or to make changes where appropriate.

Any final comments?

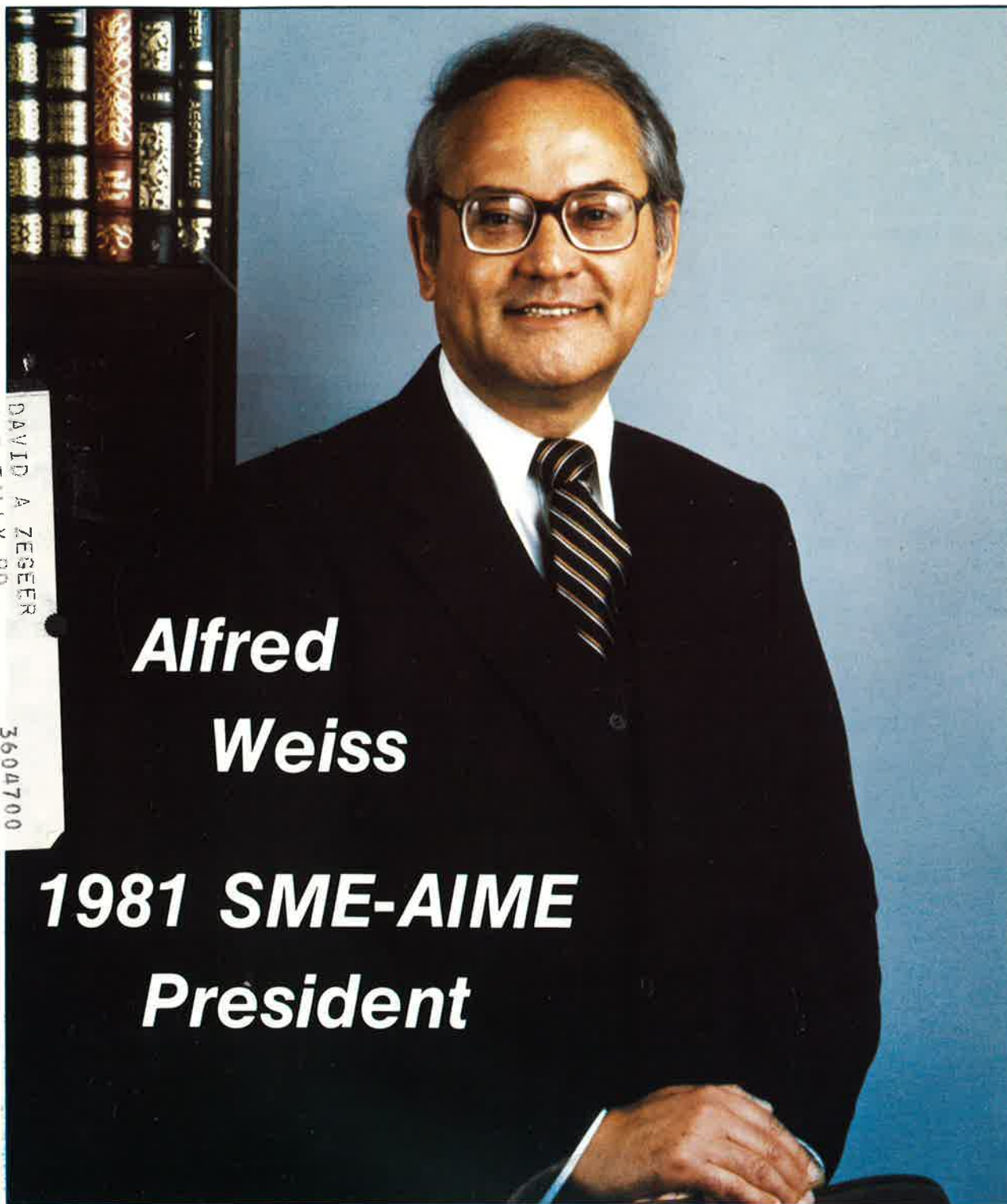
SME-AIME is a strong and vital professional society due to its member participation, involvement, and dedication. So that the Society can continue in this fashion, I would encourage those members who have been asked to serve in various capacities to do so with diligence and those who would like to become more involved to let me know your wishes. Additionally, I would also invite your input on activities you feel might be changed or added that will strengthen SME. □

MINING ENGINEERING

MARCH 1981

ISSN: 0026-5187

A PUBLICATION OF THE SOCIETY
OF MINING ENGINEERS OF AIME



**Alfred
Weiss**

**1981 SME-AIME
President**

DAVID A ZEGGER
625 TALLY RD
LEXINGTON KY

3604700
40502

An Interview With 1981 SME-AIME President Alfred Weiss

Dr. Weiss, would you briefly describe how you selected the minerals industry? What were some of the early influences on your career?

Mining has been a part of my life ever since my early years in the Far East. I was born in Surabaia on the island of Java, Indonesia, formerly known as the Dutch East Indies. My parents were Dutch and my father represented a Netherlands-based exploration and development company of which my grandfather was the managing director in Amsterdam. This company had extensive holdings both in the Middle East and Far East, in natural resources ranging from petroleum to gold. As a child I accompanied my father to many exploration and mining sites; it was probably this early exposure to mining that attracted me to the field.

At age 10 I left for Holland, where I completed my secondary education. I spent four years under the German occupation and was liberated by the US First Army in September 1944. My meeting with American GIs had a significant impact on my decision to come to the US.

My grandfather, who was fortunate enough to be in the Middle East on business during the invasion of Holland in 1940, had become a US citizen. Also, when looking over mining engineering curricula of schools both in Holland and abroad, I found the most attractive schools to be in the US. I chose Columbia University's Henry Krumb School of Mines because of its reputation.

In retrospect, I owe a lot to Columbia and its generous alumni. Not only

did I receive a broad education in mining, but I was also able to finish my education through a Henry Krumb scholarship.

After receiving B.S. and M.S. degrees in mining engineering, with a minor in mineral economics, I joined the exploration arm of Kennecott Copper Corp. My first five years with Kennecott were spent as a field engineer on development projects in Florida, North Carolina, Arizona, and Missouri.

A very important event occurred in Safford, AZ, when C. Harry Burgess, president of Bear Creek Mining Co., asked me to do a statistical analysis of the Safford ore body. His interest in this was triggered by a US Bureau of Mines publication, and his awareness of the way South Africans used statistical analysis in mining their gold deposits.

Harry Burgess then invited me to join his staff in Salt Lake City and to concentrate on applying quantitative approaches to exploration problems. My access to exploration top management allowed me to contribute significantly in many exploration projects, including the new Lead Belt in Missouri, the Tanama copper deposit in Puerto Rico, the Tintic deposit in Utah, and the phosphate deposits in North Carolina.



When Burgess became corporate vice president of exploration and Paul Bailly assumed the presidency of Bear Creek, Paul decided to establish a statistical unit with me as chief. Both Burgess and Bailly had a very important influence on the career path I followed.

To briefly summarize my career, in 1965 I became director of Kennecott's Scientific and Engineering Computing Center, which became the computing center of the Metal Mining Division, now Kennecott Minerals Co. Among all the organizations established in the early 1960s, the computer center has managed to remain viable by responding to changing needs in a changing environment.

In 1972 I became corporate director of technical/operational systems within the Management Control and Information Systems Group at Kennecott's headquarters in New York. Then, in 1975, I joined the US Bureau of Mines as assistant director for program development and evaluation. The challenge of organizing the planning and evaluation functions, in addition to assuming responsibility over traditional budgeting, attracted me to the position.

I decided to return to the private sector in 1978 and was given the opportunity to join Exxon Corp. I didn't

"Since we're not faced with an energy crisis equivalent to that of 1973, it may be difficult for the public, the Congress, and the administration to feel the urgency to formulate a nonfuel minerals policy."



realize there could be such a thing as private government, but working for Exxon is like being in another bureaucracy. Let me say this, it was a rewarding experience and worth every minute.

You've had a successful career with Kennecott, the US Bureau of Mines, and Exxon. What prompted you to start your own firm, Mineral Systems Inc.?

The idea for starting a company such as Mineral Systems had been in my mind for a long, long time. Over the years I observed the need within both the private and public sectors for a quantitative approach to decision-making. Whether the solution to a mineral problem requires the use of computers is secondary. I believe the primary objective to any solution is the delineation of alternatives and to quantify, as much as possible, the impact of those alternatives. Capabilities of operational and systems analysis are not pervasive throughout the minerals industry.

I established Mineral Systems in the summer of 1979 to offer consulting and technical services in the general area of quantitative analysis, and it has been particularly rewarding. The need perceived in different markets prompted us to establish an office in Denver, CO, in addition to the headquarters office in Stamford, CT. While we still have a long way to go, I feel we have a good foundation to build upon. Our client mix is sound and we have a highly qualified staff of mineral economists and mining and metallurgical engineers to execute the diverse jobs presented to us.

Many of the industry's problems have been blamed on excessive government regulation. Will we see reduced government involvement under the Reagan administration and a Republican Senate?

The US minerals industry's competitiveness has certainly been threatened by government regulations. However, my perspective on solutions to industry problems differs from that of many mineral engineers. Many of my colleagues have focused on factors over which we in the industry have very little control. Let me be more specific about this. There are a number of political/legal, cultural/social, economic, and other external factors that impinge on the business environment. These include environmental and safety regulations, high energy costs, depressed commodity prices, and the current high cost of money. We tend to spend a lot of time trying to alter these, as if we might actually have an effect; rather than concentrating on what I consider internal factors, such as increased emphasis on research and development, technological innovations, exploration, and controlling the cost of company operations.

In effect you're suggesting that the industry should channel its energy and expertise inward, since its impact on the political and economic situation is negligible. What about the efforts made by industry lobbying organizations, the GEM committees, and articulate industry spokesmen to influence policy and public opinion?

It is important to distinguish what can be done effectively *before* vs.

after an event—whether this is the passing of legislation, the emergence of public sentiment and pressure, or an increase in energy costs. The activities you mentioned are extremely important ones but they will only be effective, in my opinion, if they are conducted sufficiently in advance, with enough concerted effort, and in an appropriate direction. Take, for instance, the formulation of a nonfuel minerals policy. Initial attempts were made by the previous administration to develop a national policy, and I believe these attempts should be continued. Since we're not faced with an energy crisis equivalent to that of 1973, it may be difficult for the public, the Congress, and the administration to feel the urgency to formulate a nonfuel minerals policy. And yet, in my opinion, this is the time to generate and pass legislation through Congress. To explain mining's impact to the general public so that rational policy decisions can be made, or to provide an added technological perspective to appropriate government officials, are admirable goals of our GEM committees and certainly worth pursuing.

But I'm also suggesting a shift in emphasis. For example, I've had the opportunity to work briefly for an energy company in its planning activities. This company made a conscious decision to enter the minerals industry. The planning process it followed in selecting the minerals upon which to concentrate and in deciding what properties to bring into production followed a rigorous procedure—one that separated those external factors over which the firm had very little control from those requiring attention and concern.

"If a new director is not appointed promptly, then I believe our continuing concern about the welfare of the Bureau of Mines is justified. Can you imagine an organization being without a chief executive officer for over four years?"

Since you've mentioned the energy companies, what are your views on their involvement in the mining industry? Are they, because of size and financial resources, jeopardizing the smaller, independent operator?

First, the involvement of the energy companies certainly tells us something positive about the state of the mining industry. They would not venture into the minerals industry if its condition were unhealthy. They must perceive attractive business opportunities with good profit prospects for efficient projects and operations.

These companies possess the know-how, perhaps experienced through their oil and gas operations, that allows them to compete effectively with traditional mining firms. In my opinion, this is not due to their monetary position, but because of their ability to plan and execute plans—to project a business environment and conduct their business accordingly.

In addition, the energy companies have a clear vision vis-a-vis their investment goals and objectives. Each mineral investment opportunity must compete with those made in oil and gas; therefore only sizable and profitable properties are considered—those that make a significant impact on corporate earnings.

Their presence in the minerals industry structure will create the required stability, I believe, while at the same time allowing the smaller and independent operator to maintain his role among the producers. There are unique capabilities required to successfully operate small properties which large companies do not possess. It's the strength of the smaller and independent operator to act quickly and produce profitably under difficult mining conditions.

Let's return to the potential impact of the Reagan election. Many people within the industry seem to feel the change in administrations will have a positive effect.

Many of my colleagues anticipate the removal of barriers that we've felt have impeded progress in the past. I am not that optimistic. As assistant di-

rector of the Bureau, I had the opportunity to observe first-hand the government's administrative and legislative processes. As you are aware, an agency, its programs, and its regulatory mandates are all based on laws passed by Congress. These are the product of many months, sometimes years, of deliberation, both within an administration and in Congress. To reverse some of these laws entails a similar process requiring time, energy, and the right set of political circumstances. In many ways this process—which will not allow a president to quickly reverse trends set by his predecessors—safeguards many of our American values. In the final analysis, I do believe this administration will exercise more balanced enforcement of regulations in the minerals industry, but I feel we should temper our expectations to avoid disillusionment in the new leadership.

Do you foresee any negative impact resulting from the Reagan election? What policy changes would you like to see during his administration?

There has already been a change which could have a negative impact on the US Bureau of Mines: the indiscriminate removal of all presidential appointees. I realize that an incoming president is entitled to a top management team that will be compatible with his philosophy and resultant policies. If the change at the director's level occurs promptly, then that might be a very positive sign of this administration's concern for the welfare of the minerals community as a whole. If a new director is not appointed promptly, however, then I believe our continuing concern about the welfare of the Bureau of Mines is justified. Can you imagine an organization being without a chief executive officer for over four years? That's what happened to the Bureau after the departure of Tom Falkie. In my opinion, the Bureau could enjoy the stability that has made the USGS as strong as it is with a career man as its director. Allowing an extended discontinuity in its leadership would, in my opinion, be a disservice to the Bureau, the mining community, and the public.

You've discussed the outlook for the minerals industry in the US; what is your assessment of operating conditions overseas?

The international scene in mining is taking on a completely different profile. For instance, traditional concession agreements are giving way to joint venture agreements. Developing countries require a completely new set of conditions in which the foreign investor is allowed to do business.

These changes in national aspirations demand responsive business policies and practices and US companies have been among the first to adjust to these new conditions. The strength of these minerals companies is that they are international in scope and multinational in character. Many have seen the necessity to remain competitive by exploring for minerals and developing major properties abroad.

In light of this, what new demands are being placed on engineers? Are they adequately prepared or are there gaps in the mining curricula?

The profile of the mining man of the future will require a very broad-based educational background, one that is more international in scope. Unfortunately, I believe the average graduate in mineral engineering—whether in geology, mining, or metallurgy—does get shortchanged in his or her education. We must supplement these gaps with continuing education or make some important changes in mining curriculum. Let me expand on this point. Mining is essentially an international business. Many of our mines are located outside the US and most of us have been sent overseas to manage these mines. Yet I don't believe we've been taught anything about comparative management systems, international marketing, or the many human resource issues facing a multinational corporation. I'm somewhat critical of our educational system after doing my doctoral work in international business, marketing, and management. This exposure led me to conclude that these disciplines need to be incorporated into our educational system.

What is SME's role in addressing these challenges?

There is a definite role for SME-AIME in the changing industry structure and business environment. The Society's goal is the continued professional development of engineers in the minerals industry, so that they may better serve the public. To enhance professional development, SME will continue to sponsor and conduct a continuing education program and special symposia. SME meetings, because of their programming, provide additional educational opportunities for members.

Also, SME-AIME's plans to expand programming into the international arena will provide a forum for technical exchange with the international community. As you know, the first international SME Fall Meeting will be held in 1982 in Hawaii. We have already received participation commitments from the Australians, Japanese, British, and South Africans. I feel strongly that attendance, especially by young engineers, is a must if we are to keep up with the changing technology and business environment.

Much of your experience has been in the field of mineral economics. Would you like to see this area receive more attention within SME?

I stress the field of mineral economics because it pervades the entire minerals cycle. SME has a special committee on minerals resource management that not only offers continuing education short courses, but also does important programming at both the Fall and Annual meetings. This committee concentrates on microeconomics with minor emphasis on policy analysis, macroeconomics, and international economics. With the reconstitution of the Council of Economics, it will be extremely important that either of two alternative courses of action be pursued: 1) broaden the scope in terms of programming, publications, and membership in the current Minerals Resource Management Committee, or 2) establish a separate committee to cover this expanded scope. As SME president, I welcome the opportunity to insure that mineral

economics in its broadest sense receives the continuity it deserves.

As an added note, mineral economists who wish to continue their association with AIME should consider joining forces within SME, for it offers a forum for many interdisciplinary activities. Operations research, the APCOM activities, and solution mining are just a few examples.

In what ways can SME be strengthened to be more effective as a professional organization? As SME-AIME president, what will your goals be in 1981?

There are three areas in which I feel SME can be strengthened to be more effective and where I personally may be able to make a contribution. The first concerns a point I made earlier. I would like to see our GEM committees make a concerted effort to provide meaningful input toward the formulation of a national nonfuel minerals policy. Second, SME should continue to strengthen its major service of technological information exchange by broadening its base through sponsorship of, or participation in, international meetings. Third, I intend to establish several working parties to analyze a) the desirability of forming additional unit committees of interdisciplinary nature to cover emerging technologies, b) the need for a change in SME's name to better represent the professional character of the membership and c) ways to use information systems technology at SME headquarters to provide member services in an even smoother, more effective manner.

Many members seem concerned about the continued decentralization of AIME; that we may be strengthening the constituent societies at the expense of the whole. Do you share this concern? How will you attempt to resolve questions regarding the proposal that SME withdraw from the Annual Meeting?

The trend toward-decentralization, according to the official history of AIME, began in 1911 and has been evolving for 70 years. Throughout this process there have been concerns that decentralization was threatening the

whole: AIME. Yet the net result is that AIME is a strong, vital, dynamic organization *because* of decentralization. AIME is one of the very few major professional engineering societies that has provided a fluid organizational format, enabling special interest groups to pursue their goals *within* the organizational structure, rather than becoming splinter organizations.

We seem to have developed an acute sense of ambivalence on the subject. On the one hand we do all we can to make any of the constituent societies prosper, but on the other hand we fear that such prosperity will be at the expense of the other societies.

In response to your question on SME programming at the Annual Meeting, the reasons for a major policy recommendation were published last June in MINING ENGINEERING. They have been discussed widely and deliberated by the SME Board, which is acutely aware of its responsibilities. In Minneapolis, the SME Board tabled the issue in the hope that President Severinghaus would be able to work out an arrangement. I expect the issue to be resolved at the Annual Meeting in Chicago; if not, my responsibility as SME president will be to evaluate the needs of SME members and react to the policy recommendation in a manner that best serves these needs.

Any final comments?

I would like to appeal to my fellow members to follow through on assignments if they have assumed committee responsibilities; write to me personally if any of our members not active in the Society would like to make a contribution; and give me feedback on any of the issues brought up in this interview.

The SME Board makes decisions concerning the Society on your behalf. We need your input, feedback, and participation. As an SME-AIME member I have always felt that the only way to effect a change—to do something about the system—is to get involved. That is why I look forward so much to being SME president this coming year. It will give me another chance to make a contribution. ■

MINING ENGINEERING

MARCH 1980 ISSN: 0026-5187

A PUBLICATION OF THE SOCIETY
OF MINING ENGINEERS OF AIME

*Nelson Severinghaus, Jr.
1980 SME-AIME President*

DAVID A ZEGEER
625 TALLY RD
LEXINGTON KY

3604700
40502



SME-AIME President Outlines Directives for the Decade

Ben, as we begin the 1980s, what are your views on the state of the minerals industry? How did we get where we are?

The minerals industry has gone through a period of unprecedented government overregulation, environmental extremism, and social pressures. It survived during this era because inherently it does more right than wrong in responding to society's desires and needs. The industry's major shortcoming over the years may have been its inability to identify and react to changing public sentiment.

As a matter of background, 30 to 40 years ago the US viewed industrialization as an end, a successful accomplishment. A slag heap, tailings pond, or strip mine was thought to be an indication of industrial progress. As our high productivity through low-cost energy and innovative technology raised the country's standard of living, people didn't have to spend as much time producing as did their predecessors. Consequently, they had time to think about life's intangibles, one of which is the preservation of the environment. Their shift in philosophic viewpoint came sooner than those of us whose primary emphasis was on mining and production.

The 1970s also saw the emergence of the environmental extremist who lobbied strenuously for tough and often excessive government regulations. Industry slowly moved to modify its way of doing business in response to the new laws and changing viewpoints. It also attempted to communicate its views, pointing out the problems, and costs, associated with compliance.

Make no mistake about it, the needed push for change was brought about by extremists. However, many of their suggested changes were rejected. If the balance between production and environmental protection has returned to a more moderate level, it's because the balance tends to stabilize at a level reflecting society's needs and desires—and because we are communicating the industry and technological viewpoint more effectively.

What are some of the major obstacles facing the industry in the 1980s?

I think these break into three broad

areas. The changing social pressures discussed above is one. Two other areas needing further attention are excessive federal regulations and the reassessment of existing and developing technology. In all cases, one common factor will be the industry's attempt to improve communication with all groups involved.

In looking at the regulation mess,

there certainly wouldn't be "excessive governmental involvement" in our activities if there hadn't been an apparent need for it. While I consider today's regulations excessive, I'm also hoping that the sheer size of the federal regulatory bureaucracy will call sufficient attention to itself, that citizens will lobby to reduce its size. I believe this could be a first step in



"I never had any original career aspiration other than to become a good mining engineer and have never regretted it," says Nelson "Ben" Severinghaus, Jr., the president of SME-AIME for 1980.

Now the president of Franklin Limestone Co., a specialty chemical limestone producer in Nashville, TN, Ben's interest in mining was nurtured while growing up at a crushed stone operation managed by his father near Atlanta, GA. After high school Ben spent two years at Georgia Tech, then transferred to the University of Arizona's College of Mines, where he received his BS in mining engineering in 1951. Following graduation, he joined the Army Corps of Engineers and spent most of his service in Albuquerque, NM. Honorably discharged in 1954, Ben's first job was with the Tennessee Copper Corp. (now owned by Cities Service Co.) in Ducktown, TN, as a mining engineer.

"I can remember my first duties included everything under the sun, from ventilation surveys to the calculation of miners' contract payments. I was particularly interested in assignments that dealt with the testing of new equipment" Ben says one of these assignments included testing a new carbide insert bit with a stoper. "We made swiss cheese of an old abandoned drift area, logging penetration rates, bit life, and other drilling parameters."

After 18 months, Ben left Ducktown to join the Georgia Marble Co. Here his responsibilities were expanded to incorporate minerals processing technology, marketing and sales, administrative management, and finance. Ben received a series of promotions that culminated in his appointment as a director and president of Georgia Marble in 1974. With additional challenges in mind, Ben moved on to Franklin Limestone as president in 1976, where he notes "the total scope has been much greater and the opportunities are exciting."

Ben joined SME-AIME as a student member at the University of Arizona, where he was active in student affairs, an area of continuing interest throughout his professional career. Except for a two-year lapse during his military service, Ben continued his SME membership and was active in both the local section and the Industrial Minerals Division. He reflects that "SME membership has been the single most important source of good technical information as well as business contacts. I think the continuing need for a diverse background is vital in the production of industrial minerals and my affiliation with SME-AIME has certainly been an asset in helping me throughout my professional career."

improving its overall effectiveness.

Over the years, the problem with big government is its approach to rulemaking and subsequent enforcement of regulations. Policymakers often end up with a myriad of rules designed to cover every situation. By so doing, they severely curtail the factor of independent judgment. The individual or agency must enforce the letter of the law instead of being able to make a judgment decision, i.e., is this aspect of your operation safe? Well, it may be safe, but if it doesn't comply with the letter of the law, you're in violation.

Maybe there are far too many laws today because this appears to be the only way government knows how to regulate. At the state level, there tends to be a greater willingness to evaluate a particular situation, and enforcement of the regulations, while still effective, is more flexible. Dealing on a one-to-one basis provides this flexibility.

Turning to the area of technology, first I see the new decade requiring a more efficient use of energy—the fast-growing cost factor in most operations. The problems rest with the engineer who must review existing technology—even to the point of using a sharper pencil in design. The price of over-design to cover possible error will become increasingly dear. While our present methods may be considered adequate, an innovative mind will always find a more efficient way to do a job, resulting in a better product.

Additionally, continued development of new technology will be required. Ion exchange technology developed in the 1970s is one example of the type of technological breakthrough that will be needed. The technological mandate of the 1980s is twofold: Continued development of new technology and improved application of existing techniques with emphasis on better energy utilization.

In summary, while a good engineer is probably already addressing these areas, further emphasis will be needed in the decade ahead.

What is SME's role in addressing the challenges?

Technological information exchange is the basic purpose of SME. Our job is to facilitate this transfer of information so that an engineer in one half of the country can find out what his contemporary in the other half is doing to resolve a problem. The medium for exchange consists primarily of publications and meetings. As we become more sophisticated in our information requirements, we should be considering the use of new electronic data processing systems that

can expedite information retrieval and transmission. These systems are going to be a fact of life in the future.

Our GEM program is another area that can respond to the challenges. Existing programs should be continued with additional emphasis on encouraging more individuals to become involved in influencing what our government does. The SME member in performing his or her technological duties can provide an added perspective to appropriate government officials and should make a positive effort to do so. I think that over the years it's been quite easy to sit back and complain about the excesses of government without taking any personal concrete action toward changing it.

What are SME's strengths and weaknesses?

The strengths are found primarily in our network of local sections throughout the US. If you look at the combined attendance of all the local sections in a year's time, it would have to be at least 10 times as great as that at our national meetings. These national meetings serve as a different sort of forum where a broader base of information is available. But at the local level, we have a group of people that get together on a more regular basis to exchange technological information, enjoy each other's company, and find out what's going on in the world around them.

In recent years, the role of the local section in SME-AIME affairs was elevated with the creation of section representatives of SME-administered local sections. Some 65 local sections with primary interests in mining are divided into eastern, central, and western regions. The regions meet once a year to discuss common problems in local section management, programming, and administration. Each region also elects an SME-AIME vice president, who represents the region and local sections on the Board of Directors. Through this mechanism, any individual member has definite, positive input into all SME activities.

Finally, as a business organization, SME has become outstanding. We handle our administrative affairs with dispatch, our financial affairs with discretion, and we're building an adequate net worth to support whatever worthwhile activities the membership can envision. Our publication efforts, one of the major means of information exchange on a national or international level, are functioning in an extremely efficient manner.

These sorts of things I view as SME's strengths and our organization is serving its purposes quite well. I have a hard time identifying anything

that could be called a major weakness, although I'm sure we may have some.

Do you expect significant membership gains during the year?

One of my principal thrusts for 1980 is going to be encouraging each member to identify a prospective member with knowledge, skills, and contributions that he or she can make to increase SME's base of technical information. From this, I would hope to see an effective increase in membership, not for the sake of increased numbers, but rather to have a greater resource of information available for everyone.

What other goals have you set?

I view 1980 as a year of consolidation, an attempt to add to our resource base. It will be a year of adjusting to our new headquarters building, and letting our staff hone their skills to provide member services in an even smoother fashion. If I had to mention another area of major activity, perhaps it would be one of assessing our position and laying out growth and service plans for the 1980s.

In 1980, SME will jointly sponsor meetings with the Mining and Metallurgical Institute of Japan and the Institution of Mining and Metallurgy. Does this represent a new international focus for SME?

Of course international interests are part of SME's future and this is an area where the Society can provide a major service, by gathering and making available technical information from over the world to our members wherever they are. Participation in international meetings is certainly a worthwhile undertaking that fosters not only an increased information base but also provides for better understanding of our mining counterparts throughout the world. In 1982 our Fall Meeting is scheduled for Hawaii and plans are being made to reflect the international focus and participation. With the world continuing to "shrink," it will be interesting to observe how much we grow on an international basis by the end of the 1980s.

Any final comments?

Again, I would like to reiterate that I look to 1980 as a year of consolidation. I hope that during my presidency, all those members who have accepted a position of responsibility within SME, local or national, will make a strong commitment to the job and execute it well during the year. Certainly the rewards are numerous and the continued success of SME depends on it. ■



MINING ENGINEERING

MARCH 1979

ISSN: 0026-5187

A PUBLICATION OF THE SOCIETY
OF MINING ENGINEERS OF AIME

DAVID A ZEGER
625 TALLY RD
LEXINGTON KY

3604700
008
40502



Robert Stefanko
1979 SME-AIME President

An Interview With 1979 SME President Robert Stefanko

Would you briefly describe how you chose the minerals industry and reflect upon some of your earliest experiences?

I wish that I could say that I had a well-formulated career plan early in life and that mining engineering was always foremost in it, but I cannot. In fact, I was quite indecisive before I finally chose my life's vocation. But in another respect, I am glad my career unfolded in the manner it did because it gave me a better insight into advising others on career opportunities. Probably the greatest problem confronting our youth, and the one I find preys upon their minds the most, is their inability to select a career path early in life. This indecision frequently has a deep psychological effect upon them and they become down on themselves. Therefore, it fortifies them somewhat to learn that others who have become successful in their careers had difficulties choosing a career path early in life. However, while assuring young people that an early choice is not absolutely essential for success, I caution them to work toward as early a decision as possible.

I originally selected mechanical engineering as a career, but after my first year of school, I lost interest. This was at the time of World War II so I attended the Naval ROTC program at the University of Virginia and received a commission as well as a BS in Naval Science. For a while, I enjoyed the service and seriously considered making it a career but when the war ended, I took a discharge and decided to return to school. While visiting Penn State to discuss the various curricula, I decided to enter mining engineering. This decision was rather shocking to my friends and family.

I was born and raised in the heart of the coal mining area in southwestern Pennsylvania, and nearly everyone in my family had worked in the mines at one time. However, the badge of success was to be able to work out of the mines. To my friends and family, I was going in reverse. After seemingly being able to avoid the mines and achieve a modicum of success, I chose the mines on my own volition. But once I made the decision, I never regretted it.

I received my BS in mining engineering from Penn State in 1948 and immediately went to work for the Westmoreland Mining Co. in western Pennsylvania. This was a rather small company with four operating mines, but I was able to receive much valuable experience because of the diverse assignments I was given. Some early jobs included putting in a railroad siding over very difficult terrain and expanding a preparation plant, and I worked on virtually every job underground until I received my mine foreman's papers. Then I was made assistant mine foreman. I enjoyed the varied challenges of the job, and in fact, was scheduled to take charge of our first surface augering operation when disaster struck.

On August 6, 1951, I was buried in an underground roof fall that broke my back and put me permanently in a wheelchair. After a long one-and-a-half years of hospitalization, I came back to work for the company, but I missed the direct contact with operations since I was assigned a job in the office as purchasing agent. It was then that I decided to go back to Penn State in 1955, work on a masters degree, and perhaps find a new direction.



The decision to return to Penn State was probably the best one I have made in my life because it opened up a career that I have found to be the most gratifying of all. I enjoy teaching and the association with young people and all the opportunities one has at a great university. I feel that a university position is the next best thing to being your own boss. And in many respects, it is even better since you have virtually the same freedom but with the assets of a large institution behind you—an unbeatable combination. Of course, I admit I am very biased—I have found Penn State a unique place to work. It has excellent people and outstanding physical facilities.

Since you have devoted so much of your life to minerals education, and education appears to be under attack today, would you comment on the basic problems in education, or do you refute the existence of real problems?

There is no question that there are real problems in education in this country, but this situation is merely a symptom of a greater problem facing our society—a lack of discipline. To a large degree, education is the ultimate expression of discipline. In essence, we are asking the individual to discipline himself to make short term sacrifices to achieve long term objectives. However, today we have the "now generation"—our youth want it now, they are not willing to wait four or five years until they secure their educations. But before we quickly condemn this generation of students for lack of discipline, let's admit that our generation has shown a tremendous lack of discipline too, incurring a staggering personal debt in credit buying and consistently electing fiscally irresponsible governments that have brought our nation to the brink of bankruptcy.

The student today is quite different from the student of

20 years ago who came to college with a better background. We had fewer discipline problems and the students studied harder—they knew what was expected of them and they worked more uncomplainingly to achieve it. Today, our students are very poorly prepared for college work, and their basic background in the three R's is very bad. A large majority of them require remedial mathematics and English, and their spelling is unbelievable. Furthermore, they have not acquired good study habits, actually do not know how to study. The result has been an erosion of standards at the universities. All of this is a product of a permissive society and that great fiasco perpetrated on our society—the so-called progressive education that has set us back a generation.

You paint a rather dismal picture of education. How will all this affect the future role of technology in the US mining industry, and how is the industry to secure a competitive advantage?

I don't wish to sound unduly pessimistic because by nature I am an optimist. My experiences in life reveal that everything is cyclical—just as a pendulum swings on a clock, reaches a distant point, and returns again—so do trends in life swing back and forth. I see signs that the pendulum is swinging the other way now. I believe we have hit the low point and each class is trending upward with respect to its background in the basics ever so slowly, with a long way to go. Ill-advised experimentation in education seems to be on the decrease and we are returning to the basics. The unsettled nature of the youth in the sixties and early seventies is stabilizing. There is a greater awareness of the need to work hard—jobs aren't quite as plentiful and competition for them is increasing. Therefore, I feel optimistic that a correction is occurring in our educational system and, if we can hold on for a few more difficult years, we will come out of this experience in good shape—perhaps a bit wiser so we will not succumb so easily to unproven educational experiences.

The average scholastic level of students is much lower today than it was 20 years ago. The range between the poorest and best is much wider. Therefore, companies need to be much more careful in their recruiting. It wasn't too many years ago that being at the top of one's class was a "kiss of death" because it meant difficulty in getting a job. One (truly greatest shock) in 1948 was to learn that being at the top /truly class was a handicap. Companies viewed me with suspicion. My advice to companies is to look at the academic record of the student and give it considerable weight. After all, it's the 'only significant measure of his success to date. Because of the tremendous benefits of advanced technology, today's top student probably surpasses the top student of 20 years ago. There are real gems in our graduation classes just waiting to be plucked.

One hears of a potential shortage of mining engineers and miners—how serious is this?

The law of supply and demand corrects for shortages; we have always seen it work in the industry, and I see no real shortages over the long term. The belief that no one wants to work in the mines is a myth created by the media, in my opinion. There are plenty of people willing to work in milling. I will admit, however, that there is a shortage of highly experienced and motivated miners and mining engineers, but this can be corrected through proper training. We are, in fact, seeing an explosion of training today, and believe it will prove greatly beneficial.

Just a few years ago, enrollments in mining engineering were very low, and schools were abandoning their mining curricula. Today the enrollment keeps rising. At Penn

State, for example, we have gone from 18 in mining engineering in 1973 to 450 today, and this growth has been repeated at other schools, many of which are new entries into this field of education.

So there are a lot of potential mining engineers in the pipeline, and I can understand why many fear that an oversupply may be produced. And I am sure it may, but as soon as the supply exceeds the demand, students will get the word and transfer into other career paths, and the supply problem will correct itself.

What is the alternative? The government could regulate the careers one could enter. But the mere thought of government regulations sends a chill down my spine. Regulations could be successful only with good forecasting of career opportunities, and the track record in forecasting career needs has to be very dismal. Therefore, legislation would probably worsen the situation rather than improve it.

What isn't fully appreciated is the much greater need today for mining engineers than ever before. The paper work involved in placing a mine on stream today is staggering and requires engineering manpower and expertise never before dreamed about. Also, technology is moving very rapidly. The half-life of a mining engineer is currently estimated to be eight years—this means that half the training of today's graduates will be obsolete in eight years. Therefore, education must be a continuing effort.

Recognizing this, we have instituted a strong continuing education effort in SME-AIME. Professional registration is going to be a more essential requirement than ever before and periodic re-certification will be necessary. The engineer will have to be refurbished and short courses are a very efficient way of achieving such refurbishment. The practice of granting a continuing education unit credit for each 10 contact hours of instruction that has been nationally accepted will find increasing use, I would hope that SME-AIME would be in the forefront of this effort.

Since you brought up SME-AIME, would you tell us how you became affiliated with the Society of Mining Engineers of AIME, what problems must be overcome in SME, and what will be your thrust as the 1979 SME-AIME President?

When I attended Penn State in the latter forties we had a very active AIME chapter. I guess I missed that professional association very much when I went to work in industry. In order to have a professional affiliation, I joined the SME-AIME in 1950. In my experience, the more you give of yourself to any organization the more you receive from it and SME-AIME is no exception. When I hear a member complain that he hasn't received much from SME-AIME, I usually find he hasn't become involved. It is easy to stand aloof and complain about what is wrong with an organization; it is harder but much more constructive to actively work to effect changes.

The main thrust of the Society must be its technical programming. We must continuously strive to maintain the highest level of quality and professionalism. Therefore our publication effort is extremely important. Our book publishing program has been very successful and meets a great need. I would hope that we could expand the number of technical publications. Also, I believe new features in MINING ENGINEERING could prove to be highly popular. And above all, I believe it is our duty to educate the government and the general public about the need for a viable minerals policy through our GEM activity. I feel our country is at the crossroads with respect to the development and wise use of our mineral resources and we are staggering very badly. Even five years after the oil boycott,

we have not established a workable national energy policy. But it is not only energy, but mineral shortages of all sorts that loom on the horizon. However, these subjects have been reported in this magazine in considerable detail in the past, and so I do not want to dwell on them here.

I gather then that you feel the government is highly responsible for many of the problems facing the mining industry and creation of the Department of Energy and establishment of a national energy program have not produced the desired results?

Yes, I do believe government has a large responsibility for today's plight but I hesitate to place all of the blame there. The government is a convenient scapegoat, and I am afraid we have a tendency to blame labor and management inadequacies on government as well. True, the government has not inspired confidence in the people, and it is no wonder the public is so confused when it sees that our own government leaders appear so confused. The creation of the Department of Energy appears to have fragmented the mineral industry more than it has consolidated it. Further, creation of the Department of Energy is not yet complete—it is a continuing saga like many of our soap operas that go on and on.

It appears that reorganization is the bureaucrats' method of avoiding responsibility—they use it as an excuse for inaction. Just as soon as it appears that the reorganization is complete and now some work can be done, another reorganization and disruption occur. The simple fact is that even now the Department of Energy is completely disorganized, and the morale of the personnel is at a low ebb. Much of the problem lies in the political patronage system—people are put into high positions in government without having the faintest idea of what they are to do. Is it any wonder that we're in such chaos? It's strange that when medical programs are being initiated, doctors are generally responsible for implementation, architects are consulted on buildings, and lawyers about laws, but when it comes to mining, we feel constrained to avoid vested interests at any cost and, therefore, political and social scientists are placed in positions of responsibility in government.

As for the energy policy—what policy? It is merely in another guise, another social program to redistribute the wealth. No incentives are being given to produce energy—just the opposite. Now we have an oversupply of natural gas and television commercials are exhorting the public to use more gas once again. Is it any wonder the public is confused? It can only surmise that all of this is contrived.

But apart from the government's shortcomings, we have some serious problems of management and labor in the mining industry. I don't believe the industry has ever utilized mining engineers adequately. In fact, for many years, it was virtually impossible to get a job doing mining engineering work. Most jobs were in production, leading to supervisory positions. Industrial research and development were virtually nonexistent. In short, the industry has never placed a high value on engineering, and we are now reaping the harvest of this backward philosophy. The mining labor organizations look chaotic at best. The leaders no longer have control over the rank and file, and absenteeism and wildcat strikes are destroying the industry. Management has not risen to the need to provide a leadership role. The result has been an alarming loss of productivity that must be reversed. It is a tragedy that we are buying coke from abroad while many of our mines that produce metallurgical coal are being shut down because of

poor productivity. Productivity must be increased. Its reduction in recent years is not the result of any one single factor but the combination of many. Foremost among these is the decline in the work ethic which results in large measure from a lack of discipline in our society.

Then you do not necessarily agree with many who say that the federal Coal Mine Health and Safety Act is largely responsible for loss of productivity, along with environmental legislation?

I think both issues are highly emotional and not always kept in proper perspective by all concerned. I would shudder to think, for example, that safety and productivity are incompatible. It has always been my personal philosophy that the safest mine is the most productive mine and vice versa, and my faith remains unshaken. It is true that initiating changes will produce some adverse short term results. However, I have seen personally the disastrous effects of a poor safety record on productivity. Men cannot be highly productive when they are unduly concerned for their lives. The problem lies in the adoption of regulations not clearly thought out, regulations that frequently create a greater hazard than that they are intended to alleviate. We need better formulation of reasonable legislation and then strict enforcement. Now, too frequently, poor regulations are passed and then ignored by all concerned. Thus the whole system becomes suspect. Our safety record is not one to be proud of and we must continuously strive to improve it. But this does not have to be at the expense of drastic losses in productivity.

The same is true with environmental legislation. We need to avoid many of the mistakes of the past, and mistakes were made. But this was not the sole responsibility of the mine operator. The general public—the consumer—was unwilling to pay the price for environmental safeguards. But over the long run, environmental protection pays off well. What we must guard against is an overkill—moving so fast that we disrupt the whole economy. We are seeing too much of this. The fundamental problem is one of lack of respect and trust. We do not trust one another, and, therefore, all groups adopt adversary positions rather than pulling together. It is only when everyone has the best interests of the country at heart, and we build relationships on mutual respect and trust, that our society will function as a well-organized machine.

Any final comments?

I don't wish to appear to be a prophet of gloom because I have found from personal experience that it really is always the darkest before the dawn. I have confidence that we have not reached the point of no-return. This is a great country, our heritage is strong, and I believe we can overcome our obstacles. I see a greater recognition of our problems which is a first step toward their solution. In SME-AIME, I look to a period of consolidation in which we will improve upon what we are doing rather than try to over-extend ourselves in new programs. I believe our new building will prove a real asset, and we must concentrate on this near-term effort. But the strength of any organization lies within the individuals who comprise it. We have dedicated people working for the benefit of the Society but we need more help. Therefore, if one of you is approached and asked to do a task for SME-AIME, I hope you will find time in your schedule—help your Society. Do not hesitate to respond as an individual through letters to the editor. Make use of the materials emanating from our GEM organization as they can be very effective. Do not underestimate your role in helping SME achieve its goals. ■

MINING ENGINEERING

MARCH 1978 ISSN: 0026-5187

A PUBLICATION OF THE SOCIETY
OF MINING ENGINEERS OF AIME

DAVID A ZEGER
625 TALLY RD
LEXINGTON KY

3604700
40502



1978 SME-AIME President Robert S. Shoemaker

An Interview With 1978 SME President Robert S. Shoemaker



"The real mineral shortage in the US is going to be caused by a shortage of places to mine the minerals," says the new SME-AIME president. Mr. Shoemaker is manager of metallurgy, Mining and Metals Division, Bechtel Corp.

Briefly, can you relate how you got into the minerals industry and some of your experiences as an executive, engineer, and administrator? Also would you tell ME about your affiliation with the Society of Mining Engineers of AIME?

Roseburg, Ore., was where I was born and raised. It was, and still is a lumbering town; it couldn't have been any farther from mining. Upon graduation from high school, I turned 18 and, having already signed up with the Army Corps of Engineers, I was in the service eight days after my birthday. Four months later I was in New Guinea. As an amphibious engineer, I saw many of the Pacific and Philippine Islands, and ended up in Japan just a few days after the war was over. In later years, my work took me back to several of the places I had been during the war.

In 1946, I went to Oregon State, majoring in chemistry. My summers were spent as an underground miner in a baling-wire gold and copper mine mistakenly called the Champion (where my evenings were spent either shooting rats in the bunkhouse kitchen or helping run iron nail assays with a track spike) and with the USBM at Albany, Ore. In Albany, I was firmly hooked on the chemical end of metallurgy or the metallurgical end of chemistry. One bachelors' and two masters' degrees (the second M.S. from the University of Wisconsin in metallurgical engineering), a wife and three children later, Rush Spedden hired me to work at Union Carbide's new minerals research lab in Niagara Falls, N.Y.

That job was an education in itself, and I wish every young engineer could have shared in it. We researched and pilot-planted most of the ores and minerals in the book and many which weren't but which were made in Carbide's furnaces. The latter work led to assignments in Carbide's various ferroalloy plants, mostly to

operate plants to recover ferroalloys from slag. Next, I was transferred to Union Carbide Ore Co. in New York City. During the next five years I didn't spend much time at home. Mostly, I was in Norway having a great time with such things as manganese nodulizing kilns, a sinter plant, and all kinds of materials-handling problems at two ferroalloy plants and four quarries there. There was also a five-month stint in Western Australia, looking for manganese in the heart of what is now iron ore country, and other work in South America, Africa, England, Florida, and Virginia.

At the end of 1961, I had decided it was time to return to the western US. Bechtel sent a man to see me. They were interested in expanding the work of their Power and Industrial Division and were looking for metallurgists. The engineering business sounded intriguing and I decided to try it. Today, you often hear the old-timers accuse the new graduates of demanding a fancy office the first day they're out of school. I don't believe that. At that time, Bechtel gave me a stool and I shared a corner of a drafting table for the first week. The next week, I got a desk in the bull pen. That was the start of the most interesting 16 years of my life so far.

After two years, the Mining and Metals Division was formed; and with it I have been engaged in metallurgical plant design in almost every part of the world, serving as project engineer, chief metallurgical engineer, consulting metallurgist, and finally manager of metallurgy. Our major businesses have been the processing of copper, nickel, aluminum, and iron ores; but we have designed plants for the concentration of everything from bastnaesite to vermiculite. My favorites, though, have always been precious metals plants.

You asked about my affiliation with SME-AIME. I joined AIME as a student member in 1952 and have been involved in some way every year since then. Both Car-

bide and Bechtel have supported me in all my AIME activities, including the monographs I have written with Frank McQuiston. They are both fine companies and have my sincere thanks.

It's been said that the energy shortage is just a preview to the more pressing problem of a pending "minerals shortage." What are your recommendations for averting the latter?

So far we have seen only temporary and localized energy shortages, and in my opinion they have no effect on the average American. Unfortunately, the average citizen realizes the impact only when a shortage has a marked and long-term effect on his pocketbook. So far, the government has been able to delay the effects of the energy shortage by artificially holding down the prices of our domestic fuels. I don't believe this practice can be continued much longer. In regard to the "minerals shortage," I believe a true scarcity of almost any mineral will be too far in the future for an ordinary mortal to predict. For example, 50 years ago the idea of transmitting voices through glass fibers or fishing with carbon fiber rods would have been thought impossible. I believe we will find substitutes for most minerals when we need them.

The real mineral shortage in the US is going to be caused by a shortage of places to mine the minerals. Presently, wilderness areas are far more popular than metal mines. Our legislators must somehow stop this steady withdrawal of public lands from multiple use and entry. We in the minerals industry must somehow get the idea of multiple land use across to the people of the US. If we don't, the US will soon be importing minerals at the same rate it imports petroleum. This may be only an academic question, however, because it appears that by the time we need to import our minerals, we will have spent all our money for importing fuels and will have nothing left to buy in the nonpetroleum minerals.

How can SME-AIME members play a more vital role in bringing the mining industry's story to the general public and to the government?

Our GEM committees and GEM activities are the best things that have happened to SME in the last several years. They enable the individual member to explain the impact of mining to the general public so that rational policy decisions can be made. Surprisingly, though, a number of Local Sections have not yet formed GEM committees or become involved in GEM activities. I cannot help contrasting this somewhat apathetic record with that of the outspoken Sierra Club members, each of whom, it seems, is highly vocal in defending things he believes in and attacking things he doesn't believe in. If each AIME member could generate only a small amount of the enthusiasm each environmentalist generates, I am sure the general public and our lawmakers would be far better informed than they are now as to the impact of the mineral industry on our country.

An extended short course program has been developed for the SME-AIME Fall

Meeting later this year. What do you view as the future continuing education needs of SME members?

Short courses established and given by SME are one of the important ways SME can serve its members, and I would expect this service would be continued and expanded. I have hopes that in the future, SME will employ its own staff of educators who will work part-time for SME and part-time for an accredited university. With such a program, SME short courses may eventually be accredited and applied toward degrees or professional engineering registration requirements. I can further see these short courses being taken to the engineers themselves rather than being given in conjunction with the annual and fall meetings. After all, only a relatively small percentage of our members can attend these meetings. This is the reason we try to take our fall meeting to areas not usually served by the annual meeting.

The Society of Petroleum Engineers has an interesting audio-visual presentation, which SME could develop in the future. Unfortunately, we don't have the financial resources SPE has. We do, however, have a source of income which could be utilized for these purposes in the monies obtained from the Offshore Technology Conference. In 1977, this amounted to over \$80,000; and the total over the years has been over \$300,000. This money has, in effect, been used to subsidize SME expenses and thus hold down SME dues. Actually, it is past time we raised dues, since the purchasing power of 1978 dues is now less than the purchasing power before we raised dues in 1973. Holding down dues has done nothing but limit member services—and this is a trend which I believe must be reversed.

An SME Working Party is engaged in getting minerals engineering on the National Professional Engineering Registration Examinations. Would you give us your view on the importance of registration to SME-AIME members?

Professional registration by engineers has been primarily emphasized in the past by civil engineers and land surveyors. The reason behind registration in these areas has been safety of public buildings and legal problems in subdivision of lands. As our laws have become more strict and as the number of statutes has proliferated, our government has attempted to control more and more facets of our lives. Registration of more and more engineers has become commonplace and necessary.

Another factor contributing to registration is our court system, which is continually broadening its definition of legal responsibility. Lawsuits increasingly involve everyone who could possibly have any connection with the design of equipment or of a process which is in some manner involved in an accident. One of these days, I am sure professional registration will be required by law for every engineer, no matter who he works for or what he does, just as barbers and saloonkeepers are required to be licensed.

While I'm not a proponent of more government regulation, I do believe licensing of engineers will tend to keep engineers up-to-date in their fields and thus promote better engineering. Some states are already discussing a "point system" for at-

tending short courses and technical conventions, writing papers, and so forth, which will count toward the maintenance of an engineer's registration. You can be sure that once government starts discussing something, it will take place whether we like it or not; and I would therefore suggest that all engineers had better be prepared to obtain professional registration. Fortunately, our educators are promoting this registration by urging graduating students to take the EIT examinations as soon as they get out of college.

Are there any new problems that you see within SME-AIME today?

Our most important problem is growth. First, SME needs more members. It is amazing to me how many engineers and scientists in our profession are not yet members of AIME. It is obvious we haven't made our organization either sufficiently known or valuable enough to attract their interest. I think many of these nonmembers are saying, "What's in it for me?" and that's the wrong attitude. This organization doesn't exist just to be of benefit to its members, it exists to benefit our society as a whole. How else are we going to develop the knowledge to recover our mineral resources in a responsible and profitable manner if we don't have a technical society to serve as a link between industry and universities, to act as a forum to interchange technical information with other countries, and to aid in developing new mineral and metals technologies which will be needed in the future.

Unfortunately, it's kind of a chicken-and-egg thing. If we don't have the members, we can't support new member services, and if we don't have the member services, we can't attract new members. But member services through meetings, local sections, papers published, short courses given, and books published have expanded tremendously in the last few years without a parallel membership growth rate. Shall we continue to expand these services? I believe we should, particularly in those areas which will benefit those members who cannot attend either our annual or fall meetings.

In what ways can the Society of Mining Engineers be strengthened to be more effective as a professional organization?

The key word is professional. A professional organization can only result from its members being professional in the strictest sense of the word. I have just spoken of two ways to maintain this professionalism: through professional registration and continuing education of our members. We must realize that as professional engineers we have a responsibility to our country, not just to our employers and ourselves. To fulfill this charge, each of us must contribute more of ourselves to our society. Our efforts in GEM committees in each of our sections can be an area where each member can contribute effectively. By speaking from our technical experience, SME members can "translate technology to the lay public so that they will be informed legislators and voters." If we don't respond, pressures by many organizations will result in mineral shortages in the US. These shortages will, in turn, result in a continuing balance of payments de-

ficit which has only been started by our continuing purchase of foreign energy.

As SME-AIME president, what will you emphasize in 1978?

I have already discussed two of the areas I believe should be emphasized: an increase in member services and the GEM program. Finally, I would like to see an increase in membership; and I believe the areas where this is possible are the coal and industrial minerals divisions. Both these areas pose a challenge because they are served by other organizations and journals. In neither case, however, do these organizations and journals furnish the professional association and opportunity for technical publication that SME does. The addition of a substantial number of people from these two disciplines, particularly to our active membership, will be a considerable advantage during the next few years, when we face particularly difficult times.

We all know there is strength in unity; certainly that has already been conclusively demonstrated within SME ranks. A larger and more cohesive SME through the addition of large number of coal and industrial minerals engineers will also increase our impact on the problems facing us.

The Society's student membership has exploded to about 20% of the total membership. What can these future engineers do to contribute and become more fully involved in Society affairs?

I am very much concerned about the rapid increase in our SME student membership. As of December 31, 1977, there were 8800 AIME student members; of this figure over 4400 of them belonged to SME. We are trying to determine which of the SME divisions these students are interested in, but I suspect most of them are geology students. Of the remaining students, almost 2000 belong to TMS, 2370 to SPE and only 9 in ISS. We have recognized that supporting these SME student members is a serious drain upon our finances. This has resulted in a raising of student dues for 1978 from \$4.50 to \$9.00. Even so, student dues income does not cover the costs of student programs.

I am worried that all these students cannot get jobs in the minerals industries or in any discipline related to the minerals industry. I think somehow our colleges and universities should have a responsibility to limit the number of students in any one discipline. A year ago I was talking to a dean of engineering at a northwestern university. He said they were turning out one forestry student for every tree in his state. I realize I may be criticizing one of the basic rights which people in our democracy expect—that is, an education in the field of their choice—but at the same time I am worried about this approaching surplus of graduates in certain fields.

Two years ago in this column, Jack Havard advocated a return to the concept of the professional degree, as an option to the M.S. and Ph. D. programs. I completely agree with this thinking; and as a member of the Dean's Advisory Council at Mackay School of Mines I have tried to emphasize quality of graduates, not quantity. □

MINING ENGINEERING

MARCH 1977

A PUBLICATION OF THE SOCIETY
OF MINING ENGINEERS OF AIME

DAVID A ZEGEER
625 TALLY RD
LEXINGTON KY

3604700
40502



1977 SME-AIME President
Donald O. Rausch

An Interview with 1977 SME-AIME President Donald O. Rausch

Dr. Bausch, from your vantage point as educator, engineer, and corporate executive, what would you say is the most fundamental need that must be satisfied for the continuing welfare of our society, our industry and our profession?

Since we're all suffering the consequences of recession *and* inflation, and since most of us are painfully aware of the current fuel supply problems, let me skip those issues for the moment.

What concerns me more is not just the absence of an energy policy but also the lack of a national nonfuel minerals policy. I emphasize "nonfuel minerals" because the United States today depends on foreign sources to an unprecedented extent: of the 60 minerals we require, the US is self-sufficient in only 12. In 1974, for instance, we imported more than 50% of 23 of these minerals, and imported between 5% and 50% of the remaining 35. The situation hasn't improved. And, I think that our nonfuel minerals supply crisis is infinitely more complex and far more subtle than the present shortage of petroleum products.

Parenthetically, our society would not be drastically affected by, say, a massive shortage of fluorspar or rutile as it was by the oil embargo of 1973. But should simultaneous shortages occur in supplies of those various nonfuel minerals that we must import partly or wholly from foreign sources, then the effect on the US economy could be quite severe, if not catastrophic.

With so many problems that plague us, why should we worry about something that hasn't happened yet?

For two reasons.

First, most people have a tendency not to "worry" much about a problem until

the symptoms of the problem begin to interfere with their daily activities. Although many of us predicted the energy crunch years before the OPEC embargo, John Q. Public didn't become concerned about the fuel crisis until John Q. Public discovered he couldn't get gasoline or that his home heating bills had doubled or tripled.

Second, and this is happening right now, world demand for nonfuel minerals considered essential for human existence is increasing rapidly—while at the same time our ability to produce domestically many varieties of nonfuel minerals is either nonexistent (because of geology) or severely limited because of mindless over-regulation and legislation.

This is why I'm advocating a comprehensive domestic minerals policy. With the emerging third-world countries requiring additional raw materials, many of *the* minerals that industrial nations rely on will become less available. Over the years, US, English, and Japanese capital has been invested in these underdeveloped countries. Today the trend of nationalization is becoming contagious. The third-world countries seek an improved standard of living, and rightfully so—though I cannot agree on most of their methods.

A realistic national minerals policy must be based on the recognition of the important but not necessarily self-evident fact that: the power of the US in the world economy is becoming substantially less significant as developing nations, in their bid for a proportionately greater share of the world's mineral production compete more aggressively with us for many essential minerals.

The days are gone when the US can exploit the natural resources of other countries just for our own use. So, from

now on, we must try to do the best we can with what we have at home. Even under ideal condition; the orderly development of our domestic resources will require a considerable amount of time. But since current conditions are far from ideal, we must first formulate a rational domestic minerals policy that will, among other things, encourage and promote the necessary capital investment.

What would be some of the specifics in such a domestic minerals policy?

For starters: conservation. Everybody wants *that*—and yet, I haven't seen very much being done in the formulation of public policies that would provide the economic incentive for increased recycling of materials.

Of the 400 million tons of urban and industrial solid waste generated in 1970, 8% was metals. The accumulation continues at a growth rate of 4% per year. Within the next 50 years, the need for *large-scale* recycling will be inescapable.

At NL Industries, we recycle a lot of lead, mostly from old batteries. This is, of course, fairly well-established technology. But the real "recycling" need that exists in this country is to develop new technology to recycle economically other materials less amenable to recycling than, say, lead, scrap iron, or copper. Although the US Bureau of Mines has done commendable work in this area, private industry still needs government support and economic incentives. The type of incentives that would encourage industry to recycle might be tax credits, tax-exempt development bonds, lower (or at least nondiscriminatory) freight rates for recycled materials, labeling standards, and examination of any export restrictions on recycled materials.

Next. A sound domestic minerals policy must also recognize that the foreign activities of US mineral companies are, in the vast majority of cases, clearly in the best interest of the United States and of the host countries. I'm firmly convinced that multinational companies are a positive force in promoting world peace and trade; they keep our channels of communication open among the various societies and cultures by assisting underdeveloped countries to build their economies by providing jobs, investment funds and technical assistance. I think this type of foreign investment by US multinationals is a far superior approach to foreign policy than the traditional granting by our government of foreign aid in the form of cash grants or so-called "low-interest loans" that frequently are not used for the purposes intended.

Dr. Bausch, you have stressed the concept of "economic incentives" for domestic minerals development. Don't you think that some people might oppose it by calling it a program of "subsidies" or "handouts" for industry?

Of course—and to critics who advance that argument, I'd merely point out that

economic incentives are the exact opposite of handouts or subsidies. You can provide an economic incentive, say, by just removing man-made obstacles to development, production, and trade—or, for example, by allowing individuals and corporations to retain a bit more of what they earn, so as to increase savings, which generate capital investment which, in turn, creates the jobs of tomorrow. Economic incentives eventually benefit everybody. A subsidy or handout ultimately harms everybody—particularly the recipients.

The crux of the problem today is in the vast array of economic disincentives or, if you will, obstacles to domestic minerals development. For instance, when I see pending legislation that would impose unnecessarily strict and costly reclamation requirements on the strip mining of coal, particularly in light of our current energy shortage; or proposed legislation to withdraw still more acreage of public land from mineral exploration and development; or proposals to curtail mineral depletion and eliminate the use of foreign tax credits, I get the feeling that our congressional leaders have all but forgotten the Mining and Minerals Policy Act of 1970, which was a pretty good piece of legislation.

Would a strong domestic minerals policy, such as you advocate, be compatible with the national commitment to improved water and air quality?

Absolutely. These goals are not mutually exclusive. Our country needs a safe, healthy environment, as well as continued utilization of our natural resources—with a renewed emphasis on conservation and recycling of materials.

I believe the national environmental objectives should not extend beyond providing a basic healthy environment. It bothers me to see large operations ordered by a court to shut down, with disastrous accompanying unemployment, because the operations allegedly violated environmental standards not necessarily relevant to protection of human health.

Our physical environment is of primary concern to all of us; however, most of us recognize that our environment is no longer a "free" resource. In fact, we can quantify recent costs to clean up, prevent, or minimize air and water discharges. All these costs, sooner or later, will flow back to the consumer. But there are other "costs," considerably more difficult to quantify, that result from excessive environmental restraints on the minerals industry. These costs, to name a few, include: decreased levels of domestic exploration for new mineral deposits because of vast areas of public land withdrawals or unrealistic, costly regulations; reduced returns on investment occasioned when court orders, obtained by environmental groups for specious reasons, delay start-up; increased difficulty in competing as a seller in the world marketplace against foreign producers who have more realistic environ-

(Continued on page 31)

Don Rausch Rausch is a fighter. Pugnacious and enthusiastic, he has stamped his own individuality upon each new project he pursues.

Born in Portland, Ore., in 1926, he graduated from high school in Indiana, joined the Navy to fight in World War II as a torpedoman on PT boats, and later served in China. After his discharge, he traveled to Silver City, N.M., where his father held a teaching position at the time. Employment opportunities were scarce.

"Since the only jobs available in that area were for underground helpers in the mines, I accepted one of those positions. This started my mining career." He quickly became one of the top contract miners in the district.

Because of his experiences in Silver City, Don decided to make mining his profession and enrolled in the Colorado School of Mines. In record time (two years and nine months) he earned his Engineer of Mines degree, as well as being invited into Tau Beta Pi.

"The head of my department encouraged me to continue with my education by accepting a teaching instructorship in mining engineering. In addition to assisting him in consulting activities, I soon became involved in teaching, graduate studies, research, and also a substantial consulting business of my own."

The Atomic Energy Commission made use of his services in their first project concerning the underground testing of nuclear devices and their possible utilization in the construction and mining industries. This interest in nuclear applications was nurtured by his participation in the first atomic bomb tests on Bikini Island in "Operation Crossroads," and would surface again in his later career.

While under tenure at CSM, in addition to his teaching responsibilities, Don did research work into fields as diverse as explosives, concrete pumping, hydraulic classification, glaciology, and rock mechanics. He and an associate are credited with divining a mining method for recovering thick deposits of oil shale by longwall mining and he developed the accepted theory of the origin of the ice cliffs of the ice caps. Also, during this same period, he spent five summers as project manager in developing tunneling installations on an experimental basis in the Greenland Ice Cap for the Corps of Engineers.

Don Rausch, the fighter, had taken on a heavy load.

"It was difficult to put the whole thing together and I was under constant pressure to complete my graduate studies; however, I did finish the course work and received my D.Sc. from CSM within my four-year time schedule."

He spent a short time with Dravo Corp. as a mining engineer, leaving in 1958 to join the central engineering department of Kennecott Copper Corp. in Salt Lake City. There, in addition to his activities in mine engineering and slope stability work, he was a pioneer in the application of computers to mine problems and directed the initial feasibility studies into the possible application of nuclear devices for fracturing copper ore bodies in preparation for leaching.

"This position provided me with a rich background in operations, engineering, and mine property evaluation and mine development. It ultimately led to my being assigned general manager of the Tintic Division, which was under development at the time [1965]."

The responsibilities of this position were enormous; the ore zones of the Burgin mine, and others in the district, are associated with mud, sand, and large hot salt-water flows reaching temperatures of 69 C (156 F). The development of this district has been reported as one of the most difficult tasks ever undertaken in mining.

"Tintic was a real challenge because of adverse mine, metallurgical, and underground hot water and temperature conditions. The longer I stayed, the harder it became to leave, because I just would not let it whip me. I think our greatest achievement was that we did it safely."

In September 1974, Don joined NL Industries as vice-president of mineral resources.

"The last two years have been particularly rewarding; involvement in worldwide operations has provided me with a far greater understanding of the cultures of other countries and has added to my perspective of world problems."

Throughout his career, Don has been active in professional and scientific societies. He has, in the past, served as vice-president and director of AIME, as a director and treasurer of SME, and a Henry Krumb lecturer of AIME. Don has also authored and co-authored many technical publications and books, including two chapters in *Surface Mining* and one chapter in *Mining Engineering Handbook*. He is a member of the Colorado School of Mines Research Institute and a director of Mineral Deposits Limited, as well as a director of several other NL-associated companies.

An Interview with Donald O. Rausch

(Continued from page 9)

mental policies and regulations; and decreased domestic smelting capacity for certain metals because of unrealistic environmental restraints.

Dr. Bausch, to have a rational domestic minerals policy, we should improve the image of mining. But how?

That's a tough one. I believe that improving the image of mining will be a long educational process because, in effect, we must begin by educating the educators on how essential mining is for everybody's welfare. And then, we just have to rely on the educators to pass on their acquired wisdom to the coming generation.

I don't have much hope in changing or educating the minds of our politicians and bureaucrats who find it expedient to criticize anything that won't cost them too many votes or popularity with the public.

I think we can improve the image of mining via our GEM Committee and the members of SME. We could spend time, even at some sacrifice of other personal and business activities, to promote the GEM idea within the minds of our educators and local leaders. As others have expressed, I feel very strongly that SME-AIME should not become a lobbying organization and should limit its public remarks at least to convey the facts: lobbying activities should be left to the various state mining associations and the American Mining Congress.

What would you like to see from Mr. Carter's administration?

I'd like to see the formulation and implementation of a national policy that, for a change, will support the domestic minerals industry. Also, I believe the new administration should focus on the development of our coal reserves, particularly our western coal—and clear the way for utilization of our nuclear energy potential.

I would hope Mr. Carter's administration will succeed in coordinating more closely the activities of the various administrative agencies that have jurisdiction over the nation's natural resources. I'm disturbed by the conflicting policy objectives espoused by various administrative agencies; perhaps the most insidious feature of our administrative regulatory system is that few mechanisms exist to force an agency to act in a timely fashion. The Bureau of Land Management, for example, can delay for years the disposition of a mineral patent application or prospecting permit.

Is there any particular problem that you see within SME-AIME today?

Yes, and I believe that it has to do primarily with communications. Appar-

ently engineers cannot communicate any better among themselves than they can with the public. During the many hours I spent on the Board and in SME-AIME activities, the question of company control—a topic recently discussed in MINING ENGINEERING—never entered my mind or those of my associates.

I'm afraid that many members do not realize the great amount of work being done on a voluntary basis. While many companies pay a member's out-of-pocket expenses for his voluntary activities, particularly those related to a professional

society, I know of *no* case where a company has made demands or tried to control SME-AIME activities.

One of our basic problems in SME-AIME is that there are not enough individuals involved. It appears through the years that volunteers to do a job are easy to get, but for these same volunteers to complete a job is another matter. I have seen this problem now for many years, and the workhorses of our Society are still carrying the load.

One of my objectives for the coming year is to get more people involved. □

BUILT BETTER TO LAST LONGER IN

Mineral Exploration Drilling



When you're drilling in a remote area, it's no time for tool failure. That's why Drilco Industrial tools are built to last.

Drilco Industrial manufactures mineral exploration tools: kellys, Shock Sub® vibration dampeners, reamers, stabilizers, drill pipe, drill collars, and DuoTube® reverse circulation systems.

These tools are tough. Our heat-treating process strikes the right balance of hardness, strength and ductility. Precision quality control, including ultrasonic testing, backs it up. When you're drilling on a lonely site, you need that reliability. That's why Drilco Industrial tools are built better—to LAST LONGER.

For additional information, write: Drilco Industrial Reader Service, P.O. Box 3135, Midland, Texas 79701.

"We're Between You and the Bit"

DRILCO INDUSTRIAL
Division of Smith International, Inc.





Presidents 1967-1976
VOL. 19 – VOL. 28

1976 SME President J.F. “Jack” Havard

March 1976: VOL. 28 NO. 3 – An Interview With 1976 SME President J.F. “Jack” Havard

1975 SME President Robert L. Llewellyn

March 1975: VOL. 27 NO. 3 – An interview With 1975 SME President Robert L. Llewellyn

1974 SME President Donald A. Dahlstrom

March 1974: VOL. 26 NO. 3 – ME Interviews 1974 SME President Donald A. Dahlstrom

1973 SME President Robert H. Merrill

March 1973: VOL. 25 NO. 3 – ME Interviews 1973 SME President Robert H. Merrill

1972 SME President

March 1972: VOL. 24 NO. 3 – ME Interview with 1972 SME President Robert M. Grogan

1971 SME President James D. Reilly

March 1971: VOL. 23 NO. 3 – James D. Reilly 1971 SME President

1970 SME President H. Rush Spedden

March 1970: VOL. 22 NO. 3 - H. Rush Spedden 1970 President of SME

1969 SME President Brower Dellinger

March 1969: VOL. 21 NO. 3 – Brower Dellinger 1969 President of SME

1968 SME President Raymond H. Feierabend

March 1968: VOL. 20 NO. 3 – Raymond H. Feierabend 1968 President of SME

1967 SME President Dennis L. McElroy

March 1967: VOL. 19 NO. 3 – Dennis L. McElroy Becomes 1967 President of SME

MINING ENGINEERING

MARCH 1976

A PUBLICATION OF THE SOCIETY
OF MINING ENGINEERS OF AIME

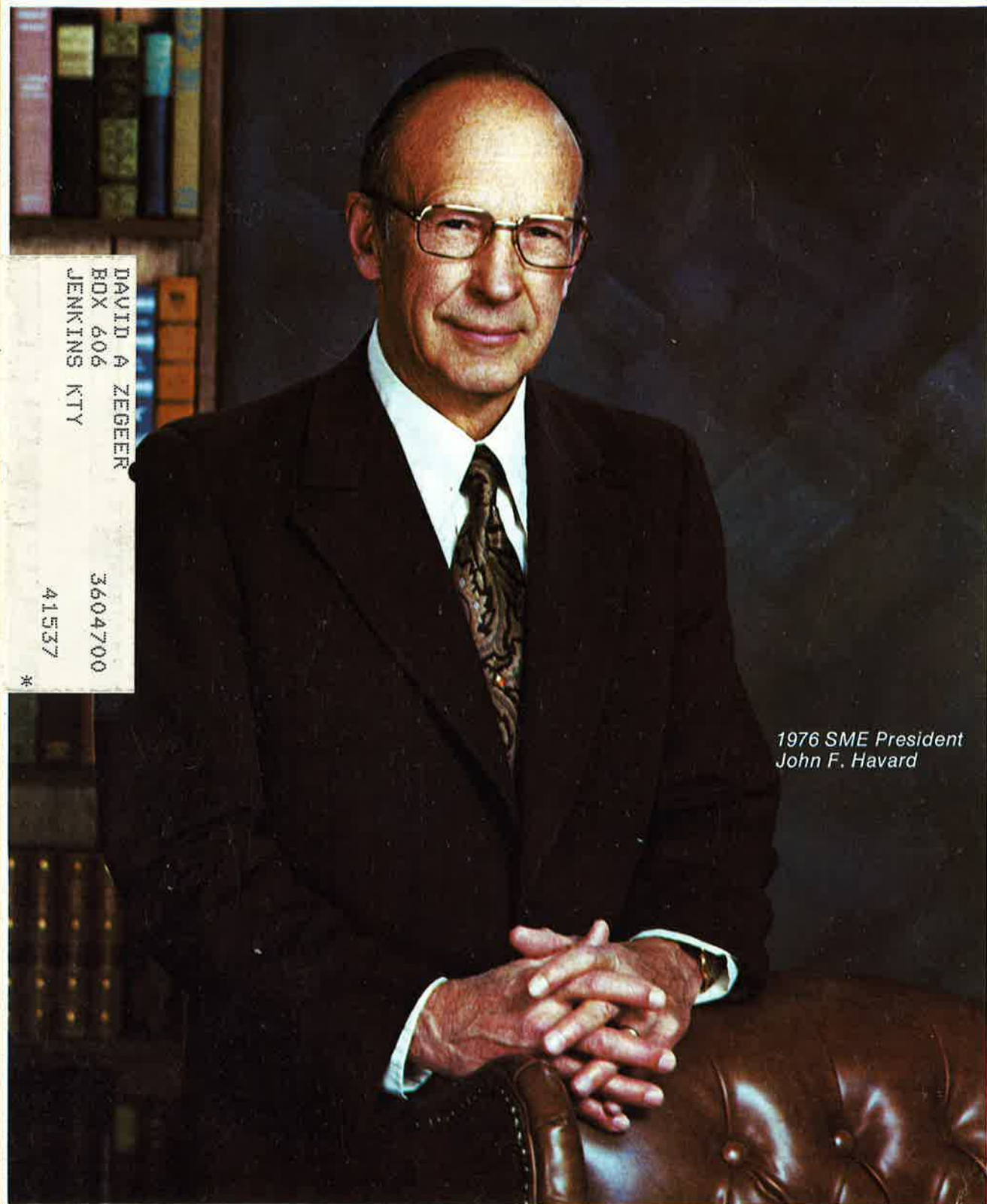
DAVID A ZEGEER
BOX 606
JENKINS KY

3604700

41537

*

1976 SME President
John F. Havard



Mr. Havard, you have spent most of your adult life in mining. What do you think or feel about our profession today, and what's your assessment of it?

Mining engineering—and I am using the term now to embrace the broad disciplines of "minerals engineering"—is not simply a profession. It exists as a distinct lifestyle and as a unique worldwide society. After all my years in the profession, I still nurture a truly romantic feeling about mining engineering, just as a boy might become bedazzled by the world and exploits of D'Artagnan, the Lone Banger, or the Mountie—you know, adventurous and picturesque, unreal and enviable. But it is there in my heart, and partly explains why I feel so singularly honored to serve as president of the Society of Mining Engineers for a year.

Pursuing the romantic view a little further, we know that every romantic plot must have its crisis. I believe mining engineering is now going through a crisis, characterized by two main challenges: one internal, the other external.

The internal challenge for each of us is in achieving a higher level of technical competence to cope with increasingly more difficult geological, mining, and metallurgical conditions within the context of true professionalism.

Isn't the crux of this internal challenge the need for a better education?

Yes, and I have spent a lot of time on this subject—on SME committees, as chairman of a committee of the Western Governors Mining Advisory Council, and in my work. But I just do not think we have entirely faced the issue of professionalism in the fields of mining engineering. When I was graduated, a young mining engineer received a sort of general engineering course, and with *Peek* and *Taggart* in his knapsack, he was ready to go anywhere in the world and tackle anything.

Today's mining engineer needs a more intensive education—including such newer subjects as rock mechanics and computer sciences—and, even more important, he needs additional training to enable him to communicate

An Interview With 1976 SME President J. F. "Jack" Havard

clearly, to negotiate and administer labor contracts, to cope with complex safety and environmental laws, and to understand the political and public relations aspects of his work. I doubt that the true professional can obtain this kind of education in four years, particularly if he is to be exposed to enough of the humanities to understand and discuss his heritage.

Would you advocate supplanting the four-year curriculum with, say, a five- or six-year curriculum?

Not quite. We will continue to have a four-year bachelor of science degree in engineering, but I believe we should thoroughly re-examine the concept of a professional degree which can be attained after more advanced professional work and more courses in the humanities and management. An additional two-year period or its equivalent should be made readily available by providing scholarships and by offering courses by correspondence and through evening schools. SME can help with recognized short courses. Thus, when degrees of geological engineer, mining engineer, or metallurgical engineer are granted, these would rank with degrees in law and medicine. Of course, from the bachelor degree onward there would be the usual academic ladder of the master's degree and the doctor's degree for students interested in advanced scientific or engineering work, research, and teaching.

I hope that the mining profession will be sponsoring a total intensive educational program. Many aspects of such a program are already underway—spotty, but underway.

How Jack Havard Got Into Mining

"My father was born in Australia, but he was graduated from the famous Freiberg School of Mines in Germany. His first job was furnace foreman in the smelter at Great Falls, Mont. He met my mother, daughter of a pioneer Montana family, at an all-Montana ball in Great Falls. They fell in love, but he was in no hurry and subsequently spent three years running mines in the Hartz Mountains in Germany and a year and a half building a small copper smelter in the Atacama Desert in Chile. Then they were married and I came along in Helena, Mont. My father decided to settle down for a while, so he joined the faculty at the University of Wisconsin to start the Metallurgy Department. He wrote a book, **Refractories and Furnaces**, which was the standard work on refractories for many years. Then he caught a fierce case of pneumonia and died as a young man. All the family fortunes disappeared about the same time, and I had to scramble.

"After graduation from Stadium High School in Tacoma, I expected to be a journalist and landed a job writing radio scripts for a Seattle station. The Depression was coming on, jobs in journalism disappeared, and I found myself working on a mine prospecting job in Montana, helping to drive an adit into Red Mountain, above the old mining

camp of Rimini. For a short time I punched grates at Asarco's East Helena lead smelter. By this time the romance of mining had overcome me, and I enrolled at Montana School of *Mines* (now Montana Tech) in Butte. For three years I worked at all kinds of things there—unloading ore at the old Timber Butte mill, working in the St. Lawrence mine, assisting the college librarian, doing freelance writing, correcting freshman themes, and working as a reporter on the **Montana Standard**.

"Just when the depression really came down on Butte, and any further education was doubtful, I had a lucky break. I was able to borrow some money and obtain some scholarships to the University of Wisconsin, where I spent another three years. This meant I could pursue the writing craft while completing my mining engineering and obtaining some advanced geology. In due course, I had my bachelor's degree in mining engineering, two degrees in geology, and a wonderful time in creative writing. Later on, I picked up my professional EM degree by meeting some requirements and writing a thesis.

"With my romantic ideas of mining engineering, you can be sure I expected to be sent to some romantic place (Continued on page 22)

Such a comprehensive program will have to include the thorough training of mine operators and mine craftsmen. It will involve technical training curricula leading to two-year associate degrees for people prepared to fill the roles of samplers, assayers, draftsmen, surveyors and the like. It should also include constant advanced education for improved supervision and management and for the constant upgrading of all kinds of skills—safety and health, environmental, and the highly technical.

Mr. Havard, when you said earlier that mining engineering is faced with an external challenge, what were you specifically referring to?

I was referring to the external handicaps that mining must overcome nowadays so as to meet its obligations and get on with the work. This external challenge is rooted in public ignorance about mining and in political attacks against our industry.

We all know that mining is largely unrecognized by the public, and when recognized it is often viewed with disfavor. People generally do not realize that all our material wealth stems from mining and agriculture. Our highly urban and highly service-oriented society is too remote from mining to recognize its vital role. Did you ever hear a motorist step into his car and say, "My goodness, this automobile was mined!", or a homeowner tap his good fire-resistant wall and say, "Hey, this gypsum was mined!", or still more unlikely, some teacher turning on the lights and explaining to the students, "This electricity was mined." No, what recognition mining gets is headlines of disasters and editorials on the "ravages" of stripping.

How can engineers, or a professional organization of engineers such as SME, deal with this external challenge? We are neither a business nor a lobbying organization. Some engineers, frustrated and exasperated with current conditions, often lash out against the bureaucracy or against some similar easy target—an approach that may momentarily provide an emotional outlet but doesn't accomplish anything positive in the long run. What can we do that is constructive?

I have heard many, many SME members say, "What can I do? I don't know anybody. I don't know how to make speeches." Well, SME as a professional organization

can play a significant role in this crisis by raising the activity level of the GEM Committees in 1976. I look upon GEM as an every-member association with every member taking responsibility. Our younger members can no longer complain of nothing to do. Our student members have a great opportunity to carry the mining message back into their home communities. All of us can talk to friends and associates and groups and whatever about the facts of mining. No fancy political harangue, just talking about what we know best. People are interested, and they will say, "I never knew that!" I know because I've tried it. And it isn't necessary to know how to make speeches. The GEM idea is much more informal. Everyone can participate. The individual engineer can talk to his clergyman, his doctor, his local politician, to his state senator and assemblyman, and yes, even to his congressman. He just has to talk the facts about his job and his industry. He will be rewarded time and time again, to his surprise, by the listener saying, "I didn't know that!"

Finally, each of us should be particularly thoughtful and fair in two directions:

First, let's not give in to the temptation of generally blasting the bureaucrats. It's a cheap shot—and an unfair one because there are many dedicated, mining-oriented public servants in SME who are as concerned as the rest of us, who want to help the mining industry to progress, and who are themselves shackled by conflicting laws and complex administrative policies.

Second, we should differentiate between the different types of environmentalists, stop lumping them into the same catch-all category, and refrain from blasting them. We should recognize that, as engineers, our problems lie with environmental extremists, with those who are impervious to facts, or who either do not grasp or don't have access to the facts. We should recognize that there are many dedicated environmentalists who are knowledgeable, intelligent, and blessed with political acumen. Remember, we mining people are environmentalists, too. One of the reasons that many of us are in the profession is our love of the outdoor life. We can say, "We live here, too." And we should seize every opportunity to talk with environment-oriented friends and groups, acquaint them with what modern mining is about—and thus counteract the effects of cultural misinformation. □

to start a romantic career. But in 1935, when any job was a good job, I landed in the rather unromantic sand hills of western Oklahoma at the Southard plant of US Gypsum Co. This was the beginning of a 17-year stint with USG, broken briefly by my urge to try metal mining at Climax, Colo.

"USG was growing and was a great place for a young man. I served all over the West as quarry and mine superintendent, geologist, mining engineer, and works manager.

"Along the way I courted my wife, Faith. It was not easy, because at the time she was in Chicago and reluctant, and I was in Montana and persistent! After our wedding I treated her as any good WAAIME should be treated by taking her first to the Montana mountains for ice-box duty and next down into the Mojave Desert for frying-pan duty. We produced four fine children, and I believe Faith also enriched the life in each mining community along our way.

"I became chief engineer of mines for US Gypsum in the Chicago headquarters, responsible for consulting services to about 25 quarries and mines in the US and Canada, and for exploration for a variety of minerals

throughout North America. The trouble was that the headquarters location was in Chicago. Maybe ahead of our time, my wife and I had notions of a lifestyle, and our lifestyle lay in the West.

"So away we went to Carlsbad, N. M., to Potash Co. of America, and later to San Francisco to join some former USG associates in what became Fibreboard Corp.

"Later came the real fun. I joined Kaiser Engineers, eventually becoming vice-president of the Minerals Division. This offered a great experience throughout the mineral industry in a wide variety of consulting, engineering, and construction projects.

"The management of Kaiser Engineers provided me with unstinting support, and the Minerals Division grew and multiplied. Last year I relinquished divisional responsibilities to younger men, and was made senior vice-president. My recent project has been the Kaiparowits coal mining complex in southern Utah, which is planned to fuel a 3000-MW power plant. This total project is stirring national controversy between the environmentalists and the power producers, with the various government agencies caught in contradictory roles."

MINING ENGINEERING

MARCH 1975

A PUBLICATION OF THE SOCIETY OF MINING ENGINEERS OF AIME

DAVID A ZEEGER
BOX 606
JENKINS KY

3604700

41537

*

- Mining Education in Turmoil
- Updating Mining Curricula
- Small Mine Profile-Jaquays Mining Co.
- Improved Open Pit Blasting-A Return to Chambering?
- Let's Have "Project Independence" for Copper



1975 SME President
R. L. Llewellyn



An Interview With 1975 SME President Robert L. Llewellyn

What do you think are the major problems that the mining industry is facing?

While I don't have any intensive knowledge of the various problems that plague our industry, I know that they are all part and parcel of a more complex and fundamental question:

What must we do to make mineral extraction successful, safe, and profitable?

Obviously, as mining people, we must continue to expand our technical know-how and to make better use of it. In today's context, however, that is not enough. We must also improve the "public image" of the mining industry.

Why?

Because the key word in the term "public image" is: the public. Many people in our country and in Congress, for instance, are against strip mining—and some are even against underground mining. Pressures from the public, from voters, have affected past, present, and new legislation. And government controls can be a major problem in any industry, let alone mining. At first, people ask government to intervene, act, or resolve problems, even in management and labor contract negotiations. But later, after Washington gets involved, there are clashes between departments and personalities, and eventually there is resentment against the interference with mining operations or our daily lives.

How could SME members improve their industry's "public image"?

I believe SME members should seek the help and cooperation of the news media in letting the public know the facts about, say, what would our life be like if all of a sudden laws were passed to abandon strip mining, or to eliminate minerals depletion, or to make mining an almost impossible task.

For example, there's a great confusion regarding high-sulfur and low-sulfur coal. A recent article in a Pittsburgh paper headlined that a certain company wanted to burn "high-sulfur" coal. The coal in ques-

tion had a 1.7% sulfur content, and someone had calculated how many pounds of sulfur would fall on the ground if the company were allowed to burn such a fuel. But 1.7% is not a high-sulfur coal, yet burning it is against the law. In this context, a logical question to raise and explain to the news media would be: How much of the country's coal reserves would be left by the year 2000 if we mine and lose recovery by overcleaning to reach the unrealistic sulfur level that would satisfy government regulations?

Informing the public would open eyes and ears to the cause-and-effect relationship between government regulation and the current energy situation—and, ultimately, the public might even discover the relationship between a healthy mining industry and a healthy economy.

What about relations with government?

I would like to see SME members getting more involved with the various government agencies such as OSHA and EPA to help direct the affairs of our industry. This should be done on a consulting basis—not by lobbying. I know that I would seek help from SME members if I were in a government position responsible for establishing good practices and/or legislation.

The mining industry can survive by taking the initiative in resolving its problems with the help, not harassment, of government and labor unions. It takes the full cooperation and understanding between labor, management and government—each doing its proper job—to achieve the goals of safety, productivity, and health which, incidentally, was the SME theme at the 1973 Fall Meeting in Pittsburgh.

How could SME be strengthened and made more effective as a professional organization?

That is a task for all of us: the task of overcoming the initial inertia in younger engineers. In my opinion, many young men seem to think that their dues only entitle them to MINING ENGINEERING magazine. "What else do I get?" "I can't attend meetings," etc. But be-

longing to an organization is not enough—whether it is a church, a golf club, or SME, you only get out of it what you put into it. While going to meetings or giving papers is important, I think that the contacts developed within the organization are even more important and rewarding. In my own case, I have had the benefit of lasting friendships across the US by the common interest of AIME for over 30 years. How much is a friend worth? How much have we improved ourselves by the association with other members and, later on, with board members?

So, I would like to have our membership keep in touch continually with younger engineers, be they prospective or new members. This is a task for everyone who has influence as a professional man in mining engineering. The president of SME serves only for one year, and I know each former president has had a similar goal to urge young men to get interested and bring their interests to SME-AIME activities. Enthusiasm has kept an organization like AIME together and growing for over 104 years. I have been part of it for almost one-third of its life, and an active member for over half mine.

As for meetings, I'd like to see a "formal discussion" after a paper so as to encourage questions, bring forth ideas, and build up interest. The author of the paper would not be the only person knowledgeable. It was the custom in the past to have a written discussion which can supplement the paper, offer other experiences, or even disagree with the author's views. More members would get involved.

Energy has become a daily household word. Our Society and AIME are more closely involved with energy problems than ever before. I would like to see the Society of Petroleum Engineers of AIME participate at the AIME Annual Meetings. That could happen in Las Vegas next February. After all, quite a few oil companies own coal mines. Carter Oil, for instance, owns Monterey; Continental Oil owns Consol; Gulf Oil owns P&M; Occidental Oil owns Island Creek—a few people might remember that United States Coal and Oil Company was Island Creek's former name, during World War I days; Shell Oil is opening coal mines; Standard Oil owns Old Ben; and so on. There are certainly mutual interests, and technical papers can be explored for our annual meetings beneficial to both SPE and SME.

In the general category of "manpower problems," how serious is the shortage of mining engineers and miners? And what can we do about it?

There is definitely a shortage of manpower in the mining industry today—and it is not taken seriously, unfortunately. We discuss this among ourselves but our views must be made public. If coal is to double or triple production, if minerals and steel production growth is to continue, and if railroads are to provide transportation, good men are required at all levels. As for mining engineers, again, we tend to speak about this shortage among ourselves. The news media could be more helpful. Instead of the usual morbid descriptions of mining, there are so many good sides to our industry that, if objectively covered by the media, would attract young people to mining. So far, it is as if the only newsworthy stories are those dealing with girls hired by coal companies, especially when the bath-house subject is discussed.

Mining schools have deteriorated at our major universities because of lack of students. The Office of Coal Research has helped, and cooperative-studies plans have increased enrollment—but mining schools

cannot continue unless there are mining students. Universities today have smaller budgets on which to operate, and the state funds that many receive are inadequate to support a mining curriculum. We can send letters to Governors to show we want to retain mining engineering education—it is more helpful to send students to the schools. So more scholarships are desirable, of course, and the WAAIMEs (the Women's Auxiliary of AIME) have been wonderful in their efforts with young people. But scholarships are limited. We must upgrade the image of the mining industry to such an extent that young men and women will want careers in mineral and mining engineering with or without scholarships. After all, the challenge is there, and no other industry can offer better adventure and satisfaction—if the story could be spread nationwide. Consider the coal industry, for instance. Where else can a man work in 63-degree temperature, winter and summer, have paid vacations, pensions, and earn as good a pay as the miner? Every job has its drawbacks, a certain amount of danger, and a lot of "belly-aching"—but, considering economic conditions today, good people who get into mining will not only be able to earn a good living but can confidently look to a better future.

"Most of my career has been in the coal industry—and I've never had a dull moment," says Robert Llewellyn, 1975 SME President.



Robert L. Llewellyn

Now vice president of Roberts & Schaefer Co., designers and builders of coal handling and preparation plants, Bob recalls the early days of his career which began in the middle of the Great Depression: "My first job was as a blueprint boy in the engineering department of the old Pittsburgh Coal Wash Co. at Ambridge, Pa. During vacation months from Dormont High School, I drove company executives through the coal fields to such West Virginia towns as Mt. Hope, Beckley, Bluefield, Logan, Mullens and surrounding areas. It was a lean era: new proposals just consisted of a car haul and rotary dump, a ROM screen, or a lowering conveyor at existing tipples."

Later on, things improved somewhat. "After graduating from Penn State University in 1936 with a BS in mechanical engineering, I was sent to the anthracite field by Koppers Co. Besides coal sampling and testing, I also worked with W. M. Menzies, who had licensed Koppers to use the Menzies Cone Washer in the bituminous field. Later I returned to Pittsburgh and was with Koppers Engineering and Construction Division until 1938."

After gaining further field experience with Island Creek Co., Bob Llewellyn joined the Coal Division of Eastern Gas & Fuel Associates where he worked 23 years before heading the Pittsburgh office of Roberts & Schaefer in 1969.

Would he advise young people to enter the coal business?

"The latest figures from Keystone indicate that 127 new mines are under construction or at the planning stage to increase coal production by 236.6 million tpy in the next decade," he says. "What a future for employment and opportunities!"

MINING ENGINEERING

MARCH 1974

A PUBLICATION OF THE SOCIETY OF MINING ENGINEERS OF AIME

1 360470
DAVID A ZEGGER
BOX 606
JENKINS KTY 41537

1974 SME President
Donald A. Dahlstrom

Would you give us a short biographical sketch including your birthplace, education and current activities?

I was born Jan. 16, 1920 in Minneapolis, Minnesota, and lived there the first 22 years of my life. I also spent quite a bit of time on a farm about fifty miles north of Minneapolis owned by relatives. During the Depression, we lived off of ten cows and about fifty chickens. I'm a full-blooded Swede all along the line, and I'll be the last one in my family since my wife is not of Swedish descent.

I attended Macalester College, a small school in St. Paul, to study for the ministry originally. However I soon realized that I really didn't have the talents for the ministry and I could probably do as much or more in a field where I did have some talent.

During my second year at Macalester, I went over to the University of Minnesota campus on a Saturday morning and wandered through the Chemistry Building, which at the time also housed the chemical engineering department. The only office in the building that was open belonged to a chemical engineering faculty man, who took a few minutes to talk to me and finally convinced me to go into chemical engineering. The following fall I transferred to the University of Minnesota.

When I began to look for a job during my senior year at Minnesota, I found that opportunities for chemical engineers were very limited within the state. Also, I wanted to see the world. I had heard that a person could get a lot of experience working overseas, so I kept interviewing companies with operations out of the country, and finally got a job with International Petroleum Co. Ltd in Peru, producing crude oil. Several of our fields in Peru were the most productive per acre foot of sand that were in existence at the time. We electrically well logged and core sampled most of the formations within the area during the three years that I was there, so we knew what was in the ground and were able to operate the field at optimum efficiency for that period. We had the only refinery on the west coast of South America, and all of our refined aviation gasoline went to the war in the Pacific.

After my three-year contract with the company expired in 1945, I returned to the States and joined the Navy as a seaman second class. I was stationed in San Diego, and the farthest I ever got to sea was on the ferry from North Island.

I obtained my Ph.D. from Northwestern University in 1949, and became a faculty member in the chemical engineering department. I was an associate professor of chemical engineering in 1953, when Wayne Dowdy, vice president of Eimco Corporation, called and asked me to consider starting a research organization for his company.

I accepted the offer, but with the thought firmly in mind that I would definitely go back to teaching

after I had the Eimco project going. I did return to teaching for two years, but I felt the work at Eimco was too important to pass up, and went back to work for the company full-time. I am now vice president of Research and Development in the Process Equipment Group, Envirotech Corporation.

When did you first become interested in AIME activities—particularly in the Society of Mining Engineers? What significance does it have for you now?

The AIME was the first society I had ever joined. I believe I became interested in AIME activities when I noticed that someone was going to present a paper I was interested in at an AIME meeting in New York, and I went to the meeting for that reason.

Today the Society holds great personal significance for me in many ways. I would ask, first of all, the most important question: Where would my profession be if we didn't have an AIME? I think we all have to admit it wouldn't be as strong. My personal belief is that we must have a strong professional society in our discipline.

ME Interviews 1974

SME President

Donald A. Dahlstrom

I think a professional society does several things very well. First of all, it can print and publish our technical papers, which is extremely important. Without the benefit of what others have done in the past we have nothing to build on.

Second, participation in its national annual meetings is very valuable. These meetings are forums for people to get involved with others in their area of technology; to discuss, argue and debate; to give the young man an opportunity to become acquainted with those who have been in his particular field a longer time and have possibly done outstanding things in the field. It gives him the chance to talk with those who can help him with his career.

Finally, I would say the Society is an area of contact that is very important in the research field. That is, to have the opportunity to easily meet people who are in your general area of technology and to talk with them and get their viewpoints, or possibly try an idea on them for size.

I feel this way about the activities of the Society—the more you involve yourself in them, the more you get out of it.

"We haven't taken our full part in the decision of how technology is being used."

Do you believe that the Society should be more active in public affairs—particularly in relation to those branches of government that formulate legislation relevant to mining?

I think the Society should be more active, and I think it should take a basic position of being the interpreter of technology to the non-technical world. I'm sure we going to eventually solve our environmental problems, but if we don't have a technological input the solutions we come up with will be far less than optimum. I would prefer, at this point, to get the engineer involved in participating in public affairs at the local or state level and to become acquainted with the facts of life in the political arena.

Because we are a voluntary society, we have to be careful how we go about representing the individual engineering societies as individuals. I can't speak for SME or AIME before Congress. I could only represent myself if I did, but what we can do as a group is to interpret technology. I'm not sure that the membership wants us to speak for them in political affairs, but I do think they want us to represent them on the technical side and to see that there is a proper technical input into decisions that are being made.

One of the areas of interest to the Society regards unions for professionals. How do you feel about them? Do you think engineers would benefit from union membership?

First of all, I don't think that engineers desire a union, and this stems from the fact that they don't feel they would derive benefits from union membership. There have been many surveys taken regarding engineering unions and I haven't seen one indicating more than six percent of those surveyed would be interested in union membership.

There are, of course, areas where unions have been organized, such as in the aircraft and aerospace industries, but I think this was because of the way the industries treated the engineers. They finally banded together in a union to express their frustration. I really haven't seen any appreciable desire for a union within the chemical engineering profession, and I've seen nothing to indicate a union would succeed in the mining industry either.

"I'm sure that I learned as much or more from my teaching experience than I did from my graduate work."



Speaking of membership, what are some of your ideas on building participation within the Society, especially in regard to increased participation among young engineers?

The fact is that people who are deeply involved in Society activities feel that participation is an important and valuable thing. Those who do not get involved, particularly at the younger level, do not feel the activities are of benefit to them, and on the other hand, the engineer who is involved in Society programs feels very strongly that it is a worthwhile organization. So the first step is get the young man involved in activities which will benefit him.

We hope to give individual members more of an opportunity to participate in committee programs. I think there is a feeling among many members that committee selection originates at the top of the society rather than the bottom, and I would like to change this.

I would like to give the members a better opportunity to participate technically in our programs. I'm sure that many young engineers who have a paper they would like to present or publish do not know quite how to go about getting it done. We have to give him a better shot at getting a chance to participate. We should have people fighting to get on our programs, rather than fighting them to get them on our programs.



MINING ENGINEERING

MARCH 1973

A PUBLICATION OF THE SOCIETY OF MINING ENGINEERS OF AIME

1 360470
DAVID A ZEGER
BOX 606
JENKINS KTY 41537





Robert H. Merrill is the 17th President of the Society of Mining Engineers of AIME.

ME Interviews 1973 SME President Robert H. Merrill

Bob, won't you tell us a little about where you were born, your early life and your education?

Edgar, Nebraska, population 700, was the rural community where I was born in 1922. The routine type of childhood for an energetic young boy, was to be in a fight—or looking for one—until you were 18 years old. I have the scars to prove it . . . 156 stitches in my body . . . and many repaired broken bones.

No one's childhood was easy during the Dust Bowl Period in Nebraska. Things were tough all around. As a consequence, we kids grew up fast, matured fast, learned fast. It was quite usual for children in my age-bracket to be self-sufficient in their teens. We worked hard. If we were lucky enough to go to college we earned our own way—or most of it. My mother still lives in Edgar, although she winters in Florida. My wife Bert and I return there to visit her and to look for old car parts in connection with my antique car restoration hobby. We also enjoy the very good pheasant hunting.

Fortunately, I knew that I wanted to be a physics major in college. The University of Nebraska wanted me to play football—but you can't play football and earn a degree in physics at a major school.

Nebraska Wesleyan, a small University in Lincoln, Nebraska had a very famous physicist, Dr. J. C. Jensen, and I could study under him and still play some football. College was interrupted in the Junior year by World War II. Actually, I joined the Army Air Corps reserve in June of 1942, but was not placed on active

duty until January 1943. By this time I had completed two and a half years of Physics.

Upon entering active service, I went through the routine Army Air Corps Pilot training. The cadet training was all in Texas, and the Transition School training was in Kansas. This is where one becomes familiar with the particular type of aircraft he is going to fly in combat. In my case, this was the B-24 Bomber.

A group of us was about to board a plane to go to Lincoln Air Force Base, pick up a combat crew and go to Europe, when they took me out of line and said, "You have two and a half years of Physics. We are going to put you on the Standardization Board." And that was the job for the rest of my career in the Air Force.

A Standardization Board pilot is a glorified Test Pilot. We tested any plane the Air Force was considering and either accepted or rejected it. If there was a particular problem with the aircraft, we traced it down and recommended a solution, as we did with a Hydraulic problem in the B-24. We also devised a means of corona discharge on military aircraft that is still in use on commercial planes today. In this work we actually flew thunderstorms daily. Although we flew in the rough air for days and months at a time, I never became accustomed to it.

Upon discharge from the service in December of '45 I returned to Nebraska Wesleyan to finish a degree in Physics in 1947. Then came part-time teaching at the University of Wyoming and a Master's Degree

in Physics in June, 1949. I taught full time at the University of Colorado, and continued graduate study toward a Doctorate.

So far, you've told us of your progress toward a career in Physics. How did you become interested in mining?

My students at Colorado did not score well in Civil Service exams. Job offers depended on the scores attained in those tests. Because the students were not getting job offers I took the examination myself to determine how to prepare them for better scores. As a result of teaching experience in engineering physics, a very high score was attained and, as a consequence, a number of job offers arrived. One of these was at the Oil Shale Mine at Rifle, Colorado. Although I was not looking for a job, the offer was intriguing. Why would anyone want a physicist for a mining operation? As a follow up, Bert and I went to Rifle for the interview and were captivated. All you could see were the problems and challenges and the experience in engineering physics qualified me to cope with those problems. I even took a cut in pay to take the job at Rifle. That's how exciting the work was—and that's how I started a career in mining and applied rock mechanics.

At the beginning there were really only four persons working in applied rock mechanics. There were others working in the field but they weren't dedicated to putting rock mechanics to work. There were still others associated with it in the schools but rock mechanics wasn't their full time effort. We still do not have enough people in the field of applied rock mechanics.

From then on I became more like an engineer interested in rock mechanics, than a physicist. At Rifle, I had the chance to learn how to operate every piece of equipment on the mine. That included the drills, the shovel, the muckers, the big trucks. I could drill, blast and muck my own round, and did on several occasions. Although my Government rating is still "Physicist" I fear that I have long left the field of Physics. In fact, I am proud to be a Registered Mining Engineer. It proves that a person can study chemistry, physics or anything in college and still become a Mining Engineer, if he wants to gain the experience to qualify in the field.

Would you recommend that all mining engineers become Registered Mining Engineers?

No. Only those who might have their credentials challenged, as in a court of law—or when a person becomes a consulting engineer. If you ever appear as an expert witness, one of the first things the lawyer asks is "What proof do you have you are an expert?" and an acceptable proof is the



answer "I am a Registered Professional Engineer."

What should a young person expect if he wants to advance in the Society and the Institute?

Using the Mining and Exploration Division as an example the young man, who may already have been active several years in his Local Section, starts as a Membership Chairman of a Unit Committee (such as underground mining, geology, operations research). He then moves up through the publications and program posts to become Unit Committee Chairman. If he has proved himself, he may be chosen as Membership Chairman of the Division and then move up each year through the Division Chairs. The next step would be a Society Directorship and, possibly, nomination as Society officer and Institute Director. It usually requires about 12 years to reach the SME Board of Directors. Any young man who wants to advance in the Society must be prepared to devote a considerable amount of his time and effort over a rather long period. Each office must be performed well in order to progress to the next. There is a lot of mail and telephone communication involved, so it is helpful to have the assistance of the company with secretarial help and telephone and mailing privileges. However, to quote Jack Fox, "You get much more out of your professional Society than you ever put into it."

What is your evaluation of the general field of rock mechanics?

As I pointed out earlier, when I entered the field, there were only a few full time applied rock mechanics practitioners. Since then, there are many more in the field, but they

USBM Research discovered that loose rock can be detected by infra-red devices.

Properly applied, Rock Mechanics will give the answers to many questions.

are specialized. One example of specialization is the computer solutions of stress analysis problems. At meetings four of five papers are likely to be on fundamentals . . . only one on application. And application is where the action is going to be in the future. It will be the applied rock mechanics man who will give the mining engineer the factors necessary to select the mining method. He will provide the figures on which the mining engineer will make his cost estimates. This means the applied rock mechanics man will play an increasingly vital role in the industry in the future.

What do you feel is the Bureau's role in Rock Mechanics?

The Bureau, Industry and Academia have equal parts to play if rock mechanics is to be developed and applied. Recently we started doing research by contract—outside the Bureau. In most cases, the Bureau identifies the problems, and publishes their needs. Then the potential contractors, through a process regulated by the Bureau's procurement people, state their capabilities and, in some cases, end up doing a research project. Right now we have many more dollars to spend on research than we have ever had before—and the research is mostly oriented directly to safety. This is a common goal in the Bureau and Industry—safety and health in the Mines.

Is in-house research more effective than contracted research?

That's a hard one to answer, Jack. Our problem today is not so much cost as it is results. Under the pressures of the Coal and Metal Mine Health and Safety Acts, we need results fast and the Bureau simply can't "tool up" that fast. Our contract research has a USBM "Technical Project Officer" for each project. He has the task of monitoring progress and cost.

Much of our contracted research is performed by the universities. This not only lets us get the answers now, but we are also training young men for the future. I have a soft spot in my heart for University research because I have a soft spot in my heart for young engineers. I never cease to be amazed at their



ingenuity and their initiative. Our future lies in our young engineers.

What will be your thrust for SME in 1973?

To answer that, remember my statement that our future lies in our young engineers. These young lions question everything we over-the-hill guys tell them. They don't want to know how we did it. They want to know the fundamentals and the facts that led to the decision. They want to know the vast amount of technology we have developed in our profession and to be free to use it to solve their problems.

The young engineer sometimes arouses the anxiety of the older engineer. We are appalled by the fact that he may want a portable pension plan and may even want a union! Many of them he really doesn't want but they are on his mind and he talks about them openly. We must be attentive to our young men's needs and develop a common ground on which to start. That's where I want to begin—to help them improve their competence and at the same time be attentive.

After reading the daily newspaper, even the layman must understand the demands that are going to be put on our mining industry. When we fill the needs of our young men, we are also going to fill the needs of our country. It is not we, but these youngsters, who are going to maintain the strength of our nation and keep up our standard of living. I am going to encourage every division of our Society to activate the young men on their committees, in their chairs and as part of their working organization, to get the young man involved—so involved that we can know what he needs and wants and so he can benefit from our wisdom.

MINING ENGINEERING

MARCH 1972

A PUBLICATION OF THE SOCIETY OF MINING ENGINEERS OF AIME



An ME Interview with 1972 SME President Robert M. Grogan



1971 has been a difficult year for the mining industry and the profession. Is SME involved in any way, Dr. Grogan?

I happen to know the exploration and mining fields best and the loss of employment there, particularly among the geologists and other members of exploration teams, has been pretty tremendous. I suspect this has also been true on the metallurgical scene, and possibly to some extent on the petroleum side, but I know for sure that it has been traumatic in the parts of the industry embraced by SME. One tends to be most impressed by what has been happening to the professionals who are working in one's own field, and consequently, I have been distressed at the deep slashes that some of the mining companies have made in their exploration shops. Whole groups of geologists and engineers, skilled in their business and carefully selected and trained, have been laid off with only brief notice. The decision to do this must have been painful for management to make, for in the long run it will result in loss of momentum in exploration and ore discovery, and this momentum is

what keeps the mineral industry moving forward to meet the demands of society.

What specifically can SME do to improve this situation?

The Society can be of great help to its members in this time of employment crisis and loss of courage and perhaps faith on the part of management. Its editorial pages can spell out the temporary nature of the recession in the mineral business, encourage managements to be far-sighted and retain or quickly replace their human expertise and again become aggressive in acquiring properties, locating mineral deposits and bringing them to production.

Through its meetings the Society can provide opportunities for members to meet, discuss their problems, and find or suggest ways of finding solutions to them. New job opportunities will result from these encounters and from the exchanges of thoughts and opinions.

What is your opinion of the health of SME?

It seems idiotic for me to say that the Society is a strong and growing organization and then turn around and say we are experiencing deficits and projecting them for the next couple of years unless something is done.

Let me tell you the good part first. SME membership went from about 15,400 in 1968 to 17,800 in 1971, and this growth has been steady for many years. Our student membership is really up the last year. Book sales are doing handsomely and new titles are being proposed regularly indicating a strong interest in technology. Advertising in MINING ENGINEERING was a little off in 1971 but it has doubled in less than ten years and it will come back as economic conditions improve.

We hope to keep the Society strong and growing and to enable it to offer increased service to members. Unfortunately, the Society, to achieve new goals and maintain its effectiveness, is going to need more money from its share of the dues paid by AIME members. AIME has had no increase of dues since 1949, which I suspect is a record unparalleled in the engineering and professional fields viewed as a group. Good and innovative management, growth in membership, and excellent income from publications and special conferences have enabled AIME to maintain this remarkable dues stability. However, with current and anticipated deficits that even the income from strong endowment funds cannot offset, the time

for an increase has clearly arrived. As the new President, it will be my duty and purpose to help explain this to the Society members, and to encourage them not to drop their membership, but to maintain it and recognize its value to them.

What do you think of the various programs and activities being carried on by the Society?

I am enthusiastic about our book publishing activities and in particular the new handbooks. As I understand it, we're going to have a completely new "Mining Engineering Handbook" this year, probably late in the year, and a "Mineral Processing Handbook" in 1974 and a completely new and different "Industrial Minerals and Rocks" in 1974. These handbooks literally involve hundreds of authors and publication of books of this type is a monumental demonstration of the solidarity of the profession. These handbooks are international in their usage and I have seen the English language versions of Peele and Taggart on the desks of Italian, French and German engineers.

In connection with meetings, I have been in favor of the SME Technologic Information Exchange Exhibit since the beginning and I believe that they should be continued, even if they may have to be subsidized occasionally. I saw my first triple-tube wire-line diamond drill barrel at an SME exhibit for example and have gotten lots of information on other new developments from the exhibit. There are lots of things that should be displayed when you consider the progress being made on all sides; take side-ranging radar and infra-red photography as examples.

Do you believe that the Society headquarters offices are likely to be moved out of New York?

The Society will continue to participate in discussions about relocation. We voted a short time ago to remain with the AIME offices and the Metallurgical Society in the interests of economy and solidarity. However, every time you make a decision something happens. In this case, New York City introduced a tax on the United Engineering Center real estate which is sufficient to have the question of relocation opened again. There are many obstacles to such a move because of our ethical and legal obligations to the United Engineering Trustees.

I am pleased to have had this opportunity to express my thinking at this point, the beginning of my year as SME President. In conclusion, I

would like to mention the satisfaction which the officers and directors feel at the response to the request for donations that went out with the 1970 dues bill. This expression by the membership in sending in voluntary contributions is another example of the strength of our Society.

Biography

SME's 1972 President, Robert Mann Grogan, brings to the office over 30 years of active participation in SME and AIME and 35 years as a geologist in the mineral industry.

Having served on more Society working committees than there is space to mention, he has, become appreciated by his co-workers for reliability and objectivity. A typical Groganist would be: "let's cut out the horsefeathers and make a decision." Among the visible posts held by Grogan was the Chairmanship of the Industrial Minerals Division in 1958-1959, SME Director 1965-1967, and SME Executive and Finance Committee 1967, 1970 and 1971. He became an AIME Director in 1970, before nomination for the SME Presidency.

A native of the state of Illinois, he attended public school in Mendota, his birthplace, and Aurora, before going on to take his B.S. degree in geology from the University of Chicago in 1935. His M.A. and Ph.D. were earned at the University of Minnesota in 1936 and 1940, respectively.

Bob Grogan is one of those fortunate individuals who discovered his real interest early in life. During a period of illness while a freshman in high school, a friend loaned him a copy of a western novel in which one of the characters was a paleontologist. This aroused his interest in geology and led to the borrowing of a library book by Blackwelder and Barrows on physical geology. This started the ball rolling; and nurtured and encouraged by the friendly companionship of a local amateur naturalist, young Bob became acquainted with the geological and mineralogical features available in the vicinity of Mendota (of which there are not many, he wryly admits), and for a brief period one winter in the vicinity of Pomona, Calif.

Choice of colleges was determined hugely by the availability of scholarships and nearness to home. The University of Chicago was a fortunate choice in both respects, even though his parents couldn't see how anyone could make a living in geology and insisted that he become a chemist instead. This emphasis on chemistry lasted through his sophomore year, when the urge to study geology became irresistible, and the reorientation to a life in that field was made.

Summers were spent in Canada

as field assistant to a graduate student, Gordon Rittenhouse, and later to Professor Francis Pettijohn. This was during the period following the devaluation of the dollar, when gold went from \$20.67 to \$35.00 an ounce. Canada was undergoing a tremendous expansion of exploration aimed at discovery of new gold deposits. Bob Grogan determined to become a part of this scene, and oriented his program of studies toward the "hard rock" side of geology.

The University of Minnesota was an obvious choice for graduate work for many reasons, not the least of which was an opportunity to earn part of his living by being departmental librarian and serving as laboratory assistant to two professors, Grout and Thiel.

The urge to get out of school in order to make a living and get married led to Grogan's choice to leave Minnesota at the end of his residence period in 1937 but before completing his doctoral thesis; two jobs opened to him, one with the Iowa Survey and the other with the Illinois Survey, and he chose the latter for reasons which seemed valid at the time and which were never proved wrong.

The Illinois Survey under the guidance of Morris Leighton was and continued to be the outstanding state survey in the United States, and working under the direction of J. E. Lamar in the Industrial Mineral Division was tremendously educational and inspiring. The disdain Bob felt for the work he was initially assigned to do however, a study of clays, can hardly be understood except by those whose whole training had been in the hard rock area; but this attitude was completely reversed by the challenge and the appreciation of the beneficial and utilitarian aspects of the investigation and evaluation of industrial minerals. A better and more inspiring leader than J. E. Lamar, by example and by instruction, he feels sure has never been equaled in this field.

Grogan's war years were spent in Survey work in the fluorspar and lead-zinc districts of southern and northwest Illinois, as part of the national effort to increase the production of vital mineral raw materials. The Illinois Survey, with its great array of scientists and technologists, substituted for the USGS in this activity in its own state.

An opportunity to look at all the principal fluorspar deposits in Mexico in 1948 as a consultant to Armour Research Foundation was a welcome break, and led to what was to become a lifelong interest.

A chance encounter with Joe Gillson, based on mutual interests in fluorspar at a geological society meeting in El Paso, Texas, led to Grogan's leaving the Illinois Survey in 1951 and joining the Development Department of the Du Pont

Co. in Wilmington. Joe had been Du Pont's house geologist since about 1926 when he began consulting for them while still teaching at MIT. He had been holding the fort alone for most of the intervening years but was beginning to feel the need for the assistance of a "leg man," an associate to share the load.

In succeeding years, Grogan became involved in many field investigations for various minerals in the United States and Mexico, Europe and Africa. The Du Pont Co.'s central interests were always fluorspar and titanium minerals, but from time to time other minerals and metals entered the scene and were investigated intensively, such as beryllium, columbium, strontium-sulfur and silver. Many months were spent looking at carbonatites in Africa, for example, when the columbium mineral, pyrochlore, was first recognized as a new and potentially important source of that metal. Fluorspar deposits were investigated in the United States, Mexico, England, Italy, France, West Germany, Spain, North Africa, South Africa and Argentina and titanium minerals in many of the same countries, as well as Sierra Leone, Norway, Canada and Australia.

Joe Gillson, as is recognized by all who knew him in AIME and by his host of professional friends, was a great leader and wonderful associate, Grogan points out. When Joe retired in 1960, Bob became manager of a newly created Geology Division. In 1969, he and his staff were transferred to the Planning Division of the Purchasing Department. Subsequently he was designated manager of a separate Geology Section within the Purchasing Department which was given responsibility for much of the geological work of the Du Pont Co. and its subsidiary and affiliated companies.

Many persons outside Du Pont are curious about the inclusion of its geological function in the Purchasing Department, but this is really quite a normal and symbiotic relationship when it is understood that the Purchasing Department has a major role in the "make or buy" decisions made by the company and that the Geology Section is its source of information about vital mineral raw materials.

Grogan has written more than 20 articles for scientific publications relating to his fields of specialization, which include the economic geology of titanium and fluorspar deposits, industrial minerals and engineering geology.

He and his wife Jean live in Swarthmore, Pa., where they are well known for their expertise in horticulture. Their three children are married, living in Virginia, Kansas and Oregon and have added four grandchildren to the family group.

Dennis L. McElroy (Deceased)

AIME President in:
1972



Dennis L. McElroy is currently a Mining Consultant in Pittsburgh and a Member of the Board and of the Executive Committee of the National Mine Service Company, Pittsburgh. He is also Member of the Board of the Rochester and Pittsburgh Coal Company, Indiana, Pennsylvania. He retired in 1965 from the position of Executive Vice President and Director of the Consolidation Coal Company.

Mr. McElroy received his Bachelor of Science and Master of Science degrees from West Virginia University. He went on to become Chairman of the Mining Engineering Department at Virginia Polytechnic Institute from 1938-1939 and Director of the School of Mines and Industrial Extension at West Virginia University from 1939-1943. He was also Head of the Coal Section of the War Production Board from 1941-1943. He joined the Consolidation Coal Company in 1943 as Chief Engineer and later served as Vice President of Engineering and Vice President of Operations before being appointed Director in 1959 and Executive Vice President in 1960. In 1965 he was selected to be a member of the U.S. Department of Commerce Survey Team to the Philippines.

Mr. McElroy became a member of AIME in 1926, and he has held a number of important positions in the Institute. He served as President of the Society of Mining Engineers of AIME in 1967 and as a Director of AIME for the years 1966-1968. He has also been affiliated with the Engineers Society of Western Pennsylvania and the West Virginia Coal Mining Institute and is a Past President of both. An active alumnus of West Virginia University, Mr. McElroy is a Past President of the West Virginia University Alumni Association, a Life Trustee of the Alumni Association's Loyalty Endowment Fund, and he is one of fifty West Virginia University alumni to have received the "Order of Vandalia" Award. He is a member of the Tau Beta Pi, Sigma Xi, and Sigma Gamma Epsilon fraternities.

Organization:
SME

MINING ENGINEERING

MARCH 1971

A PUBLICATION OF THE SOCIETY OF MINING ENGINEERS OF AIME

Copy -
pg. 53



James D. Reilly

1971 SME President

James Dunn Reilly was born September 30, 1908, in Dalkeith, Scotland. Educated in the Public Schools in West Terre Haute, Ind., he started working full time as a miner in the year 1923, advancing from coal loader to assistant superintendent of the Walter Bledso Co., in Terre Haute, Ind. He became superintendent in 1942 of the Piney Fork Mine of Hanna Coal Co.; general superintendent of Piney Fork and Dunglen in 1945; general manager of the underground mines of Hanna Coal in 1946; vice president of operations of Hanna Coal Co. in 1947; president of Hanna Coal, division of Consolidation Coal in 1961; vice president of Consolidation Coal in 1967; Chairman Emeritus of Coal Division of AIME and of American Mining Institute, and Coal Division of National Safety Council; and president of Ohio Coal Association. He was written up in *Who's Who in America*, and the International Statesman of *Who's Who in the British Empire*.

James Reilly retired on October 1, 1970, as vice president, of Consolidation Coal Co.; president of Ohio Coal Association and director of Ohio Reclamation Association; Chairman of Surface Mining Division of American Mining Congress. At the present time he is chairman of the board of three companies, Pike Natural Gas, St. Clair Oil Company and Reilly Cadillac and Chevrolet.



A ME Interview

Question: As 1971 President, you will be visiting many AIME sections. What will you talk about?

JDR: The human side of engineering or the psychological approach will be my theme. It is my opinion that if in the 1970's we can increase our ability to work together as miners, managers, engineers, federal and state inspectors, we will be able to hold the line on costs by increasing productivity. As you know our economy starts with raw material and energy. I believe the mining industry can do more to slow down inflation than any other group in this nation. I intend to give many case histories on how human engineering has worked for me.

Question: Where did you get your education?

JDR: I had very little formal education. With 14 children in the family and four grandchildren reared with us, I went to work at an early age. Then I took an International Correspondence course. I was honored in New York, at a dinner, as one of their outstanding graduates. I have been taking courses all of my life.

Many of my friends have been professors of mining engineering. I have spent a great deal of my time with the Educational Committee of the National Coal Association, also with the Scholarship Committee Coal Division of AIME. Our home has been the headquarters for the Hanna trainee's and the visiting students from different mining colleges, for the last twenty years.

Question: Am I right that you worked underground as a miner?

JDR: Yes, I started working full time as a miner in the year of 1923. I drove pick entry with my father. During this time I was in my first mine explosion. I worked in every classification of underground work until 1936. During this period I had the misfortune of having my legs broken, skull fractured, and vertebra fractured, due to a roof cavein.

I was a delegate to mine workers conventions, and a member of the policy committee to determine what position the Indiana miners would take in regards to the United Mine Workers of America and many splinter groups formed at this time. The splinter groups formed were, Progressive, The Save the Union, and the National Miners Union. We fought hard, and kept the UMW.

Question: What motivated you into going into management?

JDR: My attitude towards mine management changed during my stay in the hospital, due to visits from my foreman, Andrew Hyslop Sr., Wright Gaston, mine manager, and James Hyslop, who was manager of the mines and later my mentor.

Realizing it was impossible for the miners to maintain their standard of living, due to depressed demands for coal, and low productivity, and knowing they could double their performance if their attitude towards the owners could be changed, I decided to take my foreman certificate in order to help bridge the gulf. When I became sec-

tion foreman at Snow Hill mine, in Indiana, I knew by the performance that the attitude of the miners was of major importance in productivity. As a result of the tonnage and safety performance in Snow Hill, I was made mine manager of the Fayette mine. This mine was seriously in the red. Again by getting everyone in the act, this group of engineers, foreman and miners put this mine over 18 tons per man shift, using track loading equipment, in a 54 inch seam. This was the year of 1938.

In the year of 1939, I was transferred to the Saxton mine, of the same company. The Saxton mine was being abandoned by the Du Pont Co., and taken over by the Walter Bledso Co. Labor situations at this mine were a hot bed of insurrection. For one year we worked under gravel beds, in the east section, which had been considered unworkable, while we drove headings under the Wabash River, to the west, to a safer block of coal. It was necessary to overhaul all of the machinery in rehabilitating this property. Again as a result of imaginative engineering—development of new techniques of sealing off river water, plus changing the attitude of all concerned—this mine, with wooden mine cars, had loading performances of 500 tons plus per shift. The tonnage was more than doubled in one year's time and the mine continued to work out all of the available coal.

Question: Were there other experiences in Indiana?

(continued on next page)

JDR: Yes, Mrs. Reilly opened and operated a grocery store in West Terre Haute, Ind. Then my colleague, Clyde Gibson, and I opened up two mines. We trucked our coal to colleges, hospitals and ice plants. We were getting ready for the World War II boom.

Question: When did you move to Ohio?

JDR: In 1942 James Hyslop asked me to take over the Piney Fork mine, of the Hanna Coal Co. This was a real challenge. This mine had a bad roof, 38% washery reject and an extremely difficult labor situation. Again with the excellent cooperation of the mining and mechanical engineers, plus a change in worker attitude, it became a successful mine. This change in attitude was brought about by enclosing man trip cars that had to travel a mile on the outside tram and converting an abandoned shop into a youth center, with a roller rink. Work on the center was done by miners and their wives. We also dammed up an abandoned strip pit creating what was known as the Sportsman Park. It now has 1500 members.

At this time I meant to return to Indiana, and run my own mines. During my work at the Piney Fork mine, I met R. L. Ireland, president of Hanna Coal Co. Ireland was completely dedicated to the safety of the mines, as a result of this I decided at this time to sell my mines in Indiana, and make my career with Hanna Coal Co.

Question: What has been your experience with the continuous miner?

JDR: The first continuous miner I ever saw was in the Saxton mine at Terre Haute, Ind. It was developed by Lee Martin, who patented and sold the first pin timbering machines. It was a Meyers Whaley machine with a Sullivan loading machine front end. I believe it would have been a success if the conventional mining performance had not been so high at this mine. My next experience, with a continuous miner was at the Ireland mine, Moundsville, W. Va. We chose the ripper type machines as we knew we had to take the draw slate with the coal to make the mine safe. The major problem here was to develop roof bolters that could advance with the machines, and install six to ten ft. roof bolts and keep pace with the machines producing 600 tons plus per shift of raw material. Again the policy of human engineering created a climate around the mining and mechanical engineers. A group of young miners who attended the classes in foremanship, maintenance and safety passed their examinations and became foreman. This developed into one of the outstanding mines in the U. S., again proving that the condition of minds is of more importance than the condition of mines.

Question: Why was your Franklin mine put in with conventional units?

JDR: The equipment at our Glen Castle mine and the crews were capable of producing 900 tons of raw material per loader shift and as there was approximately 100 to 200 ft of cover, the overburden pressures would not help the continuous miner to break the coal. This team came through with a remarkable performance. One year from breaking of ground for slopes and shafts this mine was producing at the rate of 10,000 tons of clean coal a day with 38% washery reject.

Question: When did you become involved in strip mining?

JDR: When I became vice president of operations, in 1947. At this time there was a lot of thought and engineering being done on changing bucket designs and experimenting with metallurgy to reduce the weight of the buckets. The object being that weight taken out of the bucket became payload. In addition to this we made a constant drive on better bank fragmentation. The drilling and blasting crews were put under around the clock supervision and training, and a competitive spirit developed between the crews. This action increased the volume of cubic yards from 850 thousand cubic yards to one million, one hundred thousand cubic yards. We continued with these 40-yard shovels to peaks of over 2 million cubic yards per month with one crew constantly taking the record from the other.

In the 1950's I had the privilege of watching James Hyslop, Andrew Hyslop Jr., Edwin Gaston and Casey Harmon and the engineering staff of Marion Power Shovel developed the 65 yd. shovel, known as the Mountineer. This breakthrough, in my opinion, lead to the massive shovels we have today. The experience gained as an observer was of great value to me and also to the staff, when in the 60's under my presidency we built the Silver Spade and the Gem of Egypt, 105 and 135 cubic yard shovels. According to Bucyrus Erie's advertising, the 4.7 million cubic yard in a month record set by the Gem of Egypt was the best performance of any major shovel developed to date.

All of these case histories convince me that with excellent engineering, plus human engineering we can create a climate in which ordinary mining personnel can develop and bring out the genius that is all around us in the American miners. From this we can draw the personnel to negotiate labor problems, develop an operating staff for reclamation work, educate a staff for unit-train loading stations, get qualified people to operate coal pipe lines, and attack all of the problems that go with modern coal mining both underground and strip.

Question: What is the future for the young mining engineer, in the coal business?

JDR: In my judgment, the prospect for success for the young engineers is greater in the coal industry now than at any time. The future is based on an increasing demand for solid fuels and not on short time war booms. I believe the young engineer will always go where the money is and the opportunity to advance in his profession.

Question: What is the industries future in legislative matters?

JDR: It is my opinion that all mining companies will provide the American Mining Congress with the best technical and practical advice possible, on safety matters and the problems of ecology. The Bituminous Coal Operators Association is developing new methods of operation without pollution for the coal industry in order to present the results to Congress in a manner they can understand. Then I am convinced reason will prevail in our legislation. As you know this is the most difficult problem facing the industry. We need more dedicated people in this type of work. I can think of nothing more exciting than participating in this.

Question: Jim, I understand that you and your wife had brunch with Former President Lyndon Johnson and Lady Bird?

JDR: Yes, that was a wonderful experience for us. The occasion was the welcoming of the Chancellor of Austria. After the ceremony four couples were invited to have brunch with Lady Bird, and the President and the rest of the family joined us from time to time. As the result of our conversation about Lady Bird's beautification program, I had the opportunity to tell about the crown vetch we grow on our strip lands. I sent them a gift of the crown vetch seed for their ranch. I hope our crown vetch will be like the flower in the song *Edelweiss*, may it bloom and grow forever.

My wife's comment was "Jim, it is a wonderful country, where you came in as an immigrant to Ellis Island, and now are having brunch with the President of the United States."

Question: What do you consider the outstanding achievement of your career?

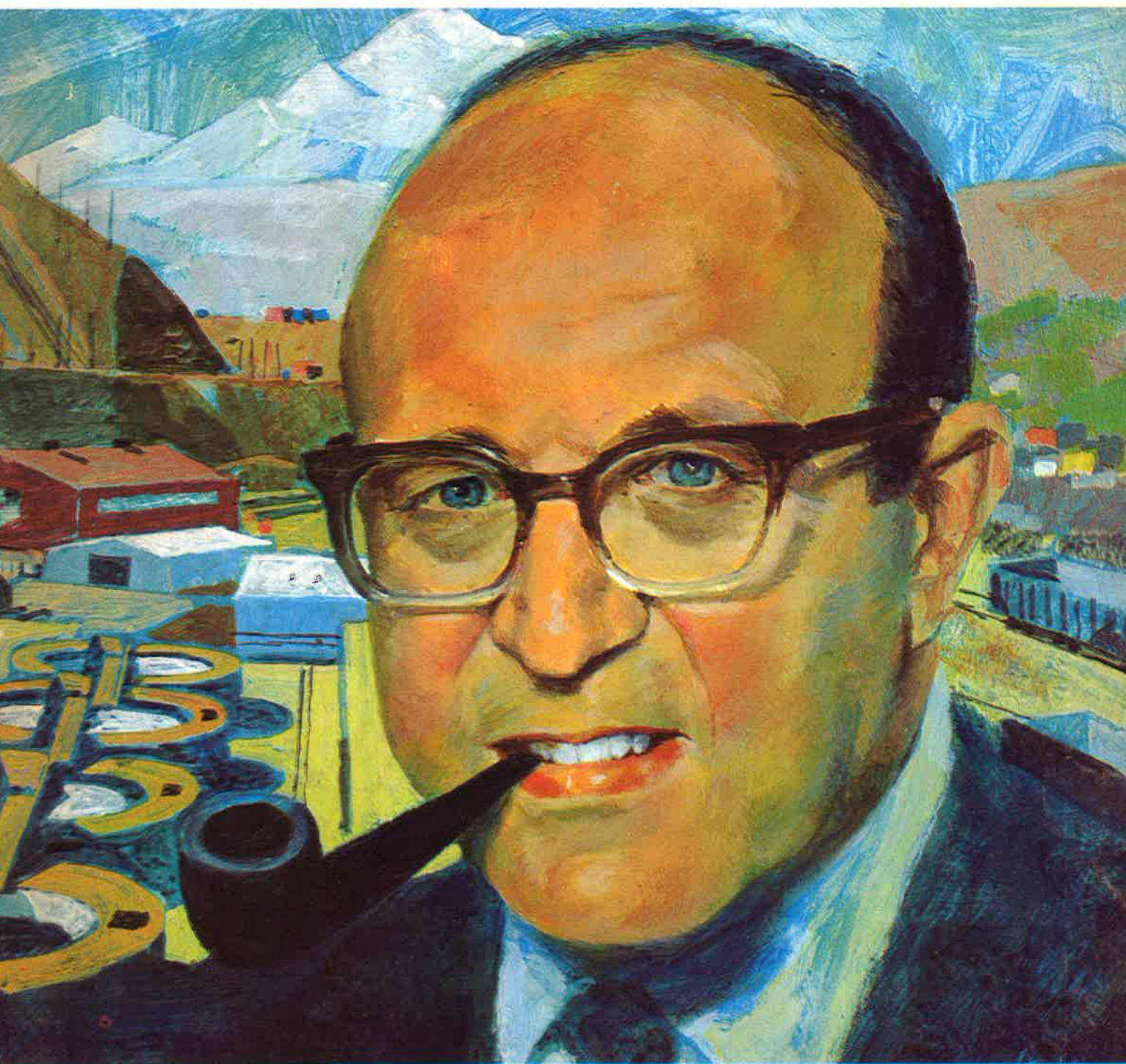
JDR: Keeping the Hanna organization intact during the coal depression and having the Franklin mine and the Gem of Egypt and the Silver Spade in the line when the coal boom started.

Question: What will you do after your term as SME President?

JDR: It will all depend on the outcome of the treatment for my old injuries. It is possible that I might become interested in some marginal mining proposition for I am sure history will repeat itself, with a policy of human engineering, based primarily on good engineering, safety, courtesy, and integrity.

MINING engineering

MARCH 1970



1871

ANNALS

1971



H. Rush Spedden
1970 President of SME

SME's new president, H. Rush Spedden, is no stranger to the members as he has been at the forefront of Society activities for the past decade. He served as MBD Chairman in 1960, Chairman of the AIME Membership Committee 1968-69, as well as serving on numerous committees. Always active in the local sections, he helped organize the Niagara Frontier Section, was Vice Chairman of the New York Section when he moved West in 1964, and Chairman of the Utah Section in 1968. He was also Chairman of the VII International Mineral Processing Congress in 1964.

Rush Spedden was born in Colville, Wash., on May 31, 1916; finished high school in Spokane and earned a degree in Mining Engineering from the University of Washington in 1939 with the aid of a WAAIME scholarship. He was President of his AIME student chapter. During summer vacations he worked underground as a mine mucker in the Coeur d'Alene silver belt and above ground as a mill operator. After graduation, he received a fellowship to the Montana School of Mines where he received his master's degree in mineral dressing.

He then turned East, accepting a research position with Professor A. M. Gaudin's group at M.I.T. Two years later, in 1942, he took a leave of absence to serve as metallurgist with the U.S. Foreign Economic Ad-

ministration in Bolivia, to bolster badly needed tin production. Upon completion of this mission in 1944, he entered the Army and after OCS training, was commissioned an officer in the Army Corps of Engineers. Following VE Day, he was assigned to the Third Army Coal and Mining Section as manager of a coal mine in Bavaria.

Completing his military service, he returned to M.I.T. in 1946 as assistant professor of mineral engineering. His name has repeatedly appeared as an author of AIME technical papers following his first contribution in 1942. Best remembered are his paper and film on "Flotation in Action" and his studies on radioactive tracers in flotation. He was also instrumental in developing hydrocyclones as classifiers.

While Chairman of the MBD Education Committee, he organized a nationwide Summer Job Program for AIME student members which is still carried on by the AIME Western Field Office.

In 1952 he joined the Metals Research Laboratories of Union Carbide at Niagara Falls to organize a department of mineral engineering. Five years later he was assigned to Union Carbide's New York headquarters as director of research for its Ore Division. While with Union Carbide he specialized in extractive metallurgy of refractory metals, manganese and chrome. He often

travelled to the company's mines in Africa and South America to implement technical innovations. He also guided the work which ensured the supply of manganese ore for dry cell batteries.

When Kennecott Copper Corp. needed someone to take over the direction of its Metal Mining Division Research Center in Salt Lake City, upon the retirement of Stuart R. Zimmerley, its first director of research, Spedden decided to accept the challenge and became director of research in August 1964, a position he still holds.

The research team he leads is responsible for a wide range of research activities including ore dressing, extractive metallurgy, improved recovery techniques of copper and valuable by-products, and other investigative fields utilizing both pilot plant and field studies. He has done much to stimulate a growing interest in dump leaching of copper.

Prior to joining Kennecott in 1964, he was awarded an honorary degree of mineral dressing engineer by the Montana School of Mines. Other academic honors include membership in Tau Beta Pi and Sigma Xi.

Just before leaving M.I.T., Rush Spedden met his wife, Betty, while white water canoeing with the Appalachian Mountain Club in New Hampshire. At the time she was employed as a physical therapist, working with crippled children. Their interest in outdoor activities has continued and during the winter they may often be found skiing with their four teen-age children in the high mountains of Utah. During the summer, the family enjoys rock-hounding in the western deserts. The Spedden enthusiasm for AIME activities has encompassed his wife, who is currently Chairman of the Utah Northern Section of WAAIME.

In addition to his AIME activities, he has served on the Panel on Columbium and Tantalum Raw Materials (1958-59) and Panel on Extractive Metallurgy (1966-68) of the National Academy of Sciences Material Advisory Board. He is the U.S. member of the International Scientific Committee, International Mineral Processing Congresses.

His other memberships include Mining and Metallurgical Society of America, Institution of Mining and Metallurgy, and American Chemical Society.

Spedden's goal for the SME is to build a stronger base from which to tackle the problems of the 70's. We must get the word across that our profession is vital to man's needs and that we are striving to make this earth a better place to live.

Our programs will emphasize the technology to increase mineral production within the constraints of an improved environment.

Career guidance, continuing education, and wider information dissemination are keys to our future.

MINING engineering

MARCH 1969





Brower Dellinger 1969 President of SME

Brower "Truck" Dellinger took over the presidency of SME at the 98th Annual Meeting in Washington, D.C. last month, following years of service to the Society. He was born in Westfield, N.J., on March 19, 1913. After finishing his preparatory school education at Trinity School in New York City, he entered Stanford University. Upon graduation from Stanford's mining school in 1936, he worked as a mucker in the gold mines of the Mother Lode Country of California, rising eventually to the position of chief engineer.

Following naval service in World War II, Dellinger joined Newmont Mining Corp. as general superintendent of the Esmeralda operations in Goldfield, Nev. In 1947 he was transferred to Grass Valley, Calif., his old stamping ground, to help reopen Newmont's Empire-Star mine. In 1952 he became manager of the Spokane-Idaho Mining Co. in Kellogg, Idaho.

Late in 1954 he joined National Lead Co. as superintendent of exploration in Utah. Uranium was the object of the search. In 1956 he was appointed plant manager of the company's uranium mill at Monticello, Utah, operated under contract with the AEC.

Dellinger came to New York in 1958 as assistant plant manager of National's MacIntyre development at Tahawus, N.Y., in the Adirondack Mountains. In 1965 he was named plant manager. The company appointed him manager of its newly-created Mining and Exploration Department in February, 1968, the position he holds at present, and he moved to offices in New York City. In the new post he has been called upon to travel often to Southeast Asia and other corners of the globe in his company's far-flung raw materials program.

President Dellinger has been a member of AIME since 1937, and has actively participated in the af-

fairs of SME and the Institute. He has been a member of the SME Editorial Board and the General Editorial Committee and served as Chairman of both from 1958-1960. In 1964 he was nominated SME Eastern Regional Vice President for a three-year term. Other responsibilities in recent years have included membership on the Planning Committee, the Executive and Finance Committee, and the SME Board of Directors. Currently he is serving a three-year term as an AIME Director.

The brief biography given above is reminiscent of "the old corps" in mining when engineers moved a great deal more than they do now. Brief though it is, it gives the measure of the man—laborer, miner, mining engineer, exploration man, mill man, mining executive. In his varied and successful career he has been tested by the peculiar demands of the mining life—hard work, sometimes danger, isolated living and long family separations. Nevertheless, while taking these in stride, he has assumed his role as true professional by giving of his time and effort to some of the toughest problems faced by the Society. For example his report on the publishing task of SME has become a working platform for **MINING ENGINEERING**. His "order of march," so-to-speak for the Mining & Exploration Procedural Manual was a monumental work that is giving day-to-day service.

Always practical, Truck's program for his year as SME President is to the point: strengthen membership service, increase membership and income.

Brower Dellinger met his wife Jane in Grass Valley, Calif., when he went to work in her home town before World War II. They have one son, who is named after his father. Truck is an enthusiastic golfer. His longtime friends have always admired among his other qualities, his great physical strength. According to informed sources, he has never been known to take a licking at arm wrestling.

The nick name "Truck" has been with Dellinger the better part of his life. It was bestowed on him unwittingly by sports writer Prescott Sullivan when in the San Francisco *Examiner* he described the performance of the SME president as being like a truck when he was anchor man on the Stanford University relay team. Dellinger won the race for his team but knocked over two competitors in the process without being disqualified.

With his year serving as SME President and the globe trotting demands of his post with National Lead, Brower Dellinger has a busy year ahead—a state of affairs he enjoys and is fully capable of handling.

MINING engineering

MARCH 1968



FREEPORT SULPHUR'S
RAYMOND H. FEIERABEND
1968 PRESIDENT OF S.M.E.



Raymond H. Feierabend, 1968 President of SME

Capping an outstandingly active career in SME—and the Institute—Raymond H. Feierabend assumed the post of 1968 President of SME at the 97th Annual Meeting in New York City. To the accolades of the members, the "transfer of the gavel" from Dennis L. McElroy, 1967 President, to Mr. Feierabend symbolized not only the bestowing of a well-earned reward, but of well-earned confidence in the brand of leadership and accomplishment exhibited over the years by Feierabend.

President Feierabend is a professional mining engineer in every sense of the word. After graduating in 1942 from the Henry Krumb School of Mines, he immediately joined Freeport Sulphur Co. as a junior engineer assigned to the

Frasch operation at Hoskins Mound, Texas. His training and engineering ability propelled him through a series of positions, including those of field engineer, production engineer, production superintendent and general superintendent of the Grand Ecaille mine in Louisiana. In 1957, the company appointed him vice president, charged with the responsibility of developing the now-famous off-shore sulfur operation, Grand Isle. He was promoted to his present position of vice president of Freeport Sulphur in 1961 with broad responsibilities for production, engineering and sulfur exploration.

From 1963 to 1967, Feierabend was headquartered in New York City, where he was active in Free-

port's diversification and expansion program. When Freeport decided to establish a new division to be known as Freeport Chemical Co., Feierabend returned to Louisiana to oversee the company's new phosphate chemical project now under construction at Convent, La., as well as its mine being opened in Florida jointly with Armour Agricultural Chemical Co.

His professionalism as an engineer has been matched by his interest and participation in his professional society. Shortly after joining AIME in 1952, Feierabend became active in the Institute's Delta Section, spending several years serving on its executive committee. At about the same time, he undertook the first of many subsequent positions in the Industrial Minerals Division, culminating in his advancement to Chairman of the Division in 1960. He was simultaneously elected to the SME Board of Directors.

Among the many committee memberships he has held in SME, Feierabend served on the SME Long-Range Planning Committee from 1962 to 1965. During this period he spearheaded the effort to establish the now successful SME Fall Meeting. Later he played a leading role in SME's decision to hold exhibits during the Fall Meeting.

On the AIME level, President Feierabend was a Director-at-large from 1960-1963, and was re-elected to the Board of Directors in 1965 for a second three-year term. In 1967 he served as a Vice President of AIME and a member of the Institute's Finance Committee.

Ray, as most of us know him, is married to the former Charlotte Wise of Richmond, Va., who for the past several years has been active in the WAAIME. They live in Baton Rouge, La., with their two youngest children, Scott 15 and Carey 7. Jane, the oldest, graduated from the University of North Carolina last June and is now working in a medical research laboratory in Chapel Hill, N. C. Ray, Jr. is a freshman at Amherst.

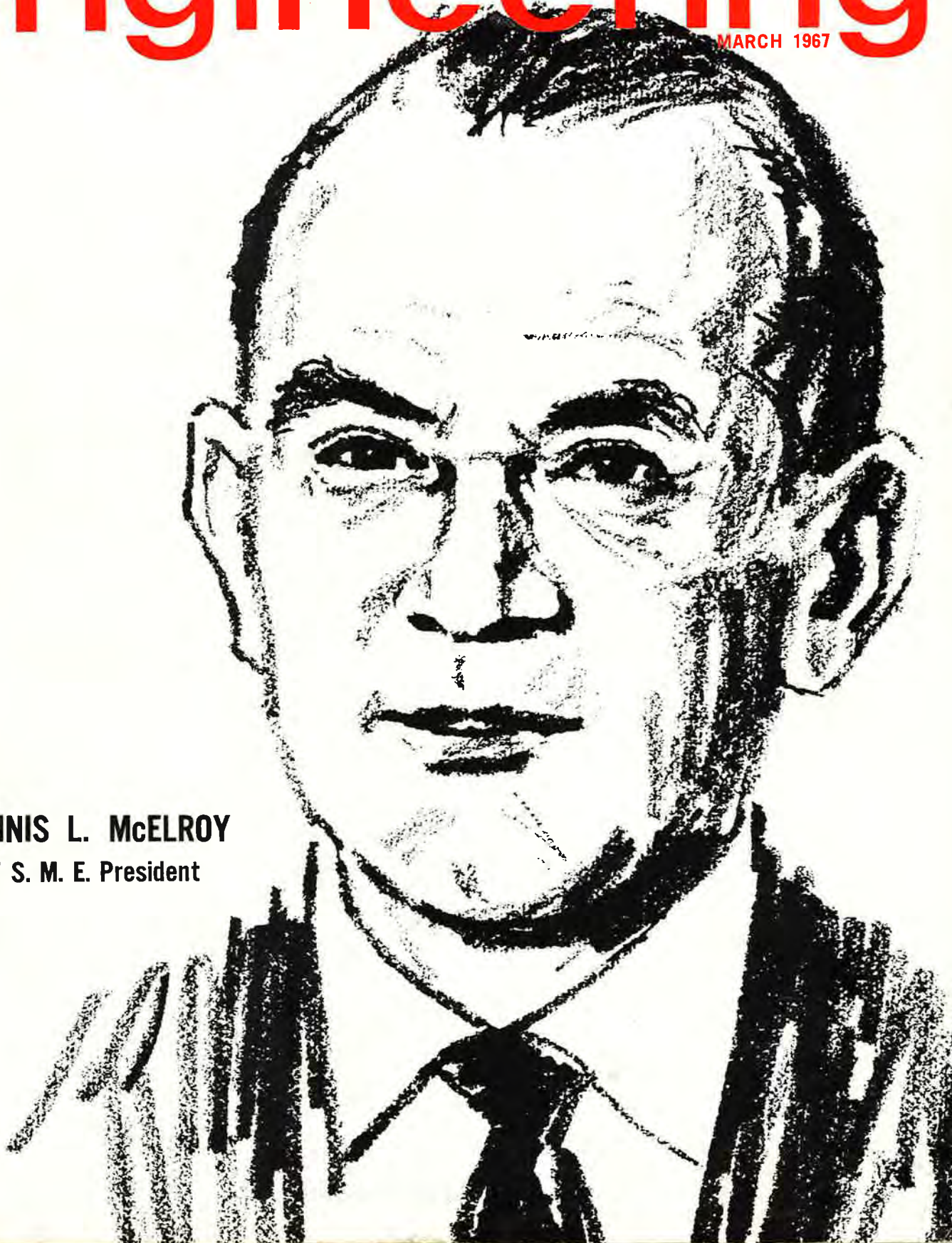
Among his many interests outside the profession, Feierabend's favorite pastimes include camping, fishing, photography, gardening and loafing. For many years he was active in Scouting. He is a member of the Mining Club of New York, the Mining and Metallurgical Society of America, Theta Tau and civic groups.

During the year ahead, President Feierabend will continue the membership development program inaugurated by his predecessors. Believing that all engineers must belong to their professional societies in order to achieve their own maximum growth in their chosen field, SME's new President will pursue those policies designed to attract all qualified mineral industry engineers to SME.

MINING engineering

MARCH 1967

DENNIS L. McELROY
1967 S. M. E. President





Dennis L. McElroy Becomes 1967 President of SME

Dennis L. McElroy brings to the presidency of SME a strong educational and administrative background in the mining industry. He was born in Moundsville, West Virginia on October 19, 1904, the son of Arch Jones and Ella Mae Dorsey McElroy. By the time he entered college he had already decided upon the direction in which his career would take him. He enrolled in the School of Mines at West Virginia University, where he earned his B.S. degree in mining engineering in 1927. Upon graduation he spent a year as mine foreman for the Penn-Pitt Coal and Coke Co. in Greensboro, Pa. He left this job in 1928 when he was awarded a research fellowship in mining, and returned to West Virginia University to study on the graduate level. He successfully completed the requirements for

an M.S. degree in 1930, but stayed on at the University as assistant director of the mining extension, a position he retained for eight years. In 1938 he accepted the appointment to head the department of mining engineering at Virginia Polytechnic Institute. He returned to his Alma Mater after a year, as director of the School of Mines; director of the Industrial Extension and professor of mining engineering. In addition to these responsibilities McElroy found time to serve his country as chief of the Coal Section of the War Production Board from 1941-1943.

McElroy then began his long and successful association with the Consolidation Coal Co., which he joined in 1943 as chief engineer. In 1946 he was transferred from the Company's Fairmont, W. Va. office to headquarters in Pittsburgh where he pro-

gressed through the increasingly responsible positions of vice president—engineering in 1947, vice president—operations in 1954, to executive vice president in May of 1960. McElroy was also made a director of the Company in 1959, a capacity in which he continued even after his retirement on February 1, 1965.

In addition McElroy has served on the board of directors of the Christopher Coal Co. in Osage, W. Va., National Mine Service Co., Pittsburgh, and the Pitt-Consol Chemical Co., in Newark, N. J.

Aside from his affiliation with AIME, which included Directorship of SME, he is active in the American Mining Congress and the West Virginia Coal Mining Institute, which he served as secretary-treasurer from 1939-1943. He is a director of Salem College, a past president of the Alumni Association of West Virginia University, and of the Society of Engineers of Western Pennsylvania. An associate editor of the Mineral Industry Yearbook from 1939-1940, he is also an author and has published several papers on coal industry topics, among them, *Coal Mine Haulage in West Virginia* and *Mechanical Coal Mining*. He contributed to the McGraw-Hill Encyclopedia of Science and Technology.

Like nearly all SME Presidents in the past, Dennis McElroy's professional responsibilities keep him pretty busy. However, he has definite ambitions for his regime as Society President and intends to devote all the time needed to realize these ambitions. First of these is to attract young people into the industry. It is McElroy's opinion that the time to make boys and girls aware of the advantages of a career in the mineral industries is in the first year of Junior High School, the seventh grade of Elementary School. Registration in mineral industry schools is low, but under the guidance of Dennis McElroy SME will do all possible to help build up the mineral industry school population.

The Society of Mining Engineers has had an unusually good year in membership. The second objective of the McElroy administration is to equal or better the 1966 record for new members. The 1967 President earnestly solicits the help of every member in achieving this goal. Third objective, and this is almost prerequisite to the accomplishment of the other two, is to engage the interest of the top officials in the minerals industry in SME. The influence of these men can be a powerful spur to the society's membership development effort and toward interesting young people in the industry.

"Mac," as his many friends call him, makes his home in Pittsburgh with his wife, the former Opal Lucille Hall. They have one son, Arch L. McElroy.



Presidents 1957-1966
VOL. 9 – VOL. 18

1966 SME President Wayne L. Dowdey

March 1966: VOL. 18 NO. 3 – SME President Outlines 1966 Programs

1965 SME President Jack M. Ehrhorn

March 1965: VOL. 17 NO. 3 – Jack M. Ehrhorn, 1965 SME President

1964 SME President Sanford S. Cole

1963 SME President Edward G. Fox

1962 SME President William B. Stephenson

1961 SME President James C. Gray

March 1961: VOL. 13 NO. 3 – Our Role in a Challenging Decade

1960 SME President A. B. Cummins

March 1960: VOL. 12 NO. 3 – A message from the 1960 SME President

1959 SME President J. W. Woomer

March 1959: VOL. 11 NO. 3 – Society of Mining Engineers President in 1959 J. W. Woomer

1958 SME President Stanley D. Michaelson

March 1958: VOL. 10 NO. 3 – Know your Society: Society of Mining Engineers President in 1958 Standly D. Michaelson

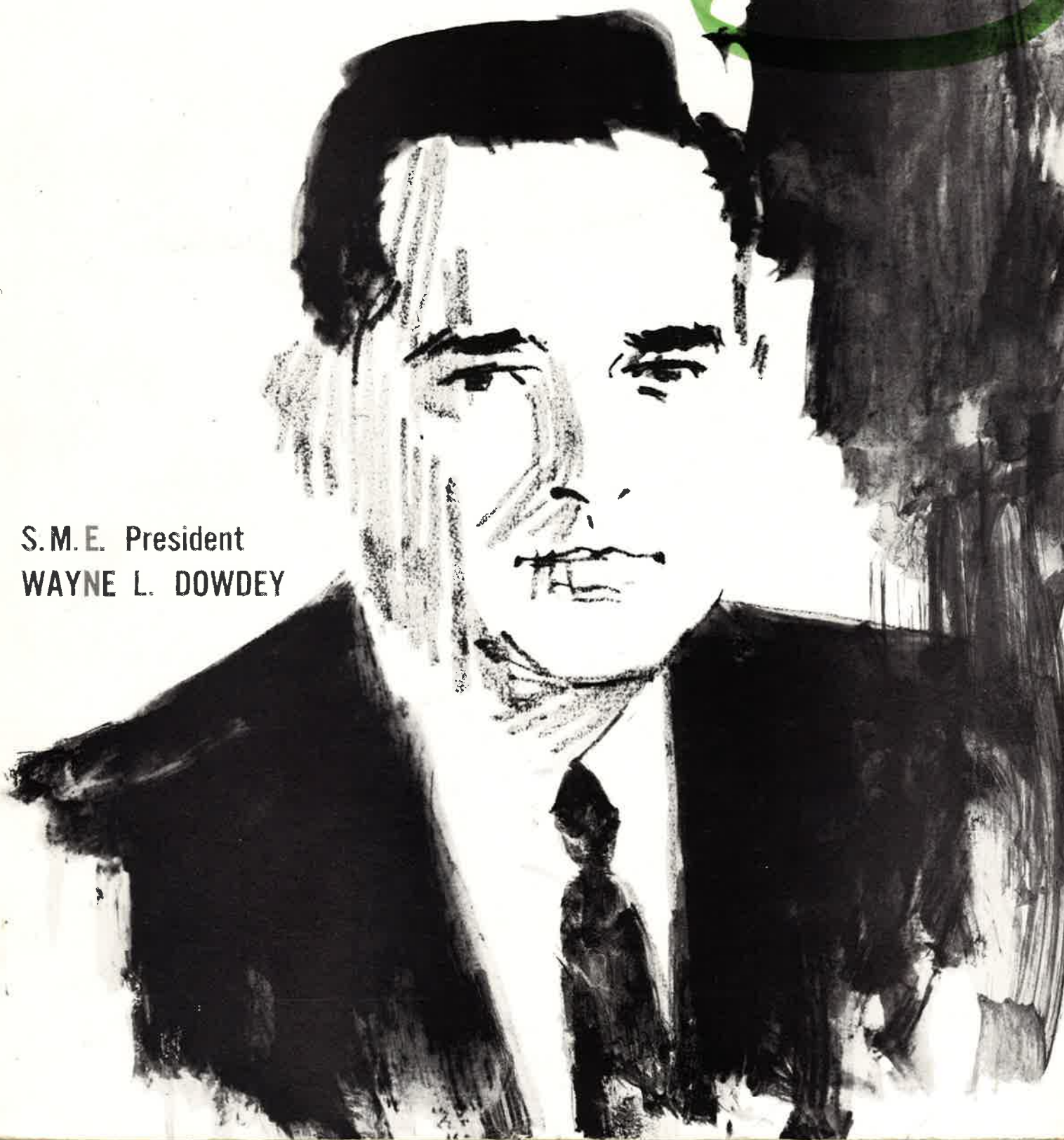
1957 SME President Elmer A. Jones

March 1957: VOL. 9 NO. 3 – Elmer A. Jones

MINING engineering

MARCH 1966

S.M.E. President
WAYNE L. DOWDEY





WAYNE L. DOWDEY, PRESIDENT OF SME

SME PRESIDENT OUTLINES 1966 PROGRAMS

Strong feelings on improved communications between Sections and Subsections has long occupied much of my time and efforts in SME affairs," says Wayne L. Dowdey, 1966 SME President. After fifteen years of active professional service on many SME committees and programs, and in recent years on SME and AIME Boards of Directors, Mr. Dowdey will utilize his experience and knowledge of SME affairs to augment the fine achievements of his predecessors.

Born in the Birmingham, Ala., coal mining district, Mr. Dowdey formed an early and lasting association with the mining industry. During summers while he attended Howard University and Alabama Polytechnical Institute, he worked in nearby mines. Later, in 1938, when he accepted his first professional job, it was naturally in the mining industry. He joined Republic Steel Corp. as a mechanical leader and between 1938 and 1945 advanced successively to foreman (1939), assistant superintendent (1942) and finally superintendent (1945) of the company's Spaulding, Ala., iron ore concentrating mill. Over three years, between 1939 and 1943, he worked on a beneficiation development project at Spaulding under the auspices of the U.S. Bureau of Mines.

Then, in 1945, Mr. Dowdey turned to sales. Beginning as a sales engineer for Eimco Corp., he repeated his earlier pattern of advancement, becoming in 1949 manager of the Southern District; in 1959, regional manager of the Birmingham and Pittsburgh Districts; and in 1960, General Sales Manager.

During this period at Eimco, he devoted his whole effort toward the build-up of sales by expansion in keeping with technological demands. He wanted specifically to increase sales by extending Eimco's coverage not only to the mineral and chemical industries, but to all basic industries. Eimco paid tribute to his work in 1961 by appointing him vice president of all sales and a corporate director. Now, Mr. Dowdey was able to help in all facets of the company's expansion—all of which were of primary importance to sales. He has even, for example, rendered strong support in the last few years to a development program directed toward industrial waste treatment. Aware of the

unprecedented leaps in technology, Dowdey constantly encourages policies that are abreast of technological progress.

During the major part of his work at Eimco, he still found ample time to actively participate in the Society of Mining Engineers, particularly its Minerals Beneficiation Division. From 1951 to 1955, he served as Chairman of various MBD committees. From 1956 to 1959, Dowdey was elected successively Secretary-Treasurer, Program Chairman, Assistant Chairman and finally Chairman of MBD as well as Regional Vice Chairman of the Richards Award Committee.

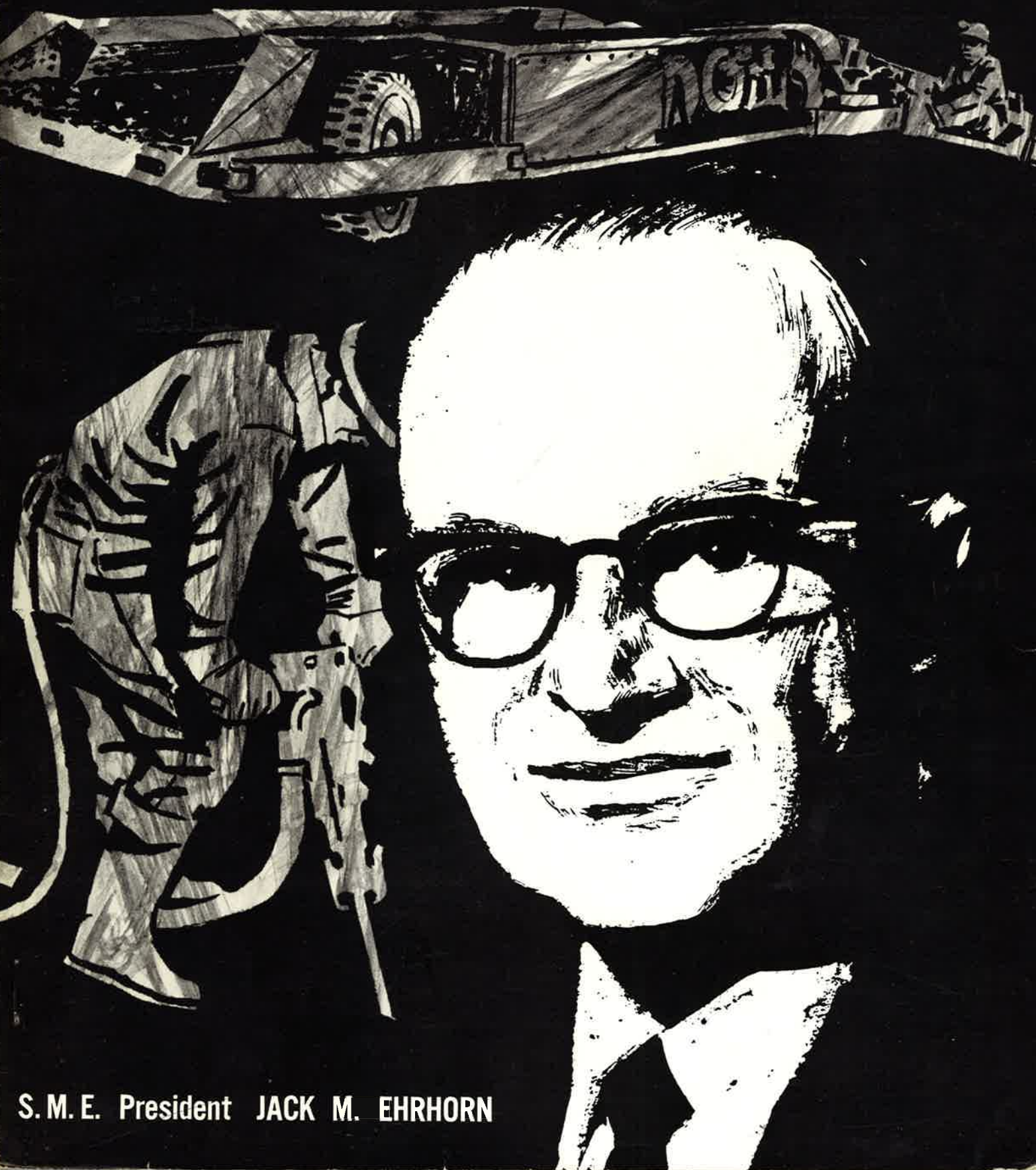
Throughout these years, of active Society support, he took special interest in improving communications on the Section level. Travelling personally as often as he could, delivering speeches, encouraging joint Section meetings and projects, Dowdey proffered an immediate service to a most vital area in the Society's professional unity and strength. This same emphasis on inter-communication of Sections will be a main tenet in his 1966 presidential program. He will, for instance, encourage Section participation in AIME President Stephenson's Career Guidance Program. In fact, Mr. Dowdey attaches great importance to the full cooperation and support of SME in the Career Program, especially the "Visitation" project.

Membership will be another top priority area of his concentration.

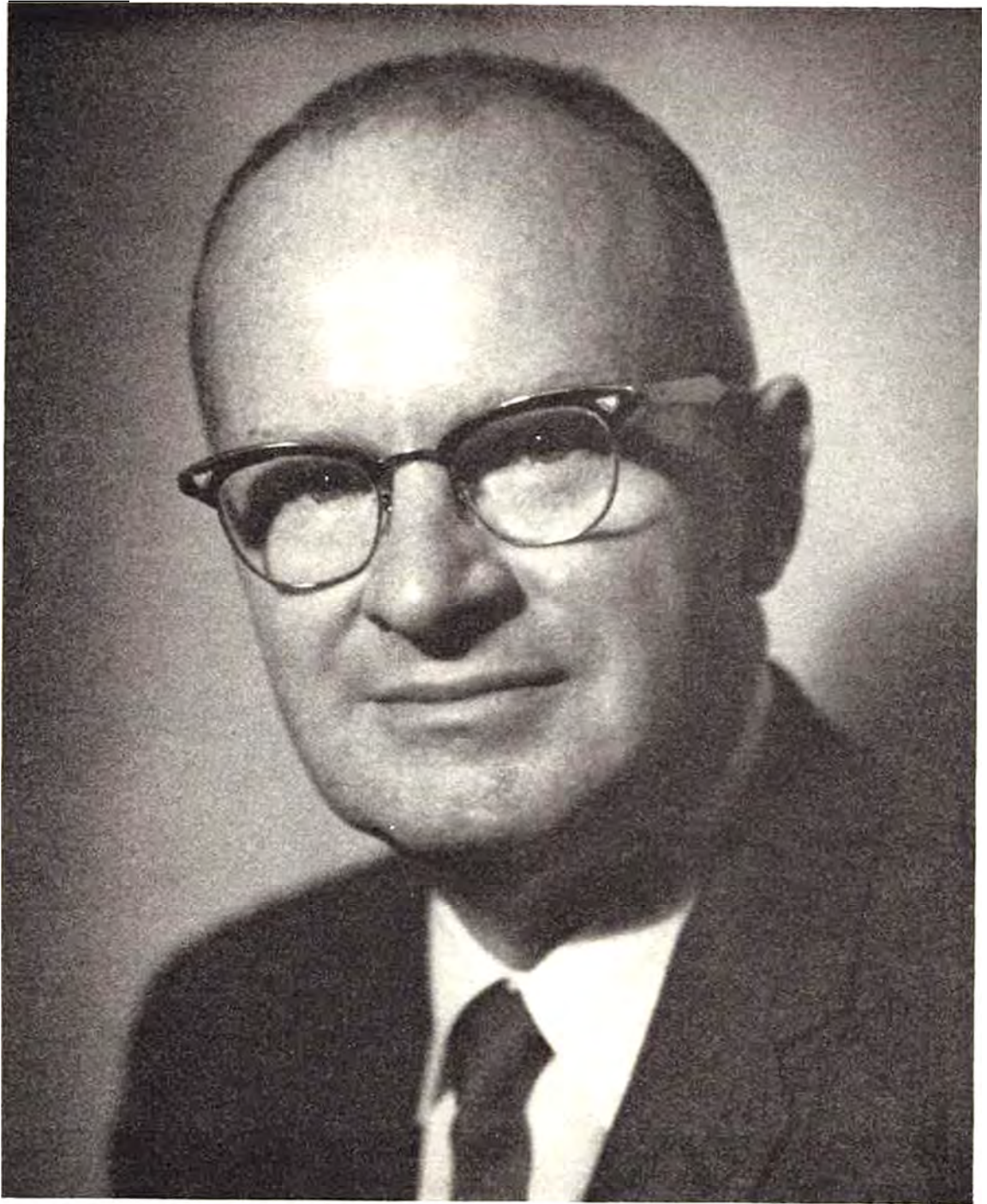
The new President emphatically opposes "relaxation" of the dynamic membership drive set in pace by his predecessor, Jack Ehrhorn. More, he hopes to expend full-scale efforts to accelerate it. His emphasis on the necessity of solidifying both the SME internal organization on the Section-Subsection level, and its external organization through such projects as the Career Guidance Program and the Visitation Program, cannot help but attract increasing numbers of professional engineers, as well as build-up SME membership for the future. President Wayne Dowdey's successful record of "built-up" sales for Eimco and unflagging service to the Society leaves no doubt of the Society's outstanding prospects for 1966.

MINING engineering

MARCH 1965



S. M. E. President JACK M. EHRHORN



JACK M. EHRHORN, 1965 SME PRESIDENT

Mining men throughout the Nation are offering congratulations to Jack Macfarlane Ehrhorn, the Society of Mining Engineers' new President. In his new role as Society President, he will continue in the same spirit of service that brought to him a full and rewarding professional career.

Jack Ehrhorn was born in Mt. View, Calif., in 1902. He attended Stanford University, receiving his A.B. in 1924 and his E.M. three years later. In 1955 he was back on campus, this time to be awarded the Advanced Management Program certificate from Harvard University's Graduate School of Business Administration.

His professional career began in 1927 with United Verde Copper Co. in Jerome, Ariz. He left that firm in 1929 to serve as engineer on a hydraulic mine project for North Fork Placers in Helena, Calif., but he returned the following year to United Verde, where he remained for two years, first as a miner, then as shift boss.

In 1932, Mr. Ehrhorn joined the Idaho-Maryland Mines Corp. in California, where he spent the following six years, moving from miner to superintendent.

From 1938 to 1942 he worked in San Francisco as a mining consultant, and in 1942 he became a construction superintendent for Western Knapp Engineering Co. in San Francisco.

Our newly-appointed president joined his present firm, United States Smelting Refining and Mining Co., in 1944. Before assuming his current post as industrial development director, Mr. Ehrhorn, served as industrial relations engineer, mine superintendent at the U.S. mine in Bingham Canyon, and as assistant to the manager of the Western Mines division of the Company.

Mr. Ehrhorn's appointment to the presidency of SME is the culmination of long, important participation in Society affairs. Among the positions he has held within the Society are those of Chairman of the Utah Section in 1955, Executive Committee

Member of the Mining and Exploration Division from 1956 to 1962, Program Chairman for M & E Division in 1959, and Chairman of the entire Division in 1962. He has been Chairman of the Jackling Award Committee as well as Chairman of the Underground Mining Committee of M & E Division, and Chairman of the M & E Nominating Committee.

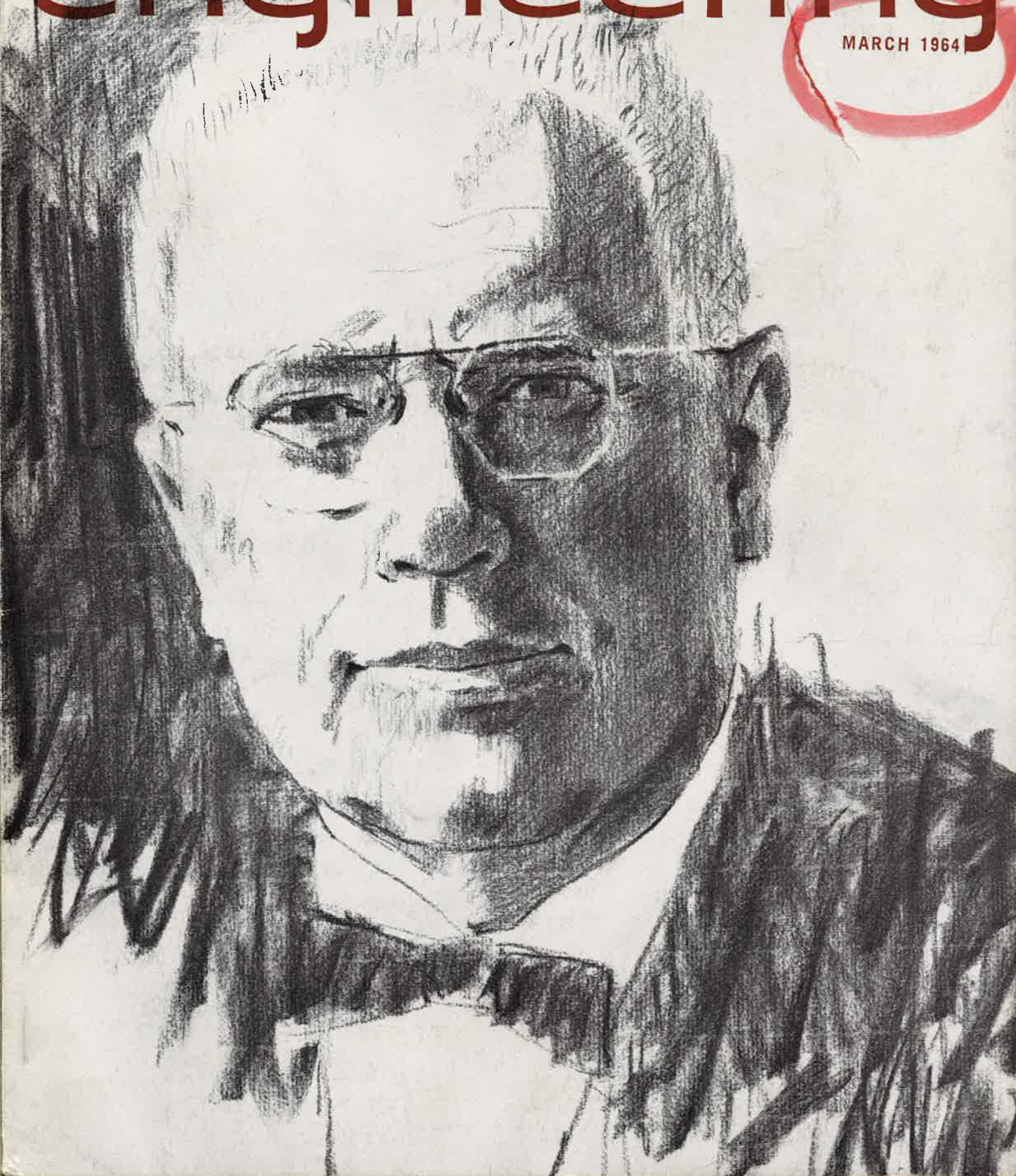
As President of the Society, Mr. Ehrhorn also assumes the vital duties of Vice President of AIME and member of its Board of Directors. In addition to his appointment to these major posts within SME and AIME, he will also preside as this year's Chairman of the Sections Committee. At the recent AIME Annual Meeting in Chicago, Mr. Ehrhorn noted "One objective of this Committee is a program of visitation and during this year *all* Sections and Subsections of our Society and of The Metallurgical Society will be visited by one or more Directors of AIME or of the two constituent Societies. This visitation program is rapidly increasing in importance for it affords the opportunity for national and local officers of the Institute to exchange their views and discuss policies in an informal but direct manner."

But the theme, the emphasis of effort which will mark Mr. Ehrhorn's presidency will be in membership development. In line with AIME President Tom C. Frick's request for bringing all qualified personnel into our ranks, Mr. Ehrhorn stressed the point that "SME vigorously supports this goal. Service to members through publications; local, regional and national meetings; and other forms of communications direct and indirect are being increasingly geared to 'professionalism,' which, in the final analysis, is what determines membership, and more importantly, a strong, unified body of professional mineral industry engineers."

Under the guidance of his leadership, members of SME can expect to see solid growth and advancement of the Society's work and effectiveness.

MINING engineering

MARCH 1964



COMING EVENTS

- Mar. 11**, Chicago Section, NOHC, Annual Off-the-Record Technical Meeting, Del Prado Hotel, Chicago.
- Mar. 18-21**, Alaska Section Meeting, sponsored by Alaska and Southwest Alaska Sections of AIME and the University of Alaska, College, Alaska.
- Apr. 13-15**, Annual General Meeting of The Canadian Institute of Mining and Metallurgy, Queen Elizabeth, Montreal.
- Apr. 13-15**, 47th National Open Hearth and Basic Oxygen Steel Conference and Ironmaking Conference, sponsored by The Metallurgical Society of AIME, Penn-Sheraton Hotel, Pittsburgh.
- Apr. 16-17**, Coal Division Annual Spring Field Meeting, Travel Lodge Motel, Marion, Ill.
- Apr. 20-24**, 4th International Symposium on Applications of Statistics, Operations Research, and Computers in the Mineral Industry, Colorado School of Mines, Golden, Colo.
- May 4-8**, 1964 International Conference on Strata Control and Rock Mechanics, Henry Krumb School of Mines, Columbia University, New York City.
- May 5-7**, 19th Purdue Industrial Waste Conference, Memorial Center, Purdue University, Lafayette, Ind.
- May 11-14**, AMC Coal Show, Cleveland, Ohio.
- May 13-15**, 5th International Well Logging Symposium of the Society of Professional Well Log Analysts, Scharbauer Hotel and Midland Mart Convention Center, Midland, Tex.
- May 14-15**, 1964 Southwest Minerals and Metals Conference, sponsored by the Southern California Section of AIME, Ambassador Hotel, Los Angeles.
- May 18-21**, A.A.P.G.-S.E.P.M. National Annual Meeting (jointly with the Geological Assn. of Canada) Royal York Hotel, Toronto, Ont., Canada.
- May 21-22**, 40th Annual Conference of the Lake Superior Mines Safety Council, Hotel Duluth, Duluth, Minn.
- May 22-24**, 9th Annual Minerals Symposium, sponsored by Uranium Section, AIME, Moab, Utah.
- May 22-24**, Meeting of the Minerals Beneficiation Division of Colorado Section of AIME, Broadmoor Hotel, Colorado Springs.
- May 26-28**, First National Convention of the Consulting Engineers Council, Brown Palace Hotel, Denver, Colo.
- June 9-11**, 9th Annual Appalachian Underground Corrosion Short Course, University of West Virginia, Morgantown.
- June 19-27**, 1964 European Convention of Chemical Engineering and 14th Chemical Engineering Exhibition-Congress, Frankfurt am Main, Germany.
- June 23-25**, National Coal Association Convention, New York City.
- Sept. 13-16**, AMC Mining Convention—Metal, Mining and Industrial Minerals, Portland, Ore.
- Sept. 20-25**, SME Fall Meeting and International Mineral Processing Congress, Americana Hotel, New York City.
- Oct. 11-14**, SPE Fall Meeting, Houston, Tex.
- Oct. 18-22**, Metallurgical Society Fall Meeting, Sheraton Hotel, Philadelphia.
- Oct. 22-23**, Annual Meeting of the Illinois Mining Institute, Hotel Abraham Lincoln, Springfield, Ill.
- Oct. 26-28**, Pacific Northwest Metals and Minerals Conference, Hotel Vancouver, Vancouver, B.C.
- Oct. 28-30**, 6th Symposium on Rock Mechanics, University of Missouri School of Mines and Metallurgy, Rolla.
- Oct. 29-31**, 14th Annual Meeting of the Gulf Coast Association of Geological Societies, Corpus Christi, Tex.
- Nov. 16-19**, Symposium on Opencast Mining, Quarrying and Alluvial Mining, Caxton Hall, Westminster, London, England.



VOL. 16 NO. 3

MARCH 1964

COVER (by Herb McClure). *At the AIME Annual Meeting last month Sandford S. Cole became the president of the Society of Mining Engineering for the year 1964. Sandford, a man long active in the various committees of the Institute, is thus the appropriate subject for this month's cover. An able spokesman for SME, we can all look forward to a year of positive action and growth in our Society under his leadership.*

ARTICLES

- 35** Asarco's Method of Keeping Its Equipment Fleet Rolling at Maximum Efficiency
• John J. Sense
- 39** Floating Limestone at Permanente
• John C. Kleiber and George M. Meisel
- 45** Grindability Tests—Short Cut to Blending Coals for Strong Coke
• J. W. Leonard
- 48** Block Caving, Nuclear Style
• David D. Rabb
- 53** Louis S. Cates—An Interview by Henry Carlisle
- 56** When Going From Test Data to Mill Design . . .
• Richard H. Ross

DEPARTMENTS

- | | | | |
|-----------|----------------------------|-----------|-----------------------|
| 2 | Personnel | 67 | Industrial Minerals |
| 6 | Books | | Newsletter |
| 9 | Products for Mine and Mill | 69 | Education News |
| 17 | Reader Service Card | 75 | Around the Sections |
| 19 | Data for Mine and Mill | 77 | Personals |
| 20 | News from Mine and Mill | 82 | 1964 SME Preprints |
| 29 | The Drift of Things | 83 | Obituaries |
| 63 | SME News | 87 | Professional Services |

MINING ENGINEERING staff, Society of Mining Engineers Officers, and AIME Officers are listed with "Drift of Things." Number of copies printed this issue: 15,400.



Address insertion orders and copy to MINING ENGINEERING, 345 E. 47th St., New York, N. Y. 10017. Send plates to: MINING ENGINEERING, c/o Lew A. Cummings Co., Inc., 215 Canal St., Manchester, N. H. Published monthly by the American Institute of Mining, Metallurgical, and Petroleum Engineers, Inc., 345 E. 47th St., New York, N. Y. 10017. Telephone: Plaza 2-6800; TWX 212 867-4857. Subscription \$10 per year for non-AIME members in the U.S., & North, South, & Central America; \$12 all other countries; \$6 for AIME members, or \$4 additional for members only in combination with a subscription to "Journal of Metals" or "Journal of Petroleum Technology". Single copies, \$1.00; single copies foreign, \$1.25; special issues \$2.00. AIME is not responsible for any statement made or opinion expressed in its publications. Copyright 1964 by the American Institute of Mining, Metallurgical and Petroleum Engineers, Inc. Registered cable address, AIME, New York. Indexed in Engineering Index, Industrial Arts Index, and by National Research Bureau. Second class postage paid at New York, N. Y., and at Manchester, N. H.

MINING engineering

MARCH 1963



COMING EVENTS

Apr. 1-3, 1963, AIME 46th National Open Hearth and Blast Furnace, Coke Oven and Raw Materials Conference, Statler Hotel, Buffalo, N. Y.

Apr. 1-3, CIM Annual Meeting, Macdonald Hotel, Edmonton, Alta., Canada

Apr. 6, Spring Meeting, Mining Geology Div., Arizona Section AIME, Miami-Inspiration, Ariz.

Apr. 8-10, 11th Symposium on Exploration Drilling, Colorado School of Mines, Golden, Colo.

Apr. 19-20, Coal Division Annual Field Meeting jointly with Central Appalachian Section, AIME and the W. Va. Coal Mining Institute, Mont Chateau Lodge, Morgantown, W. Va.

Apr. 25-27, 16th Pacific Northwest Metals and Minerals Conference, Multnomah Hotel, Portland, Ore.

Apr. 26-27, Spring Meeting, Smelting Div., Arizona Section AIME, Hayden, Ariz.

Apr. 28-May 2, American Ceramic Society Annual Meeting, Penn-Sheraton Hotel, Pittsburgh.

Apr. 29, Spring Meeting, Ore Dressing Div., Arizona Section AIME, Esperanza mine, Tucson, Ariz.

Apr. 30-May 2, 18th Purdue Industrial Waste Conference, Purdue Memorial Center, Lafayette, Ind.

May 5-8, American Mining Congress Coal Convention, Pittsburgh.

May 19-20, Spring Meeting, Open Pit Mining Div., Arizona Section AIME, Santa Rita, N. M.

May 19-21, Engineering Management Committee of The Metallurgical Society of AIME sponsored conference on Decision Making in Materials Research, Arden House, Harri-man, N. Y.

May 23-24, 9th Rocky Mountain Petroleum Sections Joint Meeting, Denver.

May 23-24, 39th Annual Conference of the Lake Superior Mines Safety Council, Hotel Duluth, Duluth.

May 26-June 2, Sixth International Congress on Mineral Preparation, sponsored by the Societe de l'Industrie Mineral of France, Cannes, France.

June 4-6, 8th Annual Appalachian Under-ground Corrosion Short Course, West Vir-ginia University, Morgantown, W. Va.

June 4-16, 8th Annual Uranium Symposium, sponsored by the Wyoming Mining & Metals Section, AIME, Riverton, Wyo.

June 10, Pittsburgh Section AIME-NOHC Golf Party, Butler Country Club, Pittsburgh.

June 14-15, Spring Meeting, Underground Mining Div., Arizona Section AIME, Can-anea, Sonora, Mexico.

June 18-20, Blast Furnace Symposium spon-sored by The Metallurgical Society of AIME, Carnegie Institute of Technology, Pittsburgh.

June 23-28, ASTM 66th Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

Aug. 19-31, XIII General Assembly of the In-ternational Union of Geodesy and Geophysics, University of California, Berkeley, Calif.

Sept. 11-13, SME Fall Meeting, Salt Lake City, in cooperation with the Rocky Mountain Minerals Conference.

Sept. 15-18, American Mining Congress Con-vention: Metal Mining—Industrial Minerals, Los Angeles.

Sept. 22-25, National Power Conference, Netherland Plaza Hotel, Cincinnati.

Sept. 23-24, Fall Meeting of the Steel Found-ers' Society of America, The Homestead, Hot Springs, Va.

Sept. 30-Oct. 4, 12th Clay Minerals Conference, Atlanta Biltmore Hotel, Atlanta, Ga.

Oct. 6-9, SPE Fall Meeting, New Orleans.

Oct. 17-18, Illinois Mining Institute Annual Meeting, Hotel Abraham Lincoln, Spring-field, Ill.

Oct. 21-25, The Metallurgical Society Fall Meeting, Cleveland.

Oct. 24-28, SEG 33rd Annual International Meeting, New Orleans.



MINING engineering

VOL. 15 NO. 3

MARCH 1963

COVER (by Herb McClure). *Complementing a distinguished career in the mineral industry, Edward G. Fox has become President of the Society of Mining Engineers of AIME for 1963. A Penn State grad of '25 and long active in SME affairs, he is now president of the Bituminous Coal Operators' Association. With Ed's leadership, we can look to this forthcoming year as one of increased growth in activities and in importance to the professional mining engineer.*

ARTICLES

- 27 The Philosophy of Belt Tripper Automation
• H. H. West
- 32 Iron Ore Developments Surge in West Africa
• C. Danielsson and S. Ivarsson
- 39 Rail Belt Haulage System at IMC's Carlsbad Operation
• C. E. Johnston
- 42 Inspiration's Approach to the Grade Haul Problem
• T. M. Anderson
- 44 Improve Your Capital Equipment Decisions!
• A. B. Matthews
- 49 In Steel's Future—Self-Fluxed Pellets?
• E. B. Johnson

DEPARTMENTS

- | | | | |
|----|-----------------------------|----|-----------------------|
| 2 | Buyers' Block | 25 | Drift of Things |
| 2 | Personnel | 54 | SME News Section |
| 4 | Mineral Information Section | 55 | Pacific Northwest |
| 9 | Reader Service Card | 64 | Education News |
| 12 | Letters to the Editor | 66 | Around the Sections |
| 13 | Abstracts | 69 | Personals |
| 17 | News from Mine & Mill | 72 | Obituaries |
| 22 | Products for Mine & Mill | 75 | Professional Services |
| 23 | Data for Mine & Mill | 78 | Advertisers Index |

MINING ENGINEERING staff, Society of Mining Engineers Officers, and AIME Officers are listed with "Drift of Things." Number of copies printed this issue: 15,800.



Address insertion orders and copy to MINING ENGINEERING, 345 E. 47th St., New York 17, N. Y. Send plates to: MINING ENGINEERING, c/o Lew A. Cummings Co., Inc., 215 Canal St., Manchester, N. H. Published monthly by the American Institute of Mining, Metallurgical, and Petroleum Engineers, Inc., 345 E. 47th St., New York 17, N. Y. Telephone: Plaza 2-6800; TWX 212 867-4857. Subscription \$8 per year for non-AIME members in the U. S., & North, South, & Central America; \$10 all other countries; \$6 for AIME members, or \$4 additional for members only in combination with a subscription to "Journal of Metals" or "Journal of Petroleum Technology". Single copies, \$.75; single copies foreign, \$1.00; special issues, \$1.50. AIME is not responsible for any statement made or opinion expressed in its publications. Copyright 1963 by the American Institute of Mining, Metallurgical and Petroleum Engineers, Inc. Registered cable address, AIME, New York. Indexed in Engineering Index, Industrial Arts Index, and by National Research Bureau. Second class postage paid at New York, N. Y., and at Manchester, N. H.

MINING engineering

MARCH 1962



COMING EVENTS

- Mar. 15**, Research Symposium to Advance Management and Conservation of the Air Resource, sponsored by Engineering Foundation, United Engineering Center, New York City.
- Mar. 26-29**, AAPG-SEPM Annual Meeting, jointly with AAPG-SEPM-SEG Pacific Sections, Civic Auditorium, San Francisco. Fairmont Hotel to be hotel headquarters.
- Mar. 26-30**, Workshop and Symposium on Computers and Computer Application in Mining and Exploration, College of Mines, University of Arizona, Tucson, Ariz.
- Apr. 5-6**, ASME-SAM Management Engineering Conference, Statler-Hilton Hotel, New York City.
- Apr. 9-10**, American Zinc Institute Annual Meeting, Chase-Park Plaza Hotel, St. Louis.
- Apr. 10-11**, Lead Industries Assn. Annual Meeting, Chase-Park Plaza Hotel, St. Louis.
- Apr. 9-11**, 45th National Open Hearth and Blast Furnace, Coke Oven and Raw Materials Conference, sponsored by The Metallurgical Society of AIME. Sheraton-Cadillac Hotel, Detroit.
- Apr. 12-14**, AIME Pacific Southwest Mineral Industry Conference, Palace Hotel, San Francisco.
- Apr. 23-25**, CIM Annual Meeting, Chateau Laurier, Ottawa.
- Apr. 26-28**, AIME-ASM Pacific Northwest Metals and Minerals Conference, Ben Franklin Hotel, Seattle.
- May 1-3**, 17th Purdue Industrial Waste Conference, Purdue Memorial Center, Lafayette, Ind.
- May 3-5**, 5th Rock Mechanics Symposium, University of Minnesota, Minneapolis.
- May 3-5**, Northern Ohio Geological Society, Salt Symposium, Manger Hotel, Cleveland.
- May 7-9**, American Mining Congress Coal Convention, Pittsburgh.
- May 11-13**, Seventh Annual Uranium Symposium, sponsored by the Uranium Section of AIME, Moab, Utah.
- May 19**, AIME Colorado MBD Subsection Annual Meeting, Broadmoor Hotel, Denver.
- May 24-25**, 38th Annual Conference of the Lake Superior Mines Safety Council, Hotel Duluth, Duluth, Minn.
- May 28-June 1**, 4th International Coal Preparation Congress, Harrogate, England.
- June 4-6**, Nuclear Congress and Atomic Exposition, New York Coliseum, New York City.
- June 7-8**, AIME Coal Division Field Meeting, Price, Utah.
- Sept. 9-12**, SME Fall Meeting, Gatlinburgh, Tenn.
- Sept. 13-14**, Joint Engineering Management Conference, Roosevelt Hotel, New Orleans.
- Sept. 17-20**, SEG, 32nd Annual International Meeting, Calgary, Alta., Canada.
- Sept. 19-21**, AIME Rocky Mountain Mineral Conference, Butte, Mont.
- Sept. 24-25**, Fall Meeting of The Steel Founders' Society of America, The Homestead, Hot Springs, Va.
- Sept. 24-26**, ASME-AIEE National Power Conference, Lord Baltimore Hotel, Baltimore.
- Sept. 24-27**, AMC Mining Show: Metal Mining—Industrial Minerals, San Francisco.
- Oct. 4-5**, AIME-ASME Joint Solid Fuels Conference, Penn Sheraton Hotel, Pittsburgh.
- Oct. 20-26**, Sixth World Power Conference, Melbourne, Australia.
- Oct. 25-27**, New Mexico Mining Assn. Convention, Grants, N. M.
- Nov. 2**, Pittsburgh Sections of AIME and NOHC, Off-the-Record-Meeting, Penn-Sheraton Hotel, Pittsburgh.
- February, 1963**, AIME Symposium on Unit Process in Hydrometallurgy, Dallas, Texas.
- May 26-June 2**, Sixth International Congress on Mineral Preparation, sponsored by the Societe de l'Industrie Minérale of France, Cannes, France.



VOL. 14 NO. 3

MARCH 1962

COVER On February 19, William B. Stephenson succeeded James C. Gray as President of Society of Mining Engineers. Well-known to SME'ers, Bill has been very active in Society affairs for many years. With his drive to advance the role and importance of SME, we can be confident that Bill will steer the Society to an outstanding year.

69 Preliminary Plans for the SME Fall Meeting.

ARTICLES

- 39** The Importance of International Developments on Foreign Investments During 1960-1961
• Northcutt Ely
- 45** Installing New Rail Haulage System at San Manuel
• L. C. Acton and C. G. Massey
- 49** Operations of A Mining Research Center
• John F. Shaw
- 52** El Algarrobo
• G. E. Aiken and R. C. Temps
- 59** Determining Ventilation Requirements for Continuous Miners
• Howard L. Hartman
- 63** Lake Superior Underground Iron Mines Gear For Future
• Phillip Pearson

PLUS

- 70** 1962 AIME Annual Meeting Report

DEPARTMENTS

- | | | | |
|-----------|-----------------------------|-----------|-----------------------|
| 2 | Personnel | 35 | Drift of Things |
| 2 | Buyers' Block | 74 | SME Bulletin Board |
| 4 | Mineral Information Section | 80 | Around the Sections |
| 11 | News from Mine and Mill | 82 | Education News |
| 17 | Reader Service Card | 83 | Personals |
| 19 | Abstracts | 88 | Obituaries |
| 26 | Products for Mine and Mill | 91 | Professional Services |
| 30 | Data for Mine and Mill | 94 | Advertisers Index |

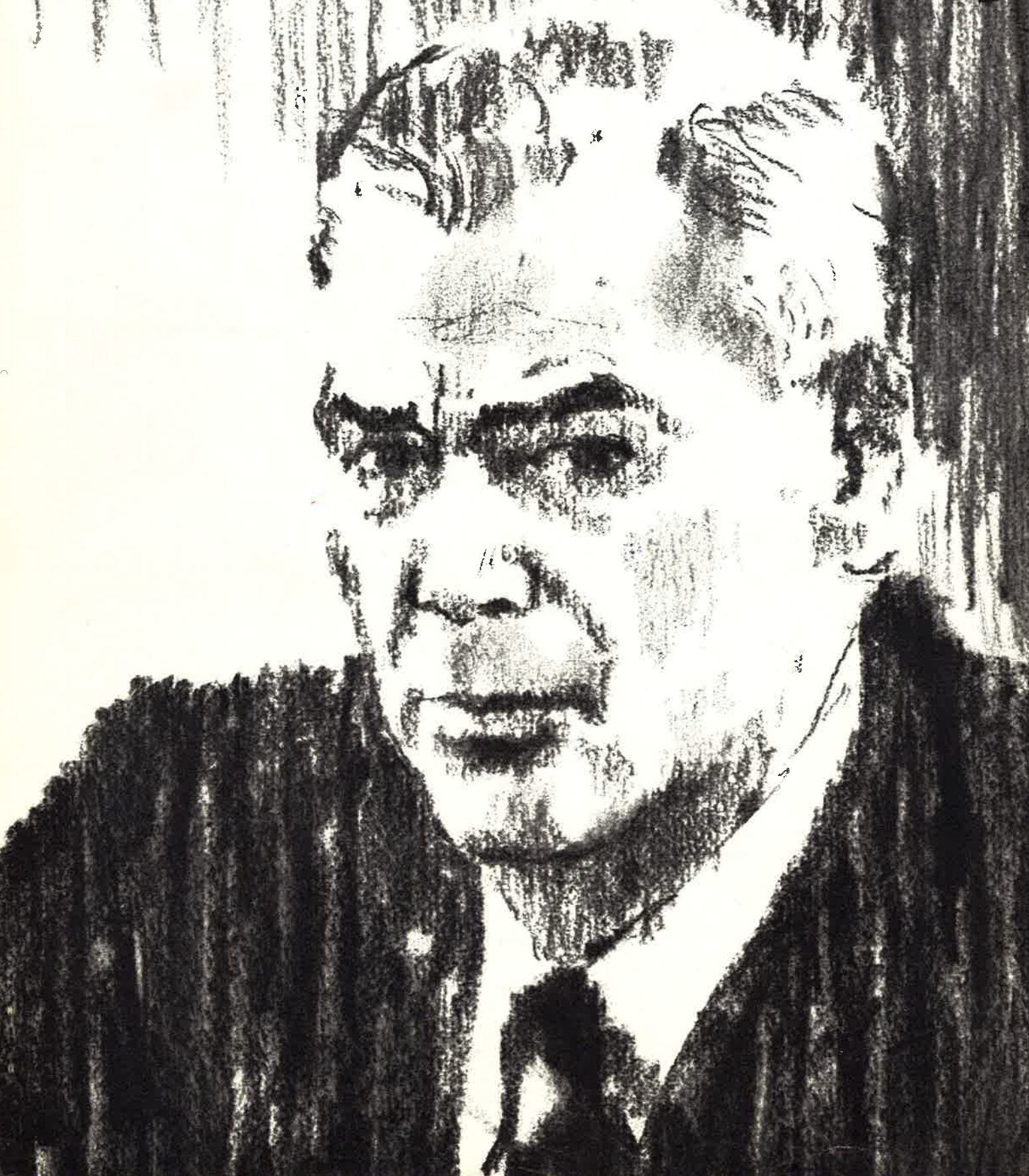


MINING ENGINEERING staff, Society of Mining Engineers, and AIME Officers are listed with "Drift of Things." Number of copies printed of this issue: 16,000.

Address insertion orders and copy to MINING ENGINEERING, 345 E. 47th St., New York 17, N. Y. Send plates to: MINING ENGINEERING, c/o Lew A. Cummings Co. Inc., 215 Canal St., Manchester, N. H. Published monthly by the American Institute of Mining, Metallurgical, and Petroleum Engineers, Inc., 345 E. 47th St., New York 17, N. Y. Telephone: PLaza 2-6800; TWX NY 1-1304. Subscription \$8 per year for non-AIME members in the U.S., & North, South, & Central America; \$10 all other countries; \$6 for AIME members, or \$4 additional for members only in combination with a subscription to "Journal of Metals" or "Journal of Petroleum Technology". Single copies, \$.75; single copies foreign, \$1.00; special issues, \$1.50. AIME is not responsible for any statement made or opinion expressed in its publications. Copyright 1962 by the American Institute of Mining, Metallurgical, and Petroleum Engineers, Inc. Registered cable address, AIME, New York. Indexed in Engineering Index, Industrial Arts Index, and by National Research Bureau. Second class postage paid at New York, N. Y., and at Manchester, N. H.

MINING engineering

MARCH 1961



MINING ENGINEERING Staff

SME Secretary: John C. Fox

Managing Editor: Paul C. Merritt

Society News Editor: Vera Dailey

Contributing Editor: Henning Nielsen

Production Manager:

Marianne Snedeker

Assistant—Valrie Simms

Eastern Advertising Manager:

James J. O'Brien

29 W. 39th St., New York 18

Mid-Western Advertising Manager:

Bob Wilson

Millard Ave., Fox River Grove, Ill.

Southeastern Advertising

Representatives:

Fred W. Smith & Associates

1201 Forest View Lane, Westhaven

Birmingham, Ala.

Western Advertising Representatives:

Dillenberg-Galavan Inc.

266 S. Alexandria Ave.

Los Angeles 4, Calif.

SOCIETY OF MINING ENGINEERS OF AIME

President: J. C. Gray

President-Elect: W. B. Stephenson

Past-President: A. B. Cummins

Regional Vice Presidents: E. G. Fox,

D. W. Scott, H. C. Weed

Treasurer: N. Arbiter

Secretary: John C. Fox

Assistant Secretary: Donald R. Tone

Editorial Board: W. L. Dowdey (Chair-

man), N. Arbiter, E. G. Fox, J. C. Fox,

E. Kipp, R. W. Wilson

General Editorial Committee: E. G. Fox,

(Chairman), B. S. Crocker, R. H. Jahns, P.

B. Nalle, E. M. Pace

Transactions Editorial Committee: W. L.

Dowdey (Chairman), M. P. Corriveau,

D. R. Irving, R. W. Marsden, O. F.

Tangel

Advertising Committee: Ewald Kipp

(Chairman), J. C. Fox, R. W. Wilson

AIME OFFICERS

President: R. R. McNaughton

President-Elect: L. E. Elkins

Past President: J. L. Gillson

Vice Presidents: J. S. Bell, A. B. Cum-

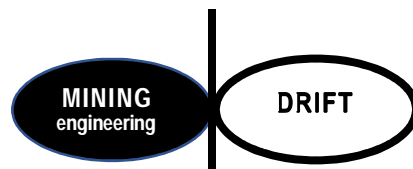
mins, W. E. Glenn, C. C. Long, J. S.

Smart, Jr., J. W. Woomer

Treasurer: G. I. Brigden

Secretary: E. O. Kirkendall

AIME also publishes: JOURNAL OF METALS (monthly), JOURNAL OF PETROLEUM TECHNOLOGY (monthly), SOCIETY OF PETROLEUM ENGINEERS JOURNAL (quarterly), TRANSACTIONS OF THE METALLURGICAL SOCIETY (bimonthly).



OUR ROLE IN A CHALLENGING DECADE

Editor's Note: *It is particularly appropriate that, in this issue of MINING ENGINEERING, the new President of the Society of Mining Engineers, Mr. J. C. Gray, submits his greetings to all members, and in so doing, reminding us of our responsibility in developing the mineral industry to meet the demands of the 1960's. It is with pleasure that we welcome President Gray to his new responsibility in guiding SME during the year ahead.*

Dear Fellow Members of the Society of Mining Engineers of AIME:

I should like to express my appreciation to all of you for the honor of serving as President of our Society during the coming year. It is my aim to promote and maintain the interest and purpose of our Society in developing our technology in the mining and use of mineral resources for the broad interests of our national and international welfare.

We are now in the second year of the so-called promising decade of the 1960's with one year of hindsight to assist our appraisal of just how promising it will be. How well have we kept informed of what is happening in this wider, broader, faster-moving, ever-changing world? What has been the significance of these changes to our mining profession? What are the demands on our profession to satisfy the requirements of population growth, higher living standards, space age requirements, nuclear power developments? We are all searching for the right answers to these questions and, as engineers of the mining profession, we have a responsibility to see that we do not fail to meet any and all requirements as they develop.

Our Society has been outstanding in the past in serving our profession to meet all economic requirements. It has always been gratifying to witness the untiring efforts of our members and to be proud of their accomplishments. The task ahead becomes more diverse, more complicated, and certainly more demanding. The purpose of our Society is accentuated by the needs of the "promising Sixties."

The response to my requests of our members to serve on the many and varied committees in our constitutional make-up has been a real revelation to me of "what makes us tick." With their able assistance, I am looking forward to a good year for SME.

Very truly yours,

J. C. Gray

1961 President

Society of Mining Engineers of AIME

MINING engineering

MARCH 1960



H. M. C. 60

MINING ENGINEERING Staff

Editorial Director:

Rixford A. Beals

Copy Editor: Margaret E. Sherman

Contributing Editor: Henning Nielsen

Production Manager:

Marianne Snedeker

Assistant—Administration:

Marilyn McKeegan

Eastern Advertising Manager:

Thomas G. Orme

29 W. 39th St., New York 18

Mid-Western Advertising Manager:

Bob Wilson

Millard Ave., Fox River Grove, Ill.

Southeastern Advertising

Representatives:

Fred W. Smith & Associates

1201 Forest View Lane, Westhaven

Birmingham, Ala.

Western Advertising Representatives:

Dillenbeck-Galavan Inc.

266 S. Alexandria Ave.

Los Angeles 4, Calif.

SOCIETY OF MINING ENGINEERS OF AIME

President: A. B. Cummins

President-Elect: J. C. Gray **Past-**

President: J. W. Woomer

Regional Vice Presidents: H. C.

Weed, C. E. Lawall, D. W. Scott

Treasurer: G. I. Brigden

Secretary: E. O. Kirkendall

Assistant Secretary: Donald R. Tone

Editorial Board: Brower Dellinger

(Chairman), N. Arbiter, N. L. Weiss, R.

D. Satterley, J. C. Fox, R. A. Beals, and

member, Advertising Staff.

General Editorial Committee: Brower

Dellinger (Chairman), J. W. Chandler,

M. D. Cooper, S. E. Erickson, Q. D.

Singewald, R. A. Beals

Advertising Committee: R. D. Satterley

(Chairman), R. A. Beals

Transactions Editorial Committee:

N. L. Weiss (Chairman), B. S. Crocker,

D. R. Irving, G. R. Spindler, J. C.

Wangaard, R. A. Beals

AIME OFFICERS

President: Joseph L. Gillson **Past-**

President: Howard C. Pyle **President-**

Elect: R. R. McNaughton

Vice Presidents: John Chipman, J. P.

Hammond, W. R. Hibbard, Jr., B. P.

Kantzer, S. D. Michaelson, J. W.

Woomer

Treasurer, Controller: G. I. Brigden

Secretary:

AIME also publishes: JOURNAL OF

METALS (monthly), JOURNAL OF PE-

TROLEUM TECHNOLOGY (monthly),

TRANSACTIONS OF THE METAL-

LURGICAL SOCIETY (bimonthly)



SME'S PRESIDENT STATES HIS VIEWS

Editor's Note: *It is fitting in this issue of MINING ENGINEERING, a portion of which is devoted to the Society's 1960 Membership Brochure, that we publish a statement by the 1960 President of the Society, A. B. Cummins. These are Mr. Cummin's views as a professional engineer and were made as the basis of a press interview when he became Society President at the Annual Meeting, February 14 to 18, in New York. The questions on the mineral industry were posed in advance of the meeting.*

What is the outlook for 1960?

Forecasts predict high industrial activity and prosperity in 1960. (GNP above \$500 trillion.) If this is so, we can expect a good year for mining. But the pattern will be spotty and not all branches of mining will fare equally well.

With strikes somewhat in the background for the time being, the iron ore, steel, and the nonferrous metal industries may expect heavy requirements, not only to meet the expected new demands, but also to fill the backlogs resulting from the 1959 work stoppages. The picture for zinc is considered favorable with Tennessee coming more to the fore as the leading producer; copper should be in a good position with possibilities for a revival of production in Michigan and the proving of more substantial reserves in Arizona. Aluminum should come through with a new record.

The production of cement has been forecast to probably drop some 3 to 4 pct from the 1959 level. This is based on a slowdown in the Federal highway program and to an anticipated reduction in home construction due to the squeeze on mortgage money. Production of sand, gravel, and stone may be expected to parallel that of cement. Most other industrial minerals are expected to be in demand equal to or above 1959 levels (abrasives, clays, borax, limestones, gypsum, phosphate rock, potash, salt, sulfur).

The major interest in 1960 is the probability that it will be significant in indicating the trend ahead, and what to expect in the next decade.

What will the decade of the 1960's bring to the mining industry?

Many economists predict for the decade 1960-1969 a boom period of unprecedented advances. Others foresee difficulties and complications. While these may be expected, let us agree that the curve of progress in general will be upward, and possibly to a fantastic degree. Technological advances, population growth, higher living standards, space age requirements, nuclear power developments, are all expected to accelerate the advance.

It should be recognized first that the demand for mineral raw materials moves with general economic trends. Thus the mining industry, per se, will not set the pace, but will follow the (technological, economic, and political) developments of the next decade. This is because the role of the mining industries, in the main, is to supply raw materials (as required by industry).

(Continued on page 224)

Drift by A. B. Cummins

(Continued from page 223)

Aside from industrial economy, and foremost among the factors that will prescribe the role of the mineral industries in the near-term future, is the question of the cold war, the approach to the space is age, etc. The emphasis on rockets and missiles will have a tremendous impact on metals. The role of the glamorous metals (beryllium, tungsten, columbium, and others) will be greatly emphasized, because these may be expected to be important, or necessary, for the equipment and devices either for space warfare or for space exploration. On the other hand, if the means for conventional defense or warfare become obsolete (battleships, aircraft carriers, bullets, aircraft, shell casings, etc.) then the requirements, on a large scale, for steel, lead, aluminum, copper, etc., may be expected to diminish to a significant extent.

The mining industry today must become adjusted to meet successfully the changes resulting from the new requirements of the space age. The 1960's will be a period placing great responsibility upon the American mining industry with a challenge to meet an almost certain demand for greater production of most mineral commodities. At the same time there is the requirement of meeting competitive prices of foreign producers. Also the major problem of protecting our future, in reserves and technologies, well beyond the 1960's, indeed into the 21st century and beyond. It seems that tariff protection and import quota restrictions alone cannot be relied upon, in most categories, to meet all of the problems of some phases of our mining industry. It appears more in line to recognize that in most cases we need to sell our products freely among the world-wide consumer countries unrestricted by artificial tariff barriers and currency problems.

It is the opinion of most competent mining authorities that if the American economy is basically sound and if it is in reasonable balance with that of the rest of the world, the American mining industry will be capable of handling the many special and difficult problems which it will have, all in the interests of American and world prosperity and peace.

Since no one can foresee the future in any significant detail, it is perhaps sufficient to point out some aspects of the mineral industries' future that seem at this time important in considering the 1960's:

- 1) In any economy and under any set of conditions, mineral products and therefore mineral resources will remain of critical importance.

- 2) Since mineral resources are not created, and once depleted are not renewable, the problems remain of conserving and developing what we have, and devising better ways and means of finding, processing, and using mineral materials.

- 0) The U.S. mining industry has demonstrated, time and again, that it has the reserve and the stamina to survive the downturns of economic setbacks, and bounce back to meet the requirements of industry and the national economy.

- 1) It may be expected to continue to have this capacity, provided adequate provision is made nationwide to recognize, provide for, and support the basic requirements of a sound mineral industry.

If we wish to be a little more specific on the status of some of the major mineral commodities dur-

ing the 1960's, the opinions of many experts in the various fields indicate: **a)** For iron and steel—continued demand. Iron ore resources in adequate supply, strengthened by improved methods for utilization of lower grade ores. **b)** For the next few years, the production capacity of aluminum, nickel, asbestos, etc., will be in excess of demand. **c)** Aluminum and magnesium are considered to have significantly greater importance as materials for construction. **d)** The markets for copper, zinc, and lead and their alloys should expand, and considerable research effort is being expended in the finding and development of new uses for these metals. **e)** Most of the less common metals—tungsten, cobalt, columbium, tantalum, zirconium, and others—are expected to be in greater demand. **f)** As for the basic industrial minerals, the U.S. may anticipate increasing requirements for materials used in construction—cement raw materials, sand, gravel and stone, gypsum, limestone. **g)** Also for the major mineral raw materials for the chemical or process industries—salt, sulfur, clays, also for potash and phosphate. **h)** So far as present information goes, we will continue to be dependent in large part on foreign resources for nickel, manganese, chrome, tin, mica, antimony, tungsten, and some others. Also to considerable extent for copper, iron ore, lead, zinc, thorium, zircon, columbite-tantalate, cobalt, beryl, and some others, because it will remain economic to import some of these mineral raw materials.

In addition to the foregoing, there are listed below four problems which it seems to the writer will be of significant importance in the 1960's:

- 1) The demand for an adequate supply of properly trained mineral engineers is not being fulfilled. Bachelor degrees in mining engineering conferred in 1958 were 220; estimated in 1959, 205; projected for 1960, 190; thereafter? Currently there are apparently not enough jobs for the full time employment of mining engineers, particularly in exploration work; but this is an unnatural, unhealthy, and unsafe national position and presumably will not continue. There is need to emphasize and bring to the attention of better qualified young men the opportunities and satisfactions in a career of minerals engineering. Efforts in this direction are being taken by AIME, EJC, and other agencies interested in professional engineering as related to the mining industries.

- 2) In the interests of a sounder and more permanent mining industry, the mining engineering profession has a better public relations job to do. This entails primarily: **a)** Let the public know what mining engineers are doing and emphasize their economic importance. **b)** Let the government know the vital importance of minerals and mining in the international *economic battle* of the 60's. **c)** Bring the story to and develop the interest of students in mineral engineering.

- 3) It is highly important that there be established a national mineral policy (long term and short term). This involves not only a wise Federal policy on depletion of mineral resources and a policy encouraging the exploration and development of our natural mineral resources, but consideration of all national and international problems in the procurement, distribution, and stockpiling of mineral materials. This policy must consider the specific requirements of the basic and strategic minerals

(Continued on page 226)

Drift by A. B. Cummins

(Continued from page 224)

and the special cases of lead, zinc, nickel, gold, silver, and others.

4) During the 1960's it may be expected that there will be an increased and significant fusion of the mining and chemical industries. This tendency was manifested in the 1950's. There will be more chemical companies going into the mining business and more mining companies going into chemical. In general, this cross-pollination of interests is inevitable and desirable. Minerals are the raw materials for the inorganic chemical industries. Chemicals and related products are the logical end-uses for many of the materials which are extracted from the earth by mining. The point to emphasize is that this combination of interests is of importance to operators, investors, the general public, and the national welfare.

How will Russian mineral production affect United States and world economy?

Currently Russia is reported to be producing about 16 pct (in value) of the world's total in mineral products (U.S. about 30 pct). The Sino-Soviet communist bloc of nations is considered to be virtually self-sufficient in minerals. In addition, the Soviet Union itself is exporting a variety of mineral products in increasing quantities, and has now become a significant competitor in some international markets. Thus, the Soviet has come from a position of many shortages to one of moderate to substantial surpluses in many mineral commodities, some of which are being sold in free world markets. In this connection, it should be recognized that the framework of the Communist Council for Mutual Economic Aid requires rapid expansion of Soviet mineral production, without regard to immediate economic soundness of this production.

Regarding exports of minerals from Russia, in 1958 it supplied the major share of its' European satellites' iron ore requirements, together with some exports elsewhere (Austria). There were also exports of manganese ore, chrome, zinc, asbestos, alumina, apatite concentrates, and potash. There were, however, imports in tungsten, molybdenum, bismuth, vanadium, uranium, and some nonferrous concentrates.

In coal, Russia produced in 1958 529 million tons, as compared with 405 million in the U.S. (U.S. all time high 636 million tons in 1947.)

Apparently Russia is unifying a plan to use to her fullest possible advantage her natural energy fuels, and this accounts for the rapid development of her coal industry (in balance with her use of petroleum and natural gas resources). In this respect, the U.S. seems to lack at present an equivalent national policy toward utilization of energy fuels in the most beneficial long term interests.

Without any attempt to itemize or specify various Soviet activities in the sphere of mineral production, it may be generalized that while Russia is still well behind the U.S. in total production of most mineral products and still further behind in the exploration of such minerals world-wide, the ratio of increase over the U.S. is significant each year and may be expected to be more so in the 1960's and thereafter.

The efforts on the part of the Soviet government in this respect is apparent. Thus, it is reported that the Soviet Union is now employing about 40,000 geologists in the search for or study of mineral resources as compared with a total of about one half this number in all U.S. government, industry, and college employment.

The number and quality of current Russian technical papers on various aspects of mining and mineral technology is impressive. Of still greater significance is the surprising number of Russian publications in the basic sciences pertaining to the mineral industries (mineralogy, geophysics, geochemistry, etc.) The number of students being trained in Russia in mining engineering and in the earth sciences appears to be well ahead of those of the U.S. and perhaps above that of the combined free world nations. Thus, it appears that Russia's national mineral policy is tied directly with its avowed policy of world domination—also that the Soviet fully recognizes the importance of mineral resources and production capacity of mineral products, in the economy of any nation striving for world dominance.

Now there is no apparent way we can stop the Russian approach to parity with the U.S. production of mineral raw materials and finished mineral products. But a national standstill or retrogression in our mineral industries could accelerate the rate of approach by Russia. Equally apparent is the fact that deceleration of relative Russian importance can result from American aggressiveness and progress.

This is not confined to the immediate future, nor for the next ten years. It concerns the longer term future wherein the development and conservation of reserves, depletion of mineral resources in accord with an economical and technically sound plan, and the most effective use of minerals (with consideration of recovery and re-use of mineral values) are all given due consideration.

There is another matter of concern in the Russian mineral industry picture. This is the production and exportation by Russia of mining and mineral processing equipment and machinery. There is an important world-wide market in this field. It seems doubtful if much Russian mining equipment could be sold in the near future in the U.S. but perhaps it could be in foreign markets which are important to the U.S. equipment manufacturers. It seems doubtful if exported Russian equipment at this time can compete with U.S. equipment on a quality and performance basis, but what about comparative prices and what may we expect in future?

In summary, we must recognize that Russia has become and will continue to become an increasingly important factor in the world-wide economy of minerals. There is no need for undue alarm about this situation. The U.S. and the free world have great mineral resources, which if wisely used and conserved, will maintain our position of self-sufficiency or domination. To achieve this position, however, calls for immediate and wise action by the American mining industry, the government, and the public. It is a challenge to the mining industry and to the legislatures of our country to handle its affairs, short term and long term, so that our mineral resources are best utilized in the broad interests of national and international welfare. That this can be done is positively certain, and it is an obligation of the mining engineering profession to see that it is done.—A. B. Cummins

MINING ENGINEERING Staff

Editorial Director:

Rixford A. Beals

Copy Editor: Margaret E. Sherman

Contributing Editor: Henning Nielsen

Production Manager:

Marianne Snedeker

Assistant—Administration:

Marilyn McKeegan

Eastern Advertising Manager:

Thomas G. Orme

29 W. 39th St., New York 18

Mid-Western Advertising Manager:

Bob Wilson

Millard Ave., Fox River Grove, Ill.

Southeastern Advertising

Representatives:

Fred W. Smith & Associates

1201 Forest View Lane, Westhaven

Birmingham, Ala.

Western Advertising Representatives:

Dillenbeck-Galavan Inc.

266 S. Alexandria Ave.

Los Angeles 4, Calif.

SOCIETY OF MINING ENGINEERS OF AIME

President: A. B. Cummins

President-Elect: J. C. Gray **Past-**

President: J. W. Woomer

Regional Vice Presidents: H. C.

Weed, C. E. Lawall, D. W. Scott

Treasurer: G. I. Brigden

Secretary: E. O. Kirkendall

Assistant Secretary: Donald R. Tone

Editorial Board: Brower Dellinger

(Chairman), N. Arbiter, N. L. Weiss, R.

D. Satterley, J. C. Fox, R. A. Beals, and

member, Advertising Staff.

General Editorial Committee: Brower

Dellinger (Chairman), J. W. Chandler,

M. D. Cooper, S. E. Erickson, Q. D.

Singewald, R. A. Beals

Advertising Committee: R. D. Satterley

(Chairman), R. A. Beals

Transactions Editorial Committee:

N. L. Weiss (Chairman), B. S. Crocker,

D. R. Irving, G. R. Spindler, J. C.

Wangaard, R. A. Beals

AIME OFFICERS

President: Joseph L. Gillson **Past-**

President: Howard C. Pyle **President-**

Elect: R. R. McNaughton

Vice Presidents: John Chipman, J. P.

Hammond, W. R. Hibbard, Jr., B. P.

Kantzer, S. D. Michaelson, J. W.

Woomer

Treasurer, Controller: G. I. Brigden

Secretary:

AIME also publishes: JOURNAL OF

METALS (monthly), JOURNAL OF PE-

TROLEUM TECHNOLOGY (monthly),

TRANSACTIONS OF THE METAL-

LURGICAL SOCIETY (bimonthly)



SME'S PRESIDENT STATES HIS VIEWS

Editor's Note: *It is fitting in this issue of MINING ENGINEERING, a portion of which is devoted to the Society's 1960 Membership Brochure, that we publish a statement by the 1960 President of the Society, A. B. Cummins. These are Mr. Cummin's views as a professional engineer and were made as the basis of a press interview when he became Society President at the Annual Meeting, February 14 to 18, in New York. The questions on the mineral industry were posed in advance of the meeting.*

What is the outlook for 1960?

Forecasts predict high industrial activity and prosperity in 1960. (GNP above \$500 trillion.) If this is so, we can expect a good year for mining. But the pattern will be spotty and not all branches of mining will fare equally well.

With strikes somewhat in the background for the time being, the iron ore, steel, and the nonferrous metal industries may expect heavy requirements, not only to meet the expected new demands, but also to fill the backlogs resulting from the 1959 work stoppages. The picture for zinc is considered favorable with Tennessee coming more to the fore as the leading producer; copper should be in a good position with possibilities for a revival of production in Michigan and the proving of more substantial reserves in Arizona. Aluminum should come through with a new record.

The production of cement has been forecast to probably drop some 3 to 4 pct from the 1959 level. This is based on a slowdown in the Federal highway program and to an anticipated reduction in home construction due to the squeeze on mortgage money. Production of sand, gravel, and stone may be expected to parallel that of cement. Most other industrial minerals are expected to be in demand equal to or above 1959 levels (abrasives, clays, borax, limestones, gypsum, phosphate rock, potash, salt, sulfur).

The major interest in 1960 is the probability that it will be significant in indicating the trend ahead, and what to expect in the next decade.

What will the decade of the 1960's bring to the mining industry?

Many economists predict for the decade 1960-1969 a boom period of unprecedented advances. Others foresee difficulties and complications. While these may be expected, let us agree that the curve of progress in general will be upward, and possibly to a fantastic degree. Technological advances, population growth, higher living standards, space age requirements, nuclear power developments, are all expected to accelerate the advance.

It should be recognized first that the demand for mineral raw materials moves with general economic trends. Thus the mining industry, per se, will not set the pace, but will follow the (technological, economic, and political) developments of the next decade. This is because the role of the mining industries, in the main, is to supply raw materials (as required by industry).

(Continued on page 224)

Drift by A. B. Cummins

(Continued from page 223)

Aside from industrial economy, and foremost among the factors that will prescribe the role of the mineral industries in the near-term future, is the question of the cold war, the approach to the space is age, etc. The emphasis on rockets and missiles will have a tremendous impact on metals. The role of the glamorous metals (beryllium, tungsten, columbium, and others) will be greatly emphasized, because these may be expected to be important, or necessary, for the equipment and devices either for space warfare or for space exploration. On the other hand, if the means for conventional defense or warfare become obsolete (battleships, aircraft carriers, bullets, aircraft, shell casings, etc.) then the requirements, on a large scale, for steel, lead, aluminum, copper, etc., may be expected to diminish to a significant extent.

The mining industry today must become adjusted to meet successfully the changes resulting from the new requirements of the space age. The 1960's will be a period placing great responsibility upon the American mining industry with a challenge to meet an almost certain demand for greater production of most mineral commodities. At the same time there is the requirement of meeting competitive prices of foreign producers. Also the major problem of protecting our future, in reserves and technologies, well beyond the 1960's, indeed into the 21st century and beyond. It seems that tariff protection and import quota restrictions alone cannot be relied upon, in most categories, to meet all of the problems of some phases of our mining industry. It appears more in line to recognize that in most cases we need to sell our products freely among the world-wide consumer countries unrestricted by artificial tariff barriers and currency problems.

It is the opinion of most competent mining authorities that if the American economy is basically sound and if it is in reasonable balance with that of the rest of the world, the American mining industry will be capable of handling the many special and difficult problems which it will have, all in the interests of American and world prosperity and peace.

Since no one can foresee the future in any significant detail, it is perhaps sufficient to point out some aspects of the mineral industries' future that seem at this time important in considering the 1960's:

- 1) In any economy and under any set of conditions, mineral products and therefore mineral resources will remain of critical importance.

- 2) Since mineral resources are not created, and once depleted are not renewable, the problems remain of conserving and developing what we have, and devising better ways and means of finding, processing, and using mineral materials.

- 0) The U.S. mining industry has demonstrated, time and again, that it has the reserve and the stamina to survive the downturns of economic setbacks, and bounce back to meet the requirements of industry and the national economy.

- 1) It may be expected to continue to have this capacity, provided adequate provision is made nationwide to recognize, provide for, and support the basic requirements of a sound mineral industry.

If we wish to be a little more specific on the status of some of the major mineral commodities dur-

ing the 1960's, the opinions of many experts in the various fields indicate: **a)** For iron and steel—continued demand. Iron ore resources in adequate supply, strengthened by improved methods for utilization of lower grade ores. **b)** For the next few years, the production capacity of aluminum, nickel, asbestos, etc., will be in excess of demand. **c)** Aluminum and magnesium are considered to have significantly greater importance as materials for construction. **d)** The markets for copper, zinc, and lead and their alloys should expand, and considerable research effort is being expended in the finding and development of new uses for these metals. **e)** Most of the less common metals—tungsten, cobalt, columbium, tantalum, zirconium, and others—are expected to be in greater demand. **f)** As for the basic industrial minerals, the U.S. may anticipate increasing requirements for materials used in construction—cement raw materials, sand, gravel and stone, gypsum, limestone. **g)** Also for the major mineral raw materials for the chemical or process industries—salt, sulfur, clays, also for potash and phosphate. **h)** So far as present information goes, we will continue to be dependent in large part on foreign resources for nickel, manganese, chrome, tin, mica, antimony, tungsten, and some others. Also to considerable extent for copper, iron ore, lead, zinc, thorium, zircon, columbite-tantalate, cobalt, beryl, and some others, because it will remain economic to import some of these mineral raw materials.

In addition to the foregoing, there are listed below four problems which it seems to the writer will be of significant importance in the 1960's:

- 1) The demand for an adequate supply of properly trained mineral engineers is not being fulfilled. Bachelor degrees in mining engineering conferred in 1958 were 220; estimated in 1959, 205; projected for 1960, 190; thereafter? Currently there are apparently not enough jobs for the full time employment of mining engineers, particularly in exploration work; but this is an unnatural, unhealthy, and unsafe national position and presumably will not continue. There is need to emphasize and bring to the attention of better qualified young men the opportunities and satisfactions in a career of minerals engineering. Efforts in this direction are being taken by AIME, EJC, and other agencies interested in professional engineering as related to the mining industries.

- 2) In the interests of a sounder and more permanent mining industry, the mining engineering profession has a better public relations job to do. This entails primarily: **a)** Let the public know what mining engineers are doing and emphasize their economic importance. **b)** Let the government know the vital importance of minerals and mining in the international *economic battle* of the 60's. **c)** Bring the story to and develop the interest of students in mineral engineering.

- 3) It is highly important that there be established a national mineral policy (long term and short term). This involves not only a wise Federal policy on depletion of mineral resources and a policy encouraging the exploration and development of our natural mineral resources, but consideration of all national and international problems in the procurement, distribution, and stockpiling of mineral materials. This policy must consider the specific requirements of the basic and strategic minerals

(Continued on page 226)

Drift by A. B. Cummins

(Continued from page 224)

and the special cases of lead, zinc, nickel, gold, silver, and others.

4) During the 1960's it may be expected that there will be an increased and significant fusion of the mining and chemical industries. This tendency was manifested in the 1950's. There will be more chemical companies going into the mining business and more mining companies going into chemical. In general, this cross-pollination of interests is inevitable and desirable. Minerals are the raw materials for the inorganic chemical industries. Chemicals and related products are the logical end-uses for many of the materials which are extracted from the earth by mining. The point to emphasize is that this combination of interests is of importance to operators, investors, the general public, and the national welfare.

How will Russian mineral production affect United States and world economy?

Currently Russia is reported to be producing about 16 pct (in value) of the world's total in mineral products (U.S. about 30 pct). The Sino-Soviet communist bloc of nations is considered to be virtually self-sufficient in minerals. In addition, the Soviet Union itself is exporting a variety of mineral products in increasing quantities, and has now become a significant competitor in some international markets. Thus, the Soviet has come from a position of many shortages to one of moderate to substantial surpluses in many mineral commodities, some of which are being sold in free world markets. In this connection, it should be recognized that the framework of the Communist Council for Mutual Economic Aid requires rapid expansion of Soviet mineral production, without regard to immediate economic soundness of this production.

Regarding exports of minerals from Russia, in 1958 it supplied the major share of its' European satellites' iron ore requirements, together with some exports elsewhere (Austria). There were also exports of manganese ore, chrome, zinc, asbestos, alumina, apatite concentrates, and potash. There were, however, imports in tungsten, molybdenum, bismuth, vanadium, uranium, and some nonferrous concentrates.

In coal, Russia produced in 1958 529 million tons, as compared with 405 million in the U.S. (U.S. all time high 636 million tons in 1947.)

Apparently Russia is unifying a plan to use to her fullest possible advantage her natural energy fuels, and this accounts for the rapid development of her coal industry (in balance with her use of petroleum and natural gas resources). In this respect, the U.S. seems to lack at present an equivalent national policy toward utilization of energy fuels in the most beneficial long term interests.

Without any attempt to itemize or specify various Soviet activities in the sphere of mineral production, it may be generalized that while Russia is still well behind the U.S. in total production of most mineral products and still further behind in the exploration of such minerals world-wide, the ratio of increase over the U.S. is significant each year and may be expected to be more so in the 1960's and thereafter.

The efforts on the part of the Soviet government in this respect is apparent. Thus, it is reported that the Soviet Union is now employing about 40,000 geologists in the search for or study of mineral resources as compared with a total of about one half this number in all U.S. government, industry, and college employment.

The number and quality of current Russian technical papers on various aspects of mining and mineral technology is impressive. Of still greater significance is the surprising number of Russian publications in the basic sciences pertaining to the mineral industries (mineralogy, geophysics, geochemistry, etc.) The number of students being trained in Russia in mining engineering and in the earth sciences appears to be well ahead of those of the U.S. and perhaps above that of the combined free world nations. Thus, it appears that Russia's national mineral policy is tied directly with its avowed policy of world domination—also that the Soviet fully recognizes the importance of mineral resources and production capacity of mineral products, in the economy of any nation striving for world dominance.

Now there is no apparent way we can stop the Russian approach to parity with the U.S. production of mineral raw materials and finished mineral products. But a national standstill or retrogression in our mineral industries could accelerate the rate of approach by Russia. Equally apparent is the fact that deceleration of relative Russian importance can result from American aggressiveness and progress.

This is not confined to the immediate future, nor for the next ten years. It concerns the longer term future wherein the development and conservation of reserves, depletion of mineral resources in accord with an economical and technically sound plan, and the most effective use of minerals (with consideration of recovery and re-use of mineral values) are all given due consideration.

There is another matter of concern in the Russian mineral industry picture. This is the production and exportation by Russia of mining and mineral processing equipment and machinery. There is an important world-wide market in this field. It seems doubtful if much Russian mining equipment could be sold in the near future in the U.S. but perhaps it could be in foreign markets which are important to the U.S. equipment manufacturers. It seems doubtful if exported Russian equipment at this time can compete with U.S. equipment on a quality and performance basis, but what about comparative prices and what may we expect in future?

In summary, we must recognize that Russia has become and will continue to become an increasingly important factor in the world-wide economy of minerals. There is no need for undue alarm about this situation. The U.S. and the free world have great mineral resources, which if wisely used and conserved, will maintain our position of self-sufficiency or domination. To achieve this position, however, calls for immediate and wise action by the American mining industry, the government, and the public. It is a challenge to the mining industry and to the legislatures of our country to handle its affairs, short term and long term, so that our mineral resources are best utilized in the broad interests of national and international welfare. That this can be done is positively certain, and it is an obligation of the mining engineering profession to see that it is done.—A. B. Cummins

YOU AND SME MEMBERSHIP

Starting on the facing page is a 12-page section giving a picture of SME and its component parts—and what they mean to a prospective member.

The section is being included in this issue of MINING ENGINEERING for two reasons: 1) Obviously the letter on the facing page is not intended for you if you are already an SME member, but rather for you to use as one man on SME's 12,000-plus membership committee. 2) As we put together this annual section, the basis for SME's Prospective-Member Brochure, we again realized that almost all of the material would be of interest to members who, far too seldom, are given an overall picture of the Society to which they belong. A once-a-year refresher is good for all of us who belong to—and believe in—SME.

Again, as in 1959, this section will be reprinted and available for use as part of SME's 1960 membership campaign. We know the membership campaign has your moral support—but if SME is to grow stronger, we need the efforts of every member on a man-to-man basis. Your Society's continued strength—and future—is your individual responsibility.

**A MESSAGE
FROM THE 1960
SME PRESIDENT**



JOHNS - MANVILLE

PRODUCTS CORPORATION

RESEARCH CENTER

MANVILLE, NEW JERSEY • TELEPHONE: RANDOLPH 5-5000

To Engineers of the Mining Industry:

All members of the Society of Mining Engineers of AIME join me in extending to you an earnest invitation to investigate the advantages of membership in our Society, and then to apply for membership.

SME is America's professional organization for all qualified men associated with the mineral industries. It is an obligation, as well as a privilege, for all engineers to support their major professional society, by membership in same, and by participation in its meetings and other activities.

Mining men, by and large, are fraternally minded, willing to share their knowledge in technical matters and happy in social relations with their colleagues.

SME is the means by which such beneficial relationships are fostered. Its sole function is to serve the varied interests of the mining engineering fraternity, and in so doing, meet our responsibility for the winning and economic use of our mineral resources.

We believe that SME merits the support of every qualified mineral industry engineer, and in turn feel that the Society has much to offer for the professional advancement and personal satisfaction of each member.

My personal message to you is to study carefully the information transmitted herewith. We trust that we may have your favorable response.

Cordially yours,

**A. B. Cummins
1960 President
Society of Mining Engineers of AIME**

WHAT IS SME?

The Society of Mining Engineers (SME) is a constituent Society of the American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME). The Mining Engineers are the oldest professional group and, until recently, have been the largest of the three Societies of AIME (the others are The Metallurgical Society and the Society of Petroleum Engineers).

As the result of a meeting in Wilkes-Barre, Pa., in April 1871, the American Institute of Mining Engineers, as it was then called, was founded. Objectives of this first meeting were "First, the more economical production of the useful minerals and metals. Second, the greater safety and welfare of those employed in these industries."

Today the purpose of AIME remains much the same "To promote the arts and sciences connected with the economic production of the useful minerals and metals, and the welfare of those employed in these

industries by all lawful means; to hold meetings for social intercourse and the reading and discussion of professional papers, and to circulate by means of publications among its members the information thus obtained, and to establish and maintain a place for meeting of its members, and a hall for the reading of papers and delivery of addresses, and a library of books relating to subjects cognate to the sciences and arts of mining and metallurgy."

That original meeting in April 1871 was attended by a group of 21 men. When formal membership rolls were published, 71 names were listed. From that preliminary membership list, the Institute, in 89 years, has grown in size to over 35,000 members, including students.

Although both "mining" and "metallurgy" were terms used in the organizational call and other announcements, the word "metallurgical" was not included in the Institute name until 1919. In 1956 the word "petroleum" was added, giving full titular recognition to the three full-fledged branches of the min-

erals industry—Mining, Metallurgy, and Petroleum.

Perhaps the most concrete testament to AIME achievements is the *Transactions—volumes* of technical literature published. No. 1 is dated 1871. Of particular interest to miners is No. 214, publication data: 1960.

Prior to 1956 three groups within AIME were Branches of the Institute under the direction of the Board of Directors of AIME. In 1956 when the three Branches became constituent Societies of AIME each was organized with its own President and Board of Directors. Decisions which relate to all three remain in the hands of the AIME Board. The Society of Mining Engineers prior to 1956 was known as the Mining Branch of AIME. Under the reorganization plan of the Institute, the Society came into being at New Orleans in February 1957. Today over 14,000 names are listed on the membership rolls of the Society. To learn more about SME, the men who run it, how it operates, and what it offers its members, read the following 11 pages.

WHO RUNS SME?

President



A. B. CUMMINS

Arthur B. Cummins was installed as President of the Society of Mining Engineers for 1960 at the AIME Annual Meeting in New York. He is manager, Central Chemical and Physical Research Dept. of the Johns-Manville Research Center, Manville, N. J.

Born in 1895 in Los Angeles, Dr. Cummins graduated from the University of Chicago in 1920 with a B.S. and earned his doctorate at the University of California in 1920. He joined the Celite Co. (now part of Johns-Manville) and became a development engineer, research engineer, manager of Celite research, manager of basic research, and finally in 1956 manager of the department he now heads.

Dr. Cummins has been an active member of AIME since 1936, serving

on many committees and acting as eastern vice chairman of IndMD, chairman in 1951, and member of the AIME Board of Directors. In addition to his AIME affiliation, he belongs to the Mineralogical Soc. of America, the Mineralogical Soc. (London), The New Jersey Mineralogical Soc. which he helped organize in 1934, and the New York Mineralogical Soc. He served on the Western Governors' Mineral Policy Conference Committee on Research in 1955 and on the Western Governors' Mining Advisory Council as technical advisor from 1955 to 1956.

Dr. Cummins is recognized internationally as an authority in mining asbestos, mineralogy, and filtration; holds 17 patents; and he has written many technical papers in his fields of specialty.

Other Officers (Past-President, President-Elect, Treasurer) and Regional Vice Presidents (Eastern, Central Area, Western)



J. C. GRAY

James C. Gray, SME President-Elect, was born in Elco, Pa., in 1904 and graduated from Pennsylvania State University in 1925 with a B.S. in mining engineering. He worked for Hudson Coal Co. for 12 years and in 1937 became superintendent of the Wylam Mine for I. T. S. Steel Corp. Mr. Gray became, in 1950, manager of the Tennessee Coal & Iron Div.'s manufacturing operations. Made vice president, Coal Div. of U. S. Steel, Pittsburgh, in 1954, he became, in 1958, administrative vice president, raw materials. At present he is one of SME's representatives on the AIME Board.



J. W. WOOMER

J. W. Woomer, Past-President of SME, is well known in mining and coal circles, and head of his own consulting firm, J. W. Woomer & Assoc. A native of Philipsburg, Pa., he received a B.S. from Pennsylvania State University in 1925 and an E.M. in 1931. During his summer vacations he worked in the central Pennsylvania coal fields and later in Maryland. Mr. Woomer's earliest professional association was with the Pittsburgh Coal Co. and he was later active in the Ohio fields during a period with Hanna Coal Co. He formed his consulting firm in 1940.

Charles E. Lawall is Eastern Regional Vice President and is serving a three-year term until 1961. He is vice president of the Chesapeake & Ohio Railway Co. A graduate of Lehigh University with E.M., M.S., and honorary LL.D. degrees, he was



C. E. LAWALL

born in Catasauqua, Pa., in 1891. In 1938 he was made acting president of West Virginia University. Almost immediately he became president of the University, a position he held until 1945 when he became engineer of coal properties for the Chesapeake & Ohio Railway Co.

Donald W. Scott is Vice President, Central Regional Area. He is general manager of Continental Sales & Equipment Co. A native of Minnesota, he received an E.M. degree from the University of Minnesota and a master's degree in metallurgical engineering from the University of Alabama. His career started in 1937 at Bingham Canyon, Utah, and he did research work on industrial minerals at the Southern Experiment Station of the U. S. Bureau of Mines at Tuscaloosa, Ala. He also spent 12 years at Battelle Memorial Inst. directing research.

H. C. Weed, Western Regional Vice President, is a native of Michigan and a graduate of Michigan College of Mines. After a short stint as efficiency engineer and miner for Calumet & Hecla Mining Co., he joined United Verde Copper Co. in Jerome, Ariz. Since 1937, he has been associated with Inspiration Consolidated Copper Co. in Inspiration, Ariz., beginning his career there as shift boss, eventually becoming assistant general manager, and then general manager. Recently Mr. Weed was elected vice president and director of the company.



D. W. SCOTT



H. C. WEED



N. ARBITER

Nathaniel Arbiter is Society Treasurer as well as Director. Professor of mining engineering at Columbia University, he received his degree from Columbia in 1935. He served with the Battelle Memorial Inst. and Phelps Dodge Corp. in Arizona and New York before accepting the post at his alma mater. He has been active in MBD since its founding; has been chairman of the ECPD New York Section and the AIME Technical Publications Committee; and is one of the AIME representatives on the Engineering Societies Monographs Committee.



Secretary

JOHN C. FOX
SME
29 W. 39th St.
New York 18, N.Y.

John C. Fox, SME Secretary, graduated from Columbia University School of Mines and held a variety of jobs in the mineral industry ranging from mine laborer to assistant manager of the mining division of a large mining company. He also spent four years teaching at Columbia and has had extensive editorial experience through work for *Canadian Mining Journal*, *American Metal Market*, *Engineering and Mining Journal*, and as editor of *Mining Congress Journal* for five years. He has traveled extensively in his mining positions in the U. S., Canada, and Latin America.

THE SME DIRECTORS



J. G. BROUGHTON



S. S. COLE



C. T. HAYDEN



S. F. KELLY



E. KIPP

John G. Broughton is state geologist, Geological Survey of New York, Albany. Born in 1914 in Rome, N. Y., Dr. Broughton received A.B. and M.S. degrees from the University of Rochester, and a Ph.D. from Johns Hopkins University in 1940. For three years he worked for the U.S. Geological Survey. Dr. Broughton has been an instructor at Syracuse University and assistant state geologist as well as acting state geologist.

Sanford S. Cole is assistant manager of research at National Lead Co. A graduate of Alfred University where he obtained B.S. and M.A. degrees, Dr. Cole now serves as a trustee for the University. He earned a doctorate in ceramics from Pennsylvania State College in 1934. It was in the same year that he joined National Lead in the Titanium Div. Dr. Cole was research supervisor from 1945 to 1948 at National Lead.

Brower Dellinger is assistant manager, Tahawus, N. Y., operation, Titanium Div., National Lead Co. Inc. A graduate of Stanford University with a degree in mining in 1936, he began his career with Newmont Mining Co. in Grass Valley, Calif. After the war he returned as general superintendent, then becoming assistant manager of all Newmont's gold properties. He joined National Lead in 1954.

Carl T. Hayden is vice president and general manager of Sahara Coal Co. Inc., Chicago. Born in Platteville, Wis., in 1893, he graduated from Wisconsin School of Mines. His early professional experience was gained in the nonferrous industry, particularly zinc, during his service with Wisconsin Zinc Co. In 1920 he joined Madison Coal Corp. as division engineer and his career in coal has spanned more than 35 years.

Sherwin F. Kelly studied at the University of Kansas, the University of Toronto, the Sorbonne, and Ecole des Mines in Paris, and was a pioneer in the introduction of geophysical techniques in the U. S. and Canada in 1921, in association with the Schlumberger firm of Paris with

which he was connected. He is president of two companies: Sherwin F. Kelly Geophysical Services Inc. and Geophysical Explorations Ltd.

Ewald Kipp, who was born in 1899, graduated from the Texas College of Mines and Metallurgy (Texas Western) in 1922 and began work for the El Paso Smelting Works, a subsidiary of American Smelting and Refining Co. He spent three years in Mexico for the Cananea Consolidated Copper Co. In 1936 he worked for the Sullivan Machinery Co. He joined his present employer, Eimco Corp., Salt Lake City, in 1945.

Raymond B. Ladoo, a well known consultant in the industrial minerals field, is a native of Ayer, Mass., and maintains his headquarters in Newton near Boston. A graduate of Harvard University, he began his professional career with two Virginia companies, Low Moor Iron Co. and John B. Guernsey & Co. Inc. His varied activities particularly qualify Mr. Ladoo for his present consulting position.

H. E. Mauck is general superintendent of Olga Coal Co., Coalwood, W. Va. Born in Danville, Ill. in 1914, he received his first mining experience in his father's coal mine where he worked for three years. He then attended the University of Illinois and later Pennsylvania State University from which he graduated in 1939. Upon graduation he was associated with Pittsburgh Coal Co. before joining Olga Coal Co. in 1948.

Charles F. Park, Jr., is dean of the School of Mineral Science at Stanford University where he had gone as professor of geology in 1946. He received a B.S. degree in mining engineering from the New Mexico School of Mines in 1926, an M.S. from the University of Arizona in 1929, and a Ph.D. in geology from the University of Minnesota in 1931. He then joined the U.S. Geological Survey, remaining until 1946.

R. D. Satterly was born in Michigan and attended Michigan College of Mining and Technology, receiving

B.S. and E.M. degrees. He was employed by Inland Steel Co. after graduation, successively as engineer, chief engineer, mine superintendent, and general manager of ore mines. He is now vice president and general manager of Caland Ore Co. Ltd., a subsidiary, and a director of several organizations.

W. W. Simmons is chief geologist for Miami Copper Co., Miami, Ariz. A native of Birmingham, he graduated from Birmingham-Southern College with a B.S. in 1933. Before entering the University of Arizona where he earned an M.S. in 1938, Mr. Simmons worked for Hog Mountain Gold Mining and Milling Co. and for USGS. In 1938 he joined Tennessee Copper Co., and in 1953 he went to Miami Copper.

E. M. Spokes is professor of mining engineering at the University of Kentucky. A native of Philadelphia, he studied at Lafayette College, the University of Kentucky, and received a Ph.D. from Pennsylvania State University. He worked for Bethlehem Steel Co. and National Lead Co. as mining engineer, foreman, and assistant superintendent. He had various teaching assignments while in the U.S. Army.

William B. Stephenson is vice president, Allen-Sherman-Hoff Pump Co., Wynnewood, Pa. Mr. Stephenson received a B.S. in mechanical engineering from Pennsylvania State University in 1933. He started his career as sales engineer for Cities Service Co., Pittsburgh, and after four years joined Jerguson Gage and Valve Co., Boston. Mr. Stephenson became associated with his present company in 1938.

Norman L. Weiss is milling engineer for American Smelting and Refining Co., Salt Lake City. A graduate of Massachusetts Institute of Technology with a B.S. and engineer of mines in 1923, Mr. Weiss was born in Boston in 1902. He did graduate work and research at Pennsylvania State College. Mr. Weiss began his years with Asarco in 1924 in El Paso, Texas, as a metallurgist dealing with ore dressing problems.



R. B. LADOO



C. F. PARK, JR.



R. D. SATTERLEY



W. W. SIMMONS



E. M. SPOKES

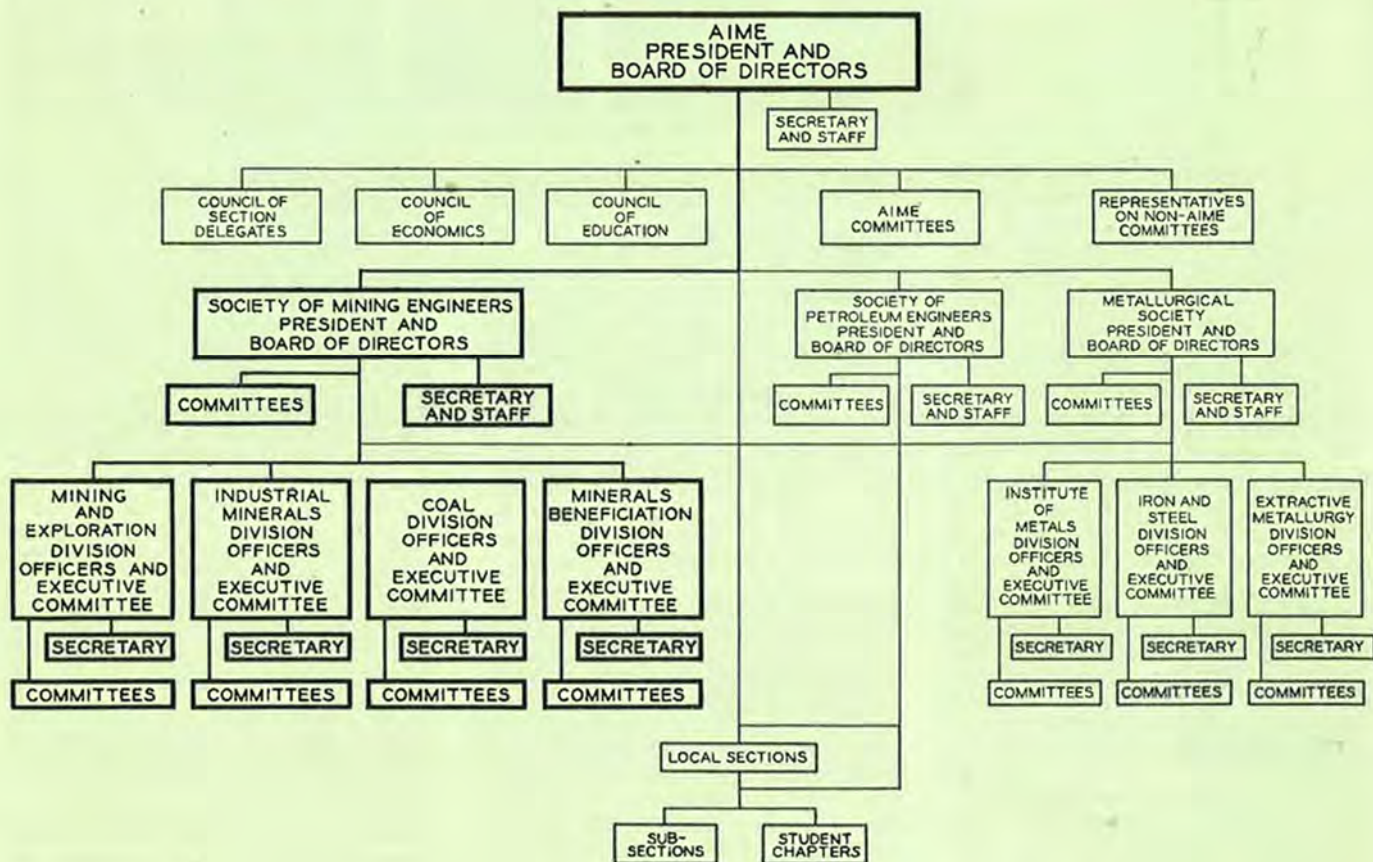


W. B. STEPHENSON



N. L. WEISS

HOW DOES SME OPERATE?



The Society in AIME

The Society of Mining Engineers (SME) is one of three constituent Societies of AIME, dedicated to carrying out the aims of the Institute in the field of activity relating to the Society. The Institute as a whole, and each of the Societies, is built on a broad foundation of active Local Sections.

The Society Itself

The Society of Mining Engineers is divided into four Divisions, all operating under the direction of the Officers and Board of Directors. SME is dedicated to the mutual exchange of knowledge and ideas leading to a higher technical and professional standing for its members. One of the principal ways in which this is done is through cooperation in an all-AIME Annual Meeting as well as sponsorship of Local Section, regional and Divisional meetings throughout the year. For example, there is a joint fall meeting with one of the AIME Local Sections which is devoted to topics of interest to those in the local industry. There are, from time to time, meetings of interest to those engaged in minerals beneficiation, coal, and industrial minerals. The mining and exploration group within SME cooperates alone or jointly with other Divisions

in Local Section, state association, or university meetings and regional meetings of the Institute.

SME Committees

The committees of SME coordinate the efforts of the Divisions to produce the greatest amount of service to members of the Society. As can be seen in the organization chart above, there are committees devoted to maintaining and enhancing the quality of the Society publications, its programming, and its participation in such activities as education and economics information.

Local Sections

The Local Sections of AIME are the focal points of professionalism and the foundations upon which are built the activities of each of the Societies and the Institute as a whole. Participation in the affairs of these Local Sections promotes personal contacts and down-to-earth discussions of common problems, aims, methods and achievements. The face-to-face exchanges of information and ideas promote a climate of mutual endeavor on a personal level. This type of exchange is an essential ingredient of professionalism and growth of the individual. The starting point for such achievement is attendance at the Local Section meetings.

Divisions

In order that SME perform its functions to the fullest extent as a professional Society, based on individualism, it is divided into four Divisions to truly represent the technical interests of its members.

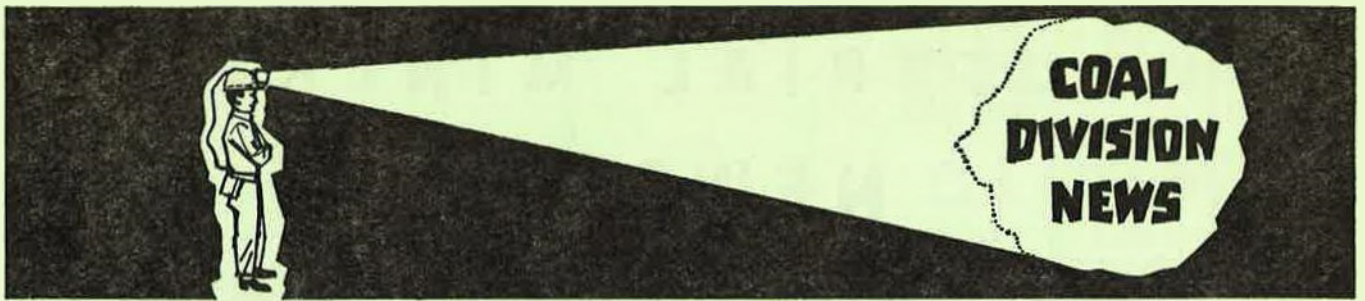
The Mining & Exploration Division includes members interested in underground and open pit metal mining, geology, geophysics, and geochemistry.

The Coal Division includes all members interested in the finding, mining, cleaning, and utilization of bituminous coal and anthracite.

The Minerals Beneficiation Division deals with the problems of making marketable products out of run-of-mine ore.

The Industrial Minerals Division is devoted to the industrial minerals field and functions through nine commodity committees.

There is some degree of overlapping of interests among the Divisions. This aids the unity of the Society and a member is free to attend meetings of any Division. Each Division is fully represented on the Society's Board of Directors. The officers of SME have been active in the Division which represents their professional interests. On the following four pages each of the Divisions will *speak for itself*.



H. O. ZIMMERMAN, DIVISION CHAIRMAN

Organizations made up of foremost engineers and other professional people are very important in today's fast-moving industrial and commercial world. The tremendously rapid progress in technical and scientific developments during recent years has made such organizations even more important today than in former years.

Progress and developments of this kind have taken place in the coal industry. Due to the need stressed by the extremely competitive situation within coal commerce specifically and the competition coal has to meet from other fuels generally, this progress and development may have been at an even more rapid pace in that industry than in industry generally.

Professional groups add a stabilizing, coordinating medium whereby developments, progress, and new ideas, as well as problems, can be frankly studied, compared, and discussed. They provide an effective opportunity for collaboration among members from widely scattered locations in the advancement of all types of technical and scientific undertakings.

More important yet, through meetings and the distribution of information-bearing issues, such as magazines, bulletins, and others, full enlightenment of members is maintained on all such undertakings, both those in the process of development and those which have been carried through to fulfillment and put to practical use.

Technical meetings sponsored by organizations of professional men afford an opportunity through the

presentation of prepared papers and talks to familiarize members regarding new and adopted ideas and methods, at the same time affording an opportunity for discussion.

Often, from such enlightenment, a member will find for himself, or the concern with which he is connected, solution to a particular problem or relief from circumstances that have been difficult and a source of economic loss. Such information may also lead to the adoption of methods that are an improvement over those being utilized, the result again being economic improvement.

The Society of Mining Engineers stands recognized as a top ethical group as compared to strictly trade groups. It offers to members all the advantages herein cited, as well as many others.

To those individuals closely associated with the coal industry, membership in the Coal Division of SME extends all of those same advantages as specifically related to that industry.

The Coal Division was organized to promote closer association of professional men connected with the coal industry, the exchange of ideas and experiences, development of new ideas and methods, and dissemination of information of common interest to the industry, the purpose of all this being to improve operations and practices so that economic conditions can, in turn, be improved.

The Division operates through an organization consisting of Chairman, Secretary, Executive Committee, and a number of other committees, each dealing with some pertinent and important phase of the activities and

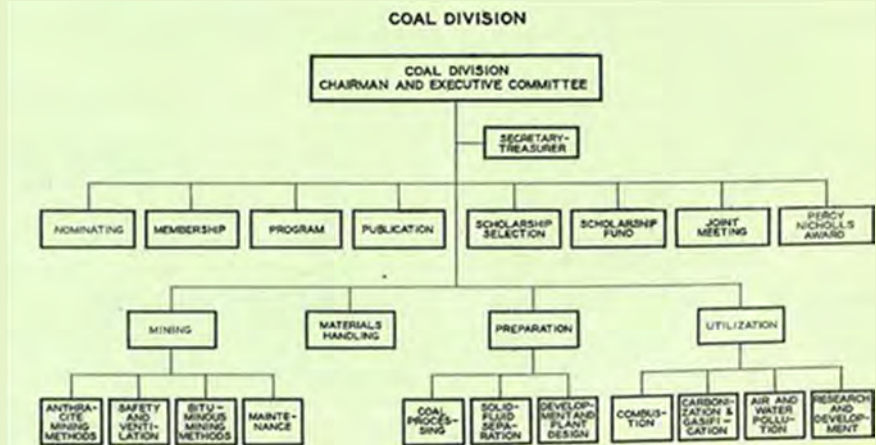
objectives of the Division. All of the men holding posts in this organization are devoted, capable individuals, highly interested in the affairs of the Division and their industry.

To the individual, membership means that the facilities and services of the Division become available to him for utilization as may best serve him. It means participation in the benefits and advantages enumerated in this article.

It may appear questionable to qualified members, either young or old, as to whether the need for membership can be evaluated in tangible worth. Even though tangible worth of membership may not be obvious or readily evaluated, it is such that no professional man can afford to remain separated from the organization and not participate in its affairs.

Furthermore, there are intangible advantages in membership such as prestige, close association with other outstanding individuals in the same profession, and the satisfaction of participation in the extremely important and worthwhile matters with which the organization is concerned. Although these may be classed as intangible in value, they actually are immeasurable.

Finally, every professional man truly interested in his profession, or the enterprise with which he is connected, should belong to one Society of AIME. Those closely interested in the coal industry should become members of the Coal Division of SME of AIME. They will find such membership to be a distinct and invaluable asset in their professional life.—**H. O. Zimmerman**





INDUSTRIAL MINERALS NEWSLETTER



H. FEIERABEND, Division Chairman

From abrasives to zircon—from search and discovery to production and marketing—leave out metals and fuels and you have the depth and breadth of the minerals industry covered by the Industrial Minerals Division. One need only to glance down the list of our Commodity Committees (see below) to envision our dimensions.

We celebrate our 25th anniversary as a Division this month. Though IndMD is one of the smaller Divisions of SME, we take pride in our ability to serve and attract many times our primary membership. We find, for example, some who cover the spectrum of activity from search to sales of a particular commodity—we find some whose main interests are in the geology or the processing of a wide range of minerals. Consequently, we have found some of our best meetings are held jointly with other Divisions or with other professional groups.

The scope and scale of our participation in the AIME Annual Meeting and in regional meetings attest to the interest and activity of our members. Invariably, IndMD members come up with many fine high quality papers at the meetings and offer them for publication.

Our Division is something of a paradox in the Society—somewhat undestrudably so—but nonetheless a paradox. The nonmetallics industry is half again as large as the metals industry in the United States. Our industry's growth-rate far exceeds any other branch of the minerals business. And, by comparison with metals during the 1958 recession, non-metals as a whole had a good year. Yet we are one of the smaller Divi-

sions of SME—and our Division's growth rate is lagging behind the industry.

We are proud of the contributions our industry has made and is making to the welfare and stability of our country and its economy. We are proud of the contributions our members have made to the mineral world—the late Oliver Bowles, Ray Ladoo, Joe Gillson, Sam Dolbear, to name only a few. There are hosts of others—real stalwarts and peers.

IndMD extends a hearty invitation to all in the minerals industry—particularly the nonmetallics—to look us over. We extend a special welcome to you who are not AIME members. If you are in the minerals business we know you have something to offer your fellow professionals and we, in turn, to you. Opportunities abound in IndMD. When you look us over we hope you will like what you find and will join us!

Organization

The chairman directs the overall Division activity under the surveillance of the executive committee. The committee makeup includes the chairman, seven regional vice chairmen, nine members (directors), the secretary-treasurer, and the past-chairman. The regional vice chairman will act with the chairman and secretary-treasurer as a *working* board under the executive committee.

Standing committees include non-ination, membership, program, and representation on various SME committees.

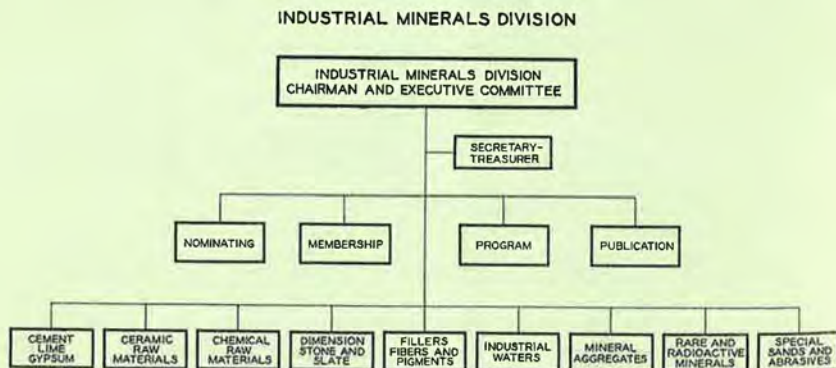
The program chairman and the chairmen and members of the commodity committees carry a heavy burden, for on them depends, to a

large degree, the success of Divisional activities at the Annual and regional meetings. Theirs is the job of securing papers, lining up sessions, and all the myriad details that invariably come up and must be decided upon.

Meetings

Each year the Industrial Minerals Division plays a large part in the annual Institute program, with three full days of technical papers and its Divisional luncheon. Then there are regional meetings held, usually in the fall, at various spots around the country. In 1959 it was at picturesque Bedford Springs, Pa. The smaller regional affairs avoid the hub-bub and rush of the Annual Meeting. They go a long way toward cementing the group together and permit a more concentrated effort strictly in the IndMD field.

History: The present Division was born in 1935 when the AIME Board of Directors, at its March 15 meeting that year, formally created "an Industrial Minerals Division (Non-metallics) in the Institute," to quote from MINING AND METALLUGRY, April 1935. Actually the Division was an outgrowth of a nonmetallics committee of AIME which had been active for about a quarter of a century prior to 1935. IndMD was to provide "a needed forum for discussion and a suitable medium for the publication of technical papers of vital interest to the leaders in the nonmetallics industries"—M & M. It was in the same year that, under the sponsorship of the Seeley W. Mudd Memorial Fund, preparations were begun for the first edition of *Industrial Minerals and Rocks*. The third edition has just been published—in 1960.



mBd'ers digest

MINERALS BENEFICIATION DIVISION



H. R. SPEDDEN, Division Chairman

Membership in the Society of Mining Engineers of the AIME is an indication of professional identity and the mark of the individual who wishes to contribute with pride to the growth of his profession. Such growth is a dual proposition: as the Society (and Institute) gain prominence in our advancing technological culture, the individual member is enabled to expand his own horizons and skills by his association with a strong professional group. An active part in SME affairs may be gained by direct association with a division of one's choice such as the Minerals Beneficiation Division.

The MBD, through its national and regional meetings and its related publications, is the paramount organization in the U. S. for presentation and exchange of technical information relating to the processing of ores. A vital part of this exchange is embodied in committee activities by which MBD members may gain professional recognition quite apart from publishing technical papers. Membership on MBD technical committees is open to all MBD affiliates and appointments to these committees are based on an indicated willingness to work as a member of a committee team. A letter to your Division Chairman, indicating a desire to serve, will provide the opportunity for association with the MBD administrative group. A demonstrated ability through these activities leads to positions of greater responsibility. This is an effective route to national professional recognition.

The Minerals Beneficiation Division is a dynamic part of the SME and AIME. Its strength arises from the dedicated efforts of individuals with a common interest in a professional field. It has gained international stature as may be seen by the

number of foreign papers presented at our Annual Meetings and the additional ones published in our *Transactions*. The Division also sponsors special conferences of an international scope and joins other Divisions of the AIME in joint programs of mutual interest. Regional and local groups, within the U. S., provide even closer bonds among our members to promote individual professional development.

As with almost any organization, each member receives benefits roughly proportional to his own contributions of effort; thus the premier standing of MBD attests to the fact that many renowned engineers and scientists have aided in its growth. We welcome new members and urge all to take part in our activities. If you wish to publish the results of your technical work, or to develop skills in professional administration, or to improve your engineering abilities, or merely to enjoy the stimulating association of engineers with similar interests, MBD has a place for you.—H. Rush Spedden

History: The Minerals Beneficiation Division of AIME came into being as a formal part of the Institute at the Feb. 16, 1948, meeting of the Board of Directors in New York. Forerunner of MBD was the Milling Methods Committee of AIME.

Actually the Division was already operating, since it had a fullfledged schedule of sessions and social events at the Annual Meeting then taking place. To quote briefly from Professor Arthur F. Taggart's colorful, well written meeting resume:

"In potential for service to members of the mineral engineering profession the word Division above [in the title of the report, MINING & METALLURGY, March 1948] marks the most important incident in many

years. Thanks are due to Ted Counselman for the original idea and for skillful and unremitting work in carrying it through; to Jack Myers for wholehearted enlistment in the fight, and to the Lord, I guess, for endowing him with the capacity to smooth the ruffled feelings it engendered; and to The Dorr Co. and to the Tennessee Copper Co. respectively for sympathetic recognition that these key men had company work so well organized they could properly devote company time, supplies, and secretarial aid to the campaign."

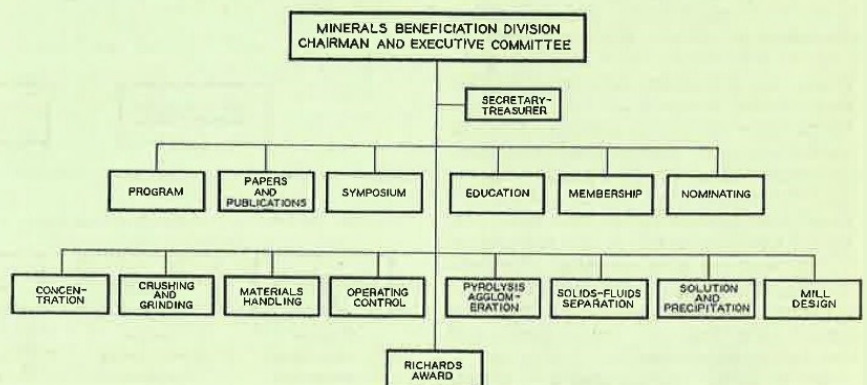
The first Division luncheon was also held in that momentous year, 1948, and at the time announcement was made of the availability of funds for an annual presentation of the Robert H. Richards Award by AIME in recognition of meritorious achievement in ore dressing.

Initial membership in MBD was some 900 pioneers. Today Division roles list over 2000 whose primary interest, among SME members, is minerals beneficiation.

1948 was indeed a banner year, for it also saw the introduction of an event of fame or infamy, depending on your viewpoint—or time of day—or both. The *M & M* Annual Meeting reporter put it this way, in describing that first Scotch Breakfast: "... a new standard in matutinal gastronomy."

Today the Scotch Breakfast and Division luncheon are Annual Meeting traditions, playing to a capacity audience. The programs arranged by MBD continue to arouse as much interest and *technical* excitement as did that first program under Division auspices. And MBD was particularly proud in New York in 1960 to have all its meeting papers available as SME Preprints (see the page on *Society and AIME Services*).

MINERALS BENEFICIATION DIVISION





ROCK IN THE BOX

Mining & - Exploration Division



R.J. LACY, Division Chairman

Some of the following is based on a recent statement by Mr. Lacy as incoming chairman of the Division for the year 1960. His ideas and hopes for M & E appeared in "Rock in the Box" in the February 1960 issue of MINING ENGINEERING.

The Mining and Exploration Division of SME serves those whose interests are the exploration for and removal from the earth of metallic and nonmetallic ores. Formerly the Mining, Geology, and Geophysics Division of AIME and SME, its members consist of underground and open pit mining engineers, geologists, geophysicists, and geochemists.

Among the benefits and services M & E offers its members are:

1) Just as the trend in the mining industry is toward integration so has M & E increased its own policy of integration. The miners and exploration people are carrying out increasingly coordinated functions rather than operating as separate units as they did in the past.

2) The programs the Division sponsors at AIME Annual Meetings reflect this trend. The various program committees during the past few years have tried to schedule more joint sessions for all Division members and fewer total sessions. By scheduling fewer sessions, especially concurrent ones, M & E's have the opportunity to hear the latest developments in all aspects of their field of engineering. For example, open pit or underground miners have an opportunity to learn about the newest techniques and tools for exploration.

3) MINING ENGINEERING, official

publication of the Society of Mining Engineers of AIME, serves Division members. Their newsletter, *Rock in the Box*, is carried in most issues during the year. This newsletter keeps members abreast of Division business, helps acquaint M & E's with their officers and projects of their part of SME, and serves as a sounding board for ideas and interests. Letters to the editor, published last year, informed miners and explorers of technical highlights of a number of non-AIME meetings. These were meetings most Division members could not attend. Actually, any member can use *Rock in the Box* as a "sounding board" for a pet project or idea or grievance just by addressing a letter to the editor.

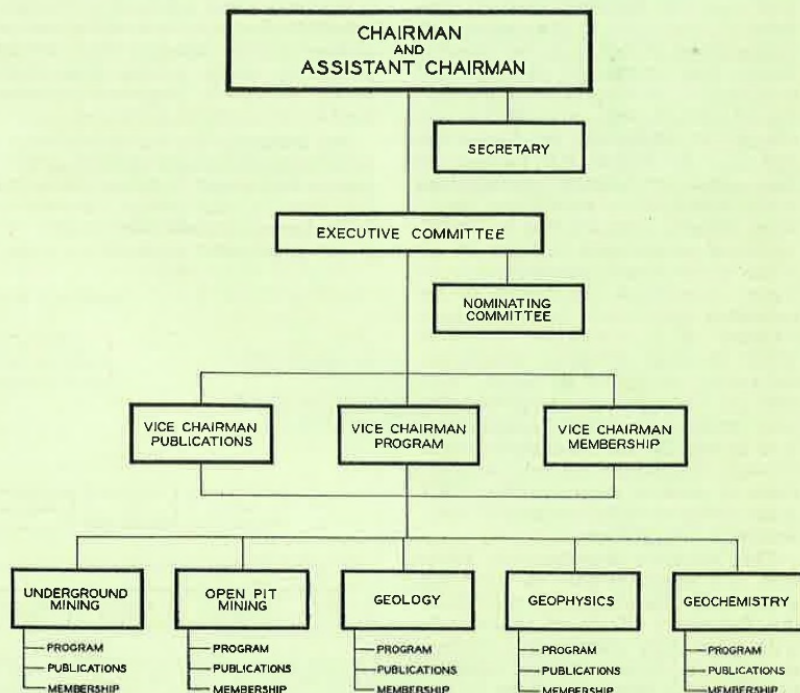
MINING ENGINEERING serves M & E's in many other ways. Numerous articles throughout the year are devoted to topics within the Division's field of interest. An *Abstracts* column not only gives handy reference digest of papers in a given issue but also those presented at meetings

of interest to SME members. The *Mineral Information* Section gives data on current technical literature from leading publishers, state agencies, and many foreign countries.

History: The Division (under the name Mining, Geology, and Geophysics Division of AIME) was founded in the fall of 1949, an outgrowth of the activities of several former committees of the Institute. In 1958 the name was changed to Mining and Exploration Division and a certain amount of reorganization was effected in order to both broaden the scope of the Division and provide greater cohesion.

Organization: Today, M & E's basic organization is the Unit system, one each for open pit mining, underground mining, geology, geophysics, and geochemistry. However, to preserve the integration attained by the Division, the various committees of each Unit (program, publications, membership) are responsible to a Division vice president who coordinates the activities of the five units.

MINING AND EXPLORATION DIVISION



SME OFFERS PROFESSIONAL RECOGNITION

Through AIME and SME, individual engineers attain professional recognition when they are named recipients of major awards. This page is devoted to the awards of interest to members of SME. The captions accompanying the pictures explain what aspect of professionalism the award represents.



The James Douglas Gold Medal recognizes distinguished achievement in nonferrous metallurgy including both beneficiation of ores and alloying and utilization of nonferrous metals. (Above.)



The William Lawrence Saunders Gold Medal recognizes distinguished achievement in mining other than coal. The term "mining" includes the production of metals and nonmetallic minerals. (Above.)



The Charles F. Rand Memorial Medal is awarded at such a time and under such rules as may be determined by the Board of Directors of AIME for distinguished achievement in Mining Administration. The term "mining" is defined in its broader sense to include metallurgy and petroleum. (Above.)



The Erskine Ramsay Gold Medal is awarded in recognition of distinguished achievement in coal mining including both bituminous and anthracite coal. (Above.)

The Robert H. Richards Award recognizes achievement in any form which unmistakably furthers the art of minerals beneficiation in any of its branches. (Not illustrated.)

The Rossiter W. Raymond Award (in the form of a certificate and check) is given annually for the best paper published by a member of the Institute under 33 years of age. Not only technological content but literary quality are considered.

The Robert Peele Memorial Award (in the form of a certificate), established in 1954 by the then Mining, Geology, and Geophysics (now the Mining & Exploration Division), is given to encourage young men in creative work.

The Hal Williams Hardinge Award was recently established to recognize outstanding achievement in the field of industrial minerals. (Right.)

The Daniel C. Tackling Award and Lecture was instituted by the Mining, Geology, and Geophysics Division (now Mining & Exploration Division) in 1953. The award is

presented for significant contributions to technical progress in the fields of mining, geology, and geophysics. The recipient is the Jackling Lecturer at the AIME Annual Meeting. (Lower left.)

In addition to these awards presented in recognition of achievement on a professional basis, each of the constituent Societies of AIME may give annually an award to students for papers submitted in the Annual National Prize Paper Contest. SME may give an award of \$100 each for a paper in the graduate class and for one in the undergraduate class. These presentations are made at the welcoming luncheon during the Annual Meeting of the Institute.

The Institute also cooperates with the other Founder engineering societies in the presentation of certain awards:

The John Fritz Medal is awarded for notable scientific or industrial achievement.

The Alfred Nobel prize is given for a technical paper of particular merit accepted by the publication committee of any of the four—AIME, ASME, AIEE, and the Western Soc. of Engineers—for publication, in whole or in abstract, in any of their respective technical publications, provided the author, at the time the paper is accepted in practically its final form, is not over 30 years of age.

The third joint award of the Founder Societies is the Hoover Medal. Named in honor of Herbert Hoover, Past-President of AIME and former President of the United States, the medal is awarded for distinguished public service by an engineer.

The Percy Nichols Award is given for notable scientific or industrial achievement in the field of solid fuels. Given under the joint sponsorship of AIME and ASME, the Award is presented at the Annual Joint Meeting of the Coal Division of SME and the Fuels Division of ASME.



SOCIETY AND AIME SERVICES

Described below are some of the services provided by the Society and the Institute and available to you as a member of SME of AIME. They range from papers and books to personnel service.

Preprints—As a service to its members, the Society of Mining Engineers preprints papers presented at the Society meetings. In 1960 approximately 116 Annual Meeting papers, presented at New York in February, were preprinted and available on a coupon basis to members and nonmembers of the Society of Mining Engineers.

In order to make this program financially feasible, preprints are distributed on a coupon basis. Each member of SME receives with his annual dues bill a book of five free coupons which entitles him to five preprints. If he should attend the Annual Meeting, he receives as part of his registration a second book of five free coupons entitling him to five additional preprints. Thereafter coupon books are available to members for \$5 per book of ten coupons. Each coupon is redeemable for one preprint. The Society also sells books of ten coupons at \$10 per book to nonmembers. These coupons are again redeemable for preprints.

In addition to the papers preprinted for the Annual Meeting, the Society is also preprinting papers presented at some regional meetings. In 1959 the AIME papers presented at the Joint Solid Fuels Conference of AIME and ASME were preprinted and available to members and nonmembers on a coupon basis. Also available were papers presented at the Bedford Springs Meeting of the Coal and Industrial Minerals Divisions. During the forthcoming year, SME is hoping to expand its preprint coverage of meetings.

Books—In addition to the professional and personal contact function of AIME, the Institute has a major objective the dissemination of technical information of varying kinds. One method of so doing is publication of a monthly technical journal, MINING ENGINEERING by the Society of Mining Engineers. In addition, the *Transactions* papers, or contributions worthy of inclusion in the permanent technical literature, are collected and published as a bound volume once a year. The present *Transactions* of AIME published under the auspices of the Society of Mining Engineers consists of those transactions papers published monthly in MINING ENGINEERING.

In addition to the annual *Transactions* volume, AIME publishes from time to time books of interest to those engineers in the minerals industry. For example, *The Porphyry Coppers in 1956* edited by A. B. Parsons, was a recent publication of

the Institute. *Economics of the Mineral Industry* was a 1959 publication of AIME. Published early in 1960 was a third revision of *Industrial Minerals & Rocks*, edited by J. L. Gillson, 1960 AIME President. A long-needed revision of two earlier volumes, this 900-some page book is truly a monumental contribution to technical literature. From time to time AIME issues an available book list for the information of its members. Members of SME can obtain these books (and those of other publishers) at a discount.

Library—The Engineering Societies Library is located physically in the Engineers Building, home of AIME and the other Founder Societies. It is a department of the United Engineering Trustees, a corporation of which each of the five Founder Societies is a member. Through their membership in UET, the Societies support the Library. ESL is, of course, outstanding in its Founder Societies, fields—civil, electrical mechanical, mining, metallurgical, petroleum, and chemical engineering—but the over 175,000 volumes in the Library cover all branches of engineering, primarily on the level of the graduate practicing engineer. In addition to these reference works, the Library currently receives over 1500 periodicals from all parts of the world.

The reading room of the Library is available to anyone, whether member or not of the Founder Societies.

The Library offers special services such as preparation of bibliographies; literature searches; and translation, photoprint, and microfilm copying of material contained in the Library. Such services can be ordered by mail. The Library will be glad to furnish a brochure of its services and charges therefor upon request.

ESPS—The Engineering Societies Personnel Service Incorporated is a nonprofit, self-supporting national employment service cooperating with various engineering societies, of which AIME is one. With offices in Chicago, New York, and San Francisco, engineering employment services are available for employer and employee. The range of jobs listed for engineers includes every field of industry and government from production, administration, consulting, to editorial and sales. ESPS carries a listing of available engineers as well as positions open.

EJC—Engineers Joint Council is a federation of Professional Societies

whose memberships total a quarter of a million engineers (AIME is a constituent society). EJC is dedicated to the betterment of the nation and to the professional and sociological development of the individual engineer. Societies in special fields serve members in their particular areas by EJC represents the broad engineering profession and works for engineering by promoting sound public recognition of the engineer.

Some of the areas to which EJC's jurisdiction extends are national manpower policy, engineers' employment conditions in industry, science and engineering education, secondary and technical school education, national resources policies, international standards, labor management relations, and developments such as nuclear energy.

The fourfold constitutional objectives of EJC are 1) to advance the general welfare of mankind through the available resources and creative ability of the engineering profession 2) to promote cooperation among the various branches of the engineering profession, 3) to advance the science and profession of engineering, and 4) to develop sound public policies respecting national and international affairs wherein the engineering profession can be helpful to the services of the engineering profession.

To achieve these objectives EJC acts as an advisory and coordinating agency to work out and study matters of mutual interest to the constituent societies and to recommend parallel action by them. EJC represents the constituent societies of the council in instances in which the constituent societies deem such joint representation desirable. EJC also administers, on behalf of the engineering profession, those activities authorized by a majority of the societies.

Several major annual events are held under the auspices of EJC. One is the general assembly, normally scheduled for January, which brings engineers together with world authorities on subjects of broad interest to the engineer in the profession. The Nuclear Congress, first held in 1955 and again in 1957, became in 1958 an annual event controlled by EJC's permanent policy committee on nuclear congresses. In addition to these events other conferences are arranged as the need arises. By joining the Society of Mining Engineers of AIME, an engineer can participate in the conferences and programs of Engineers Joint Council.

Professional Activities at Your Doorstep

A map of the United States showing the distribution of 100 different bird species. Each state is labeled with a number representing the number of species found there. Some states have a fraction, indicating a specific count or ratio. A cross-hatched area in the Southeast is labeled "CROSS HATCHED AREA -> 88". Arrows point to various numbers outside the state boundaries, such as 48, 82, 79, 46, 51, 91, 72, 76, 70, 87, and 85. The map includes state names and a legend for the cross-hatched area.

Legend: CROSS HATCHED AREA -> 88

State numbers (including fractions):

- Washington: 25
- Oregon: 28
- California: 34
- Nevada: 22
- Arizona: 2
- Idaho: 10
- Wyoming: $\frac{43}{83}$
- Montana: $\frac{21}{66}$
- N. Dakota: 86
- S. Dakota: 3
- Nebraska: 3
- Kansas: 73
- Colorado: $\frac{57}{65}$
- New Mexico: $\frac{60}{77}$
- Utah: 41
- Texas: 62
- Oklahoma: 27
- Arkansas: 58
- Mississippi: 56
- Alabama: 35
- Georgia: 35
- South Carolina: 35
- Florida: 45
- Louisiana: 52
- Illinois: 74
- Indiana: 7
- Ohio: 8
- Kentucky: 6
- Tennessee: 39
- Michigan: 40
- Wisconsin: 20
- Minnesota: 20
- Iowa: 74
- Missouri: $\frac{33}{68}$
- Virginia: 42
- North Carolina: 31
- South Carolina: 31
- Georgia: 31
- Florida: 31
- Alabama: 31
- Mississippi: 31
- Arkansas: 31
- Oklahoma: 31
- New Mexico: 31
- Arizona: 31
- Nevada: 31
- California: 31
- Idaho: 31
- Wyoming: 31
- Montana: 31
- N. Dakota: 31
- S. Dakota: 31
- Nebraska: 31
- Kansas: 31
- Colorado: 31
- New Mexico: 31
- Utah: 31
- Arizona: 31
- California: 31
- Idaho: 31
- Wyoming: 31
- Montana: 31
- N. Dakota: 31
- S. Dakota: 31
- Nebraska: 31
- Kansas: 31
- Colorado: 31
- New Mexico: 31
- Utah: 31
- Arizona: 31
- California: 31
- Idaho: 31
- Wyoming: 31
- Montana: 31
- N. Dakota: 31
- S. Dakota: 31
- Nebraska: 31
- Kansas: 31
- Colorado: 31
- New Mexico: 31
- Utah: 31
- Arizona: 31
- California: 31
- Idaho: 31
- Wyoming: 31
- Montana: 31
- N. Dakota: 31
- S. Dakota: 31
- Nebraska: 31
- Kansas: 31
- Colorado: 31
- New Mexico: 31
- Utah: 31
- Arizona: 31
- California: 31
- Idaho: 31
- Wyoming: 31
- Montana: 31
- N. Dakota: 31
- S. Dakota: 31
- Nebraska: 31
- Kansas: 31
- Colorado: 31
- New Mexico: 31
- Utah: 31
- Arizona: 31
- California: 31
- Idaho: 31
- Wyoming: 31
- Montana: 31
- N. Dakota: 31
- S. Dakota: 31
- Nebraska: 31
- Kansas: 31
- Colorado: 31
- New Mexico: 31
- Utah: 31
- Arizona: 31
- California: 31
- Idaho: 31
- Wyoming: 31
- Montana: 31
- N. Dakota: 31
- S. Dakota: 31
- Nebraska: 31
- Kansas: 31
- Colorado: 31
- New Mexico: 31
- Utah: 31
- Arizona: 31
- California: 31
- Idaho: 31
- Wyoming: 31
- Montana: 31
- N. Dakota: 31
- S. Dakota: 31
- Nebraska: 31
- Kansas: 31
- Colorado: 31
- New Mexico: 31
- Utah: 31
- Arizona: 31
- California: 31
- Idaho: 31
- Wyoming: 31
- Montana: 31
- N. Dakota: 31
- S. Dakota: 31
- Nebraska: 31
- Kansas: 31
- Colorado: 31
- New Mexico: 31
- Utah: 31
- Arizona: 31
- California: 31
- Idaho: 31
- Wyoming: 31
- Montana: 31
- N. Dakota: 31
- S. Dakota: 31
- Nebraska: 31
- Kansas: 31
- Colorado: 31
- New Mexico: 31
- Utah: 31
- Arizona: 31
- California: 31
- Idaho: 31
- Wyoming: 31
- Montana: 31
- N. Dakota: 31
- S. Dakota: 31
- Nebraska: 31
- Kansas: 31
- Colorado: 31
- New Mexico: 31
- Utah: 31
- Arizona: 31
- California: 31
- Idaho: 31
- Wyoming: 31
- Montana: 31
- N. Dakota: 31
- S. Dakota: 31
- Nebraska: 31
- Kansas: 31
- Colorado: 31
- New Mexico: 31
- Utah: 31
- Arizona: 31
- California: 31
- Idaho: 31
- Wyoming: 31
- Montana: 31
- N. Dakota: 31
- S. Dakota: 31
- Nebraska: 31
- Kansas: 31
- Colorado: 31
- New Mexico: 31
- Utah: 31
- Arizona: 31
- California: 31
- Idaho: 31
- Wyoming: 31
- Montana: 31
- N. Dakota: 31
- S. Dakota: 31
- Nebraska: 31
- Kansas: 31
- Colorado: 31
- New Mexico: 31
- Utah: 31
- Arizona: 31
- California: 31
- Idaho: 31
- Wyoming: 31
- Montana: 31
- N. Dakota: 31
- S. Dakota: 31
- Nebraska: 31
- Kansas: 31
- Colorado: 31
- New Mexico: 31
- Utah: 31
- Arizona: 31
- California: 31
- Idaho: 31
- Wyoming: 31
- Montana: 31
- N. Dakota: 31
- S. Dakota: 31
- Nebraska: 31
- Kansas: 31
- Colorado: 31
- New Mexico: 31
- Utah: 31
- Arizona: 31
- California: 31
- Idaho: 31
- Wyoming: 31
- Montana: 31
- N. Dakota: 31
- S. Dakota: 31
- Nebraska: 31
- Kansas: 31
- Colorado: 31
- New Mexico: 31
- Utah: 31
- Arizona: 31
- California: 31
- Idaho: 31
- Wyoming: 31
- Montana: 31
- N. Dakota: 31
- S. Dakota: 31
- Nebraska: 31
- Kansas: 31
- Colorado: 31
- New Mexico: 31
- Utah: 31
- Arizona: 31
- California: 31
- Idaho: 31
- Wyoming: 31
- Montana: 31
- N. Dakota: 31
- S. Dakota: 31
- Nebraska: 31
- Kansas: 31
- Colorado: 31
- New Mexico: 31
- Utah: 31
- Arizona: 31
- California: 31
- Idaho: 31
- Wyoming: 31
- Montana: 31
- N. Dakota: 31
- S. Dakota: 31
- Nebraska: 31
- Kansas: 31
- Colorado: 31
- New Mexico: 31
- Utah: 31
- Arizona: 31
- California: 31
- Idaho: 31
- Wyoming: 31
- Montana: 31
- N. Dakota: 31
- S. Dakota: 31
- Nebraska: 31
- Kansas: 31
- Colorado: 31
- New Mexico: 31
- Utah: 31
- Arizona: 31
- California: 31
- Idaho: 31
- Wyoming: 31
- Montana: 31
- N. Dakota: 31
- S. Dakota: 31
- Nebraska: 31
- Kansas: 31
- Colorado: 31
- New Mexico: 31
- Utah: 31
- Arizona: 31
- California: 31
- Idaho: 31
- Wyoming: 31
- Montana: 31
- N. Dakota: 31
- S. Dakota: 31
- Nebraska: 31
- Kansas: 31
- Colorado: 31
- New Mexico: 31
- Utah: 31
- Arizona: 31

1	Alaska	47	Mexico
2	Arizona	48	Southwestern Alaska
3	Black Hills	49	West Central Texas
4	Boston	50	Adirondack
5	Carlsbad Potash	51	Peru
6	Central Appalachian	52	Lou-Ark
7	Chicago	53	South Plains
8	Cleveland	54	Fort Worth
9	Colorado	55	Dallas
10	Columbia	56	Mississippi
11	Connecticut	57	Colorado Plateau
12	Delta	58	Arkansas
13	Detroit	59	San Joaquin
14	East Texas	60	Central New Mexico
15	El Paso	61	Hobbs
16	Gulf Coast	62	Hugoton
17	Kansas	63	Panhandle
18	Lehigh Valley	64	Niagara Frontier
19	Mid-Continent	65	Denver Petroleum
20	Minnesota	66	Billings Petroleum
21	Montana	67	New York Petroleum
22	Nevada	68	Illinois Petroleum Basin
23	New York	69	Los Angeles Basin
24	North Texas	70	Eastern Venezuela Petroleum
25	North Pacific	71	Evangeline
26	Ohio Valley	72	West Venezuela
27	Oklahoma City	73	Great Bend
28	Oregon	74	Upper Mississippi
29	Pennsylvania-Anthracite	75	Uranium
30	Permian Basin	76	Caracas
31	Philadelphia	77	Four Corners
32	Pittsburgh	78	California Coastal
33	St. Louis	79	CIM-AIME Calgary
34	San Francisco	80	Snyder
35	Southeast	81	Ras well
36	Southern California	82	CIM-AIME Edmonton
37	Southwest Texas	83	Wyoming Mining & Metals
38	Southwestern New Mexico	84	Balcones
39	Tri-State	85	Hudson-Mohawk
40	Upper Peninsula	86	Williston Basin
41	Utah	87	Saudi Arabia
42	Washington, D. C.	88	Appalachian Petroleum
43	Wyoming	89	Northern Oklahoma
44	Spindletop	90	Utah Coal
45	Florida	91	Sumatra
46	Philippine		

50 Alaska	20 Minnesota
50 Adirondack	56 Mississippi
88 Appalachian Petroleum	21 Montana
2 Arizona	22 Nevada
58 Arkansas	23 New York
84 Balcones	67 New York Petroleum
66 Billings Petroleum	64 Niagara Frontier
3 Block Hills	89 Northern Oklahoma
4 Boston	25 North Pacific
7 Caracas	24 North Texas
5 Carlsbad Potash	26 Ohio Valley
6 Central Appalachian	27 Oklahoma City
60 Central New Mexico	28 Oregon
7 Chicago	63 Panhandle
79 CIM-MME Calgary	29 Pennsylvania-Anthracite
82 CIM-MME Edmonton	30 Permian Basin
8 Cleveland	31 Philadelphia
9 Colorado	46 Philippine
57 Colorado Plateau	32 Pittsburgh
10 Columbia	81 Roswell
11 Connecticut	33 St. Louis
78 California Coastal	34 San Francisco
55 Dallas	59 San Joaquin
12 Delta	87 Saudi Arabia
65 Denver Petroleum	80 Snyder
13 Detroit	35 Southeast
14 East Texas	36 Southern California
70 Eastern Venezuela	53 South Plains
5 El Paso	37 Southwest Texas
71 Evangeline	48 Southwestern Alaska
45 Florida	38 Southwestern New Mexico
54 Fort Worth	44 Spindletop
77 Four Corners	91 Sumatra
73 Great Bend	39 Tri-State
6 Gulf Coast	74 Upper Mississippi Valley
61 Hobbs	40 Upper Peninsula
85 Hudson-Mohawk	75 Uranium
62 Hugoton	41 Utah
68 Illinois Basin Petroleum	90 Utah Coal
17 Kansas	42 Washington, D. C.
18 Lehigh Valley	49 West Central Texas
51 Lima, Peru	72 Western Venezuela
69 Los Angeles Basin	86 Williston Basin
52 Lou-Ark	43 Wyoming
47 Mexico	83 Wyoming Mining & Metals
19 Mid-Centint	

MINING ENGINEERING — SME's MAGAZINE

MINING ENGINEERING is the official magazine of the Society of Mining Engineers of AIME. Published monthly, it is one of the leading publications serving the mineral industry. As a member of SME you receive a subscription.

History: As is true of many features of the Society, MINING ENGINEERING, in its present form, is an outgrowth of developments during the 89-year history of the Institute. As was quoted in the Section *What Is SME?*, publication of technical information and its circulation among members has always been one of the primary purposes and functions of this professional organization in the mineral industries.

Actually, the first AIME publication appeared in 1871, the founding year, and was the first of many *Transactions* volumes (Vol. 214 for SME papers will appear in 1960). The *Transactions* contain contributions to the permanent technical literature on engineering and technology in the industry. In addition, at various times throughout Institute history, these technical contributions have been distributed as individual papers and quarterly in the *Technologies*, originally published in the 1930's.

It was recognized fairly early in AIME history that any vigorous and growing organization must keep its membership informed not only of its own activities but also of the newsworthy events of the industry. For this reason, the *AIME Bulletin* was started in 1905. At first bimonthly, it became a monthly in 1908. During its years of publication, the *Bulletin* contained such data as news of Institute meetings and business affairs, lists of new members, various announcements and notices of general interest, and advertising.

MINING AND METALLURGY became

its hardy successor (formally in January 1920) as the regular monthly magazine of the Institute. For many years this publication served as a cohesive element in AIME affairs; it went to all members and contained news material of interest to all. It was an aggressive, commercial publication, containing, in addition to professional news, articles of general engineering interest.

As the Institute grew in size and broadened in scope, it became increasingly evident that MINING & METALLURGY was either to become too broad in format and content to satisfy the many diversified interests of all its members or too bulky and cumbersome to be economically feasible in the future.

Therefore, in 1949 three new monthly magazines came into being: MINING ENGINEERING, JOURNAL OF METALS, and JOURNAL OF PETROLEUM TECHNOLOGY, each of which today serves as official publication of its Society within AIME. MINING ENGINEERING then—as now—served the interests of the industry: covering topics of interest to those engaged in "mining geology and exploration, mining and beneficiation of metallic and nonmetallic ores and minerals, and in the mining, preparation, and utilization of coal," to quote from the initial editorial in January 1949.

Organization Today: MINING ENGINEERING in its present form serves three functions for its readers.

First, the magazine serves as a digest of sources of information. Included in the front section are notices of coming events; jobs; a comprehensive survey of current literature in the field, published here and abroad; abstracts of papers published and presented at meetings; reports of recent developments and publications by manufacturers; and in each issue, a summary of industry news.



MINING ENGINEERING provides, as its core, an article section containing coverage of all phases of mineral industry activity.

The third function of the monthly is presented in a newspaper-type section in the back. This provides coverage of professional and Society affairs, meetings past and future, news of people, and also contains the largest directory of services available in the industry.

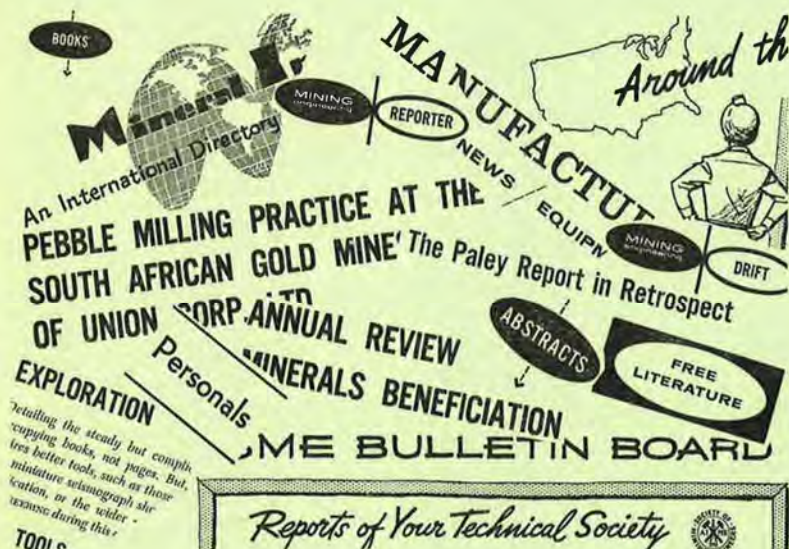
In addition to its regular functions, MINING ENGINEERING performs a number of once-a-year services. In July SME uses its monthly journal as its vehicle for distribution of its annual, complete Membership Directory. Late in the year, SME again uses the magazine to furnish members with as complete data (program and paper abstracts) as possible on the forthcoming Annual Meeting, held each February.

MINING ENGINEERING also serves members of the Society by presentation of an Annual Review, devoted to summary of industry developments and progress in the year past as well as prognostications for the future.

SME's Programs: Its monthly journal is part of the overall Society publications program which includes preprints, magazine, and the annual *Transactions* volume.

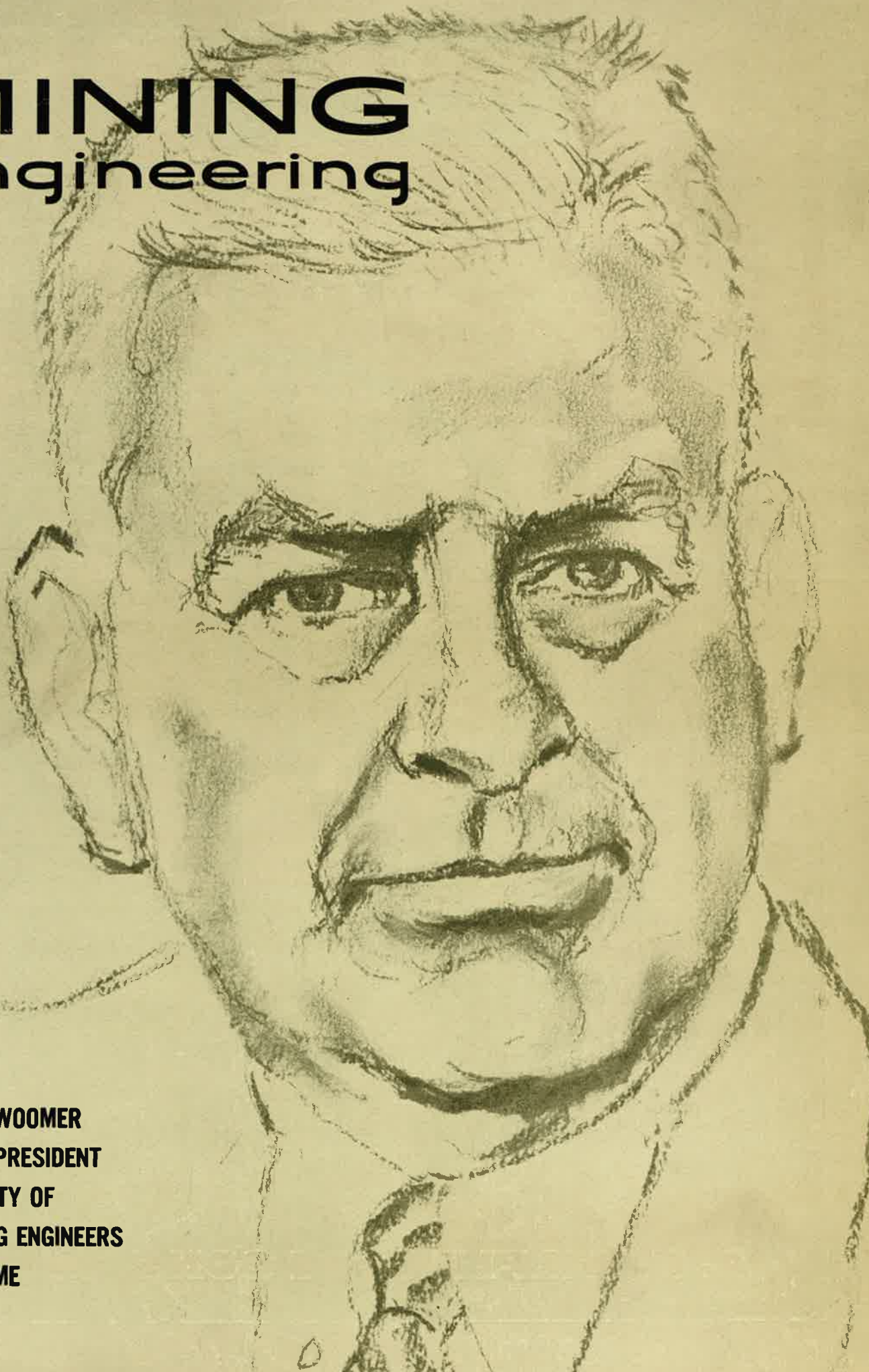
Each of these three media fulfills a specific role: 1) Preprints are intended for rapid dissemination at low cost of information presented at meetings. The Preprint program is set up so that not only members attending meetings, but also those who could not, can have the text of papers presented as quickly as possible. 2) The monthly magazine performs the three functions outlined above, as well as providing a media for "special" information or service. 3) The annual *Transactions* fulfill their historic role as reference volumes and a consistent series in the permanent technical literature of the mineral industries.

Thus, through its publications, SME serves you, its members.



MINING engineering

MARCH 1959



**J. W. WOOMER
1959 PRESIDENT
SOCIETY OF
MINING ENGINEERS
OF AIME**

SOCIETY OF MINING ENGINEERS PRESIDENT IN 1959



J. W. Woomer

J. W. Woomer, President of the Society of Mining Engineers for 1959, is an engineer who planned his career from high school onward. His goal was his own consulting firm, J. W. Woomer & Associates, which now exists in Pittsburgh. As a sophomore he began to build experience starting as a surveyor during summer vacations. At various times in his career he has worked at all levels in the mining industry

—from day laborer to mine manager. "I would recommend a similar pattern for any young man seeking a career in mining," he has declared:

Born in Philipsburg, Pa., Mr. Woomer received a B.S. from Pennsylvania State University in 1925 and an E.M. in 1931. His first full-time job was as assistant to the superintendent in the Georges Creek mining field near Frostburg, Md. He later became assistant chief engineer at the Pittsburgh Coal Co. and worked for a time for the Hanna Coal Co. When the two firms merged with Consolidation to become the largest coal mining company in the world, the new firm became his first consulting client.

Mr. Woomer has gathered wide experience all over the world. He has had mining assignments in Alaska, Argentina, Australia, Canada, Chile, China, Colombia, France, Germany, Greece, India, Manchuria, Mexico, Turkey and the United Kingdom. He has learned that many mining problems stem from public relations as well as technology, and has developed sound, practical theories from his handling of both. Although he credits John L. Lewis with the present high state of mechanization in the mining industry, Mr. Woomer strongly objects to the idea of unions for engineers. "A young man must decide whether he is going to be an educated individualist or an employee who needs the protection of a 'mother' organization."

He feels a professional attitude is essential for a mining engineer, and has approached his own work consistently with this in mind. Equal in importance to technical competence, Mr. Woomer believes, is active participation by every engineer in his professional society. He himself has long been an active member of the AIME Coal Division and in 1958 was its Chairman. He is also director of the Engineering Society of Western Pennsylvania and is a member of several other mining societies. He feels that the direct measure of a society's value is in the service it renders to its members—not just the tangible services such as publications and meetings, but also the intangible benefits that come from contact with one's fellow engineers, getting to know them and getting to be known by them.

The reorganization of AIME into the Society of Mining Engineers, the Society of Petroleum Engineers, and The Metallurgical Society, he believes, has been and will be increasingly a help to all AIME members in terms of increased services of all kinds. He assumed leadership of the Society of Mining Engineers of AIME in February with a deep sense of dedication and the resolve to bring these increasing benefits to every member of the Mining Engineering profession.

MINING engineering

MARCH 1958



S. D. MICHAELSON
1958 PRESIDENT
SOCIETY OF
MINING ENGINEERS
OF AIME

Society of Mining Engineers President in 1958



Stanley D. Michaelson

STANLEY D. MICHAELSON, President of the Society in 1958, is a native New Yorker. He attended Lehigh University, receiving a B.S. degree in mining engineering in 1934, later doing graduate work there. Although he had done some prospecting in northern Ontario as a student, he began his formal career as a field engineer in the Mining Dept. of

Bethlehem Steel Co. Mr. Michaelson was associated for six years with Allis-Chalmers Mfg. Co., first in the minerals research laboratories in Milwaukee, and later as metallurgical engineer and field engineer.

During World War II Mr. Michaelson served five years in the Army as lieutenant colonel in the Ordnance Department. Resuming his career after the war, he rejoined Allis-Chalmers as director of the Basic Industries Research Laboratories. In 1947 he joined Tennessee Coal & Iron Div. of U. S. Steel Corp. as a special engineer in the coal mines division. Subsequent promotions led to the position of chief engineer—coal mines and later, chief engineer—raw materials.

One of the highlights of his activity at TCD was the completion of the 20,000-tpd Concord mine project. Under his direction as chief engineer—coal mines this project marked the first integration of rock bolting in a mining scheme as a regular production tool, and the project also utilized the largest slope belt installed to that date.

In September 1954, Kennecott Copper Corp. announced Mr. Michaelson's assignment as chief engineer of the Western Mining Divs. with headquarters in Salt Lake City, a post he now holds.

An active AIME member, Mr. Michaelson served as Chairman of MBD in 1954, and in the same year was elected a Director of the Institute. Some of his technical articles were published in MINING TECHNOLOGY and dealt with ball and rod mill operations.

Society of Mining Engineers Officers in 1958

President-Elect



J. W. WOOMER

J. W. Woomer, President-Elect, will become President of the Society in 1959 at the Annual Meeting in San Francisco. Well known in mining and coal circles, Mr. Woomer is head of his own consulting firm, J. W. Woomer & Assoc.

A native of Philipsburg, Pa., he received a B.S. from Pennsylvania State University in 1925 and an E. M. in 1931. During his summer vacations he worked in the central Pennsylvania coal fields and later in Maryland. Mr. Woomer's earliest professional association was with the Pittsburgh Coal Co. and he was later active in the Ohio fields during a period with Hanna Coal Co. He formed his consulting firm in 1940.

Mr. Woomer's activities have taken him to almost all states in the U. S.; to Canada; many countries in South America and Europe; and to

China, India, and Australia in the Far East. His professional work has been concerned with coal, lignite, clays, potash, copper, uranium, iron, oil, sands, and shales.

An active member of the SME Coal Division, Mr. Woomer had been serving as Chairman-Elect, taking office as Chairman of the Division in 1958. In addition to his AIME association, Mr. Woomer is a director of the Engineering Soc. of Western Pennsylvania and a member of Tau Beta Pi, honorary engineering society; Sigma Gamma Epsilon, mining society; and the Explorers Club of New York City; Pittsburgh Athletic Assn; and the University Club.

Elmer A. Jones, now Past-President, was the first President of SME as established under the reorganization of AIME in 1957. He is manager of Southeast Missouri Div. for St. Joseph Lead Co. with headquarters in Bonne Terre, Mo.

Born in Minneapolis on Aug. 11, 1902, Mr. Jones attended public schools in his native city and graduated from the University of Minnesota School of Mines in 1924 with a degree in mining engineering. He began his career as an engineer with the Minnesota State Highway in 1924 and in 1925-1926 he worked for what is now part of Tennessee Copper Co. in Ducktown, Tenn.

Elmer Jones began his long affiliation with St. Joe in 1926. Before assuming his present post of division manager, he had served the company, successively, as mine surveyor, safety inspector, mine engineer, mine superintendent, and assistant

Past-President



E. A. JONES

general mine superintendent. During the years with St. Joe, Mr. Jones participated from the very inception of mine mechanization in the district. Two of his AIME publications have dealt this subject and he is considered an authority on trackless mining operations.

Besides his varied career in engineering and his contributions to the professional society, Elmer Jones has been active in civic affairs. In his hometown, Bonne Terre, he has served on the local school board, as well as filling the office of president for seven years. He has been a participant in such diversified groups as the Rotary Club, the Executive Council of Boy Scouts (St. Louis), Rivermines Engineers Club, and the Missouri Athletic Club.

MINING engineering

MARCH 1957



ELMER A. JONES
FIRST PRESIDENT
SOCIETY OF MINING ENGINEERS OF AIME



Elmer A. Jones

ELMER A. JONES, first president of the Society of Mining Engineers of AIME, is Manager of Southeast Missouri Div. for St. Joseph Lead Co. He truly represents the miners of the Society.

Born in Minneapolis on Aug. 11, 1902, he attended public schools in his native city and graduated from the University of Minnesota School of Mines in 1924 with a degree in mining engineering. Mr. Jones began his career as an engineer with the Minnesota State Highway in 1924 and in 1925-1926 he worked for what is now part of Tennessee Copper Co. in Ducktown, Tenn.

Elmer Jones began his long association with St. Joe in 1926. Before assuming his present position of division manager, he had served the company, successively, as mine surveyor, safety inspector, mine engineer, mine superintendent, and assistant general mine superintendent. During his long career with St. Joe he participated from the very inception of mine mechanization in the district. Two of his AIME technical publications have dealt with this subject and he is considered an authority on trackless mining operations.

Besides his varied career in engineering and his contributions to the professional society, Mr. Jones has been active in civic affairs. His home is in Bonne Terre, Mo., where he has served as a member of his local school board, as well as filling the office of president for seven years. He has been a participant in such diversified groups as the Rotary Club, the Executive Council of Boy Scouts (St. Louis), Rivermines Engineers Club, and the Missouri Athletic Club.

Mr. Jones married Celeste Phillips Jones of Rogersville, Tenn., and they have three sons, Stanley Gordon, James Irvin, and John Thomas; a daughter, Celeste Phillips Jr.; and, to date, one daughter-in-law. When not busy with his many professional and civic activities, he enjoys working in his garden—its tulips and shrubs being his specialty—and occasionally manages to squeeze in a fishing trip.

