

BLACK DIAMONDS

WEST VIRGINIA

DEPARTMENT OF MINING ENGINEERING | BENJAMIN M. STATLER COLLEGE OF ENGINEERING AND MINERAL RESOURCES | WEST VIRGINIA UNIVERSITY®

MESSAGE FROM THE CHAIR



KECOJEVIC

Dear Alumni and Friends,

Greetings from Morgantown! I do hope you are all staying safe and healthy. It was an exciting and very productive year for the Department with so many achievements, accomplishments and activities of our students and faculty. I do hope that you will enjoy reading them. I am happy to inform you that we successfully completed ABET evaluation in the fall 2021 semester, and our program was without any deficiencies, weaknesses or concerns. Many thanks to John Craynon who assembled an excellent report with the help of faculty in the Department.

Our mining engineering students landed summer 2021 internships and full-time jobs across the coal, metal and non-metal sectors of our industry. It is gratifying to have our students working in a variety of commodities and gaining valuable experience during the summer in 18 states across the United States (West Virginia, Virginia, Maryland, Arizona, New York, North Carolina, Ohio, Pennsylvania, Alabama, Indiana, Iowa, Nevada, New Jersey, Tennessee, Texas, Utah, Washington D.C. and Wisconsin) and internationally (Oman). Our students worked for a number of companies (several of them being Fortune 500 companies) including Arch Resources, Luck Stone, Nevada Gold Mines, Freeport-McMoRan, B&N Coal, Barrick Gold, Vulcan Materials, Kiewit, Pennsy Supply, Blackhawk Mining LLC, Warrior Met, Alliance Resources Partners, CEMEX, Martin Marietta, Alpha Metallurgical Resources, East Fairfield Coal Co., Hallett Materials (CRH Subsidiary), Laurel Aggregates, Nyrstar, Capstone Mining Corp., Rio Tinto Kennecott, Whiting-Turner, Dominion Energy, Gall Zeidler Consultants, Fincantieri Marine Group, Bowen Engineering Inc, Kleinfelder and Manhattan Construction.

I have included several stories on their summer internship experiences and I hope you enjoy reading them.

It has been encouraging to conduct industry information sessions and have many companies come back to interview our students. We welcomed Martin Marietta, RESPEC, Blackhawk Mining, CEMAX, American Consolidated Natural Resources, Alpha Metallurgical Resources, Pennsy Supply, Rosebud Mining, Coronado, Piedmont Lithium, Arch Resources, Nevada Gold Mines and Robindale Energy.

We are very proud that we have almost 24 percent female students in the Department. We have a student chapter of Women in Mining (WIM), and this professional society is very active in inviting guest speakers, participating in WIM national meetings and recruiting events. Our goal is to increase female enrollment in the Department to at least 40 percent in the next five years. We currently have one female faculty member (out of six total tenure-track faculty in the Department), and our goal is to continue to diversify the Department.

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MISSION STATEMENT

The Statler College mission is to prepare students for success in their professional careers; to contribute to the advancement of society through learning, discovery, extension and service; and to stimulate economic well-being in West Virginia and the world through technical innovation, knowledge creation and educational excellence.

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MESSAGE FROM THE CHAIR

The quality of WVU mining engineering is exceptional. Our students take accolades, honors, and recognitions at national competitions such as senior design, mine rescue, and graduate contests. For example, our students have taken first or second place in the SME/PCMA Senior Mine Design contest 14 times in the last 20 years. Our students have taken first place in Carlson Senior Design Project competition three times in last four years. We have won mine rescue national championships four times in the last five years. Graduate students have taken first or second place in graduate student competitions at the national level two times in last three years.

I advise and encourage students to apply and compete for many external scholarships that are awarded to mining engineering students. I am happy to report that our students won a number of national scholarships and awards; they make us very proud of their achievements. I am also thankful to many of our alumni, friends and donors who established a strong scholarships support and endowments for our students over the years.

In October, we had the honor of welcoming George J. Schuller Jr., Chief Operations Officer of Compass Minerals, as the speaker for the William N. Poundstone Lecture. George shared a valuable lecture on "Identifying Success from Failure: A Real Life Lesson" with the students, faculty, alumni and friends of the Department.

Please remember that your feedback, observations and experience with the WVU Department of Mining Engineering, either in person, by e-mail or by phone, is always welcome and much appreciated. My office door is always open, and you are welcome to share information about any aspect of our Department. I will be listening to your suggestions to continuously improve. The faculty and staff of the Department are fully committed to provide all our undergraduate and graduate students with a friendly, conducive and supportive educational environment.

As the chair, and on the behalf of the faculty, staff and students, I thank you very much for your support and commitment to the West Virginia University Department of Mining Engineering.

I wish you all a safe, healthy and happy new year.

VLADISLAV KECOJEVIC

Robert E. Murray Chair and Professor
Department of Mining Engineering





Students and faculty at the William N. Poundstone Lecture on October 14, 2021 at the Erickson Alumni Center.

William N. Poundstone Lecture



George J. Schuller Jr., Chief Operations Officer of Compass Minerals, delivered the William N. Poundstone Lecture on October 14, 2021 at Erickson Alumni Center. His lecture was on “Identifying Success from Failure: A Real Life Lesson.”

Schuller has more than three decades of experience in senior management roles in both surface and underground mining operations, beginning his career as an underground laborer in southern West Virginia. Prior to joining Compass Minerals, he served as president of Peabody Australia. His experience also includes global roles in continuous improvement and technical services where he integrated many emerging technologies from markets such as South America and the Asia Pacific into useful mining practices.

Schuller has a degree in mining engineering from West Virginia University and has held professional memberships and board positions with several organizations such as board member of Minerals Council of Australia and Queensland Resources Council, chair of the COAL21 Fund, director of Australian Coal Association and president of the National Mine Rescue Association. In 2018, Schuller received an honorary doctorate degree in mining engineering from WVU for his contributions to the mining industry. He also has an MBA from the University of Charleston.

The Department of Mining Engineering established the William N. Poundstone Lecture Series in 2000 to honor Poundstone, a distinguished alumnus of the Department, and to bring mining industry experts to campus to share their expertise with students and faculty. Poundstone, who passed away in 2015, was inducted into the National Mining Hall of Fame and Museum in 2016.

“George is a dedicated champion of diversity, belonging, inclusion and equity in the workplace,” said Vladislav Kecojevic, Robert E. Murray Chair and professor in the Department of Mining Engineering. “We were excited to have him lead this discussion and bring a new industry insight to WVU.”

Department News

Kecojevic named to prestigious SME class of 2022 fellows

An honor presented to only the best in the profession, **Vladislav Kecojevic**, the Robert E. Murray Chair and Professor of mining engineering in the Statler College, has received the Society for Mining, Metallurgy, and Exploration's prestigious Fellow Award.

SME presents its Fellow Award to a select few members who have made sustained and notable contributions to the society and industry. Only 1.8% of the more than 15,000 memberships spanning more than 100 countries receive this prestigious award.

"I am very honored to be elected as an SME Fellow," Kecojevic said. "It is a distinct honor by my professional peers, and it brings a significant recognition to me personally, the Department of Mining Engineering and West Virginia University."

SME Fellows are nominated by existing Fellows in recognition of their distinguished contributions to the profession. The committee may select four or fewer members to be elevated to the class of Fellows per year, and the committee's selection of nominees is submitted to the SME Board of Directors for approval.

The designation to the class of 2022 Fellow's recognizes Kecojevic's contributions and commitments to global engagement and service throughout his career.



A member of the Statler College faculty since 2010 and chair since 2018, he currently serves as the Secretary-General of the Society of Mining Professors (SOMP), where his tenure as President from 2015-2016 recorded an all-time high in memberships. Additionally, he served as the President of West Virginia Coal Mining Institute and on the Board of Directors of the SME Pittsburgh Section.

Among the many honors he has received are the 2019 SME Coal and Energy Division Distinguished Service Award, the Medal of Honor by TH Georg Agricola University, Germany, and the 2017 Erskine Ramsay Medal Award by the American Institute of Mining, Metallurgical and Petroleum Engineers.

A member of SME since 2001, he served as the chair of multiple committees including the 2015 SME program chair, 2013 SME Coal and Energy Division chair, Robert E. Murray Innovation Scholarship Committee chair and of the SME Distinguished Member Award Committee.

Kecojevic will be formally presented with the award at the 2022 SME MINEXCHANGE SME Annual Conference and Expo annual awards dinner in Salt Lake City, Utah, this March.

"I am very pleased that Vlad Kecojevic was selected as SME Fellow," said **Pedro Mago**, Glen H. Hiner Dean of the Statler College. "Election to Fellow grade by an engineering society is the ultimate recognition by peers of exceptional technical achievement. We are proud to have Vlad as a member of the Statler College and as chair of our Mining Engineering Department. Vlad's dedication to his students and his passion for the field ultimately made him deserving of this prestigious designation."

Mehta, Tulu named Richards Faculty Fellows in Engineering

Two assistant professors at West Virginia University have been named J. Wayne and Kathy Richards Faculty Fellows in Engineering.

Piyush Mehta, from the Department of Mechanical and Aerospace Engineering, and **Berk Tulu**, from the Department of Mining Engineering, were appointed to the three-year positions, which provides funds to support and grow their respective research programs.

The fellowships are the result of a \$1 million gift made in 2014 by alumnus **J. Wayne Richards** and his wife, Kathy. The endowment at WVU provides flexible funds to allow the College to hire, retain, reward and recognize faculty members who have not yet achieved tenure.

"Kathy and I are honored to have the ability to support and recognize these two outstanding young faculty members as they work to grow their research profiles," Richards said. "With that, we look forward to the opportunity to support the following faculty members. Kathy and I are exceptionally proud of the Statler College and we look forward to helping our faculty members research endeavors."

Mehta plans to use this opportunity to further his research in artificial intelligence.

"Wayne and Kathy Richards are WVU alumni and wholehearted supporters of the WVU community and the state of West Virginia," Mehta said. "It is my esteemed honor to have myself carry their names. The support provided by the fellowship gives us the opportunity to further grow our research on the application of artificial intelligence for advancing space sciences and engineering and raise the status of WVU and the state in the field."

Tulu noted honoring Wayne and Kathy's legacy by using the funds to continue developing mine safety in West Virginia and the United States.

Mehta received his bachelor's in aerospace engineering in 2009 and his doctorate in 2013, both from the University of Kansas. Mehta's research focuses on artificial intelligence for advancing space sciences and engineering.

Tulu received his bachelor's in mining engineering from Middle East Technical University in 2004, later coming to WVU in 2009 to receive his master's and doctorate degree in mining engineering. His research focus areas include ground control, rock mechanics, geomechanics and field monitoring/instrumentation technologies.



"The Richards Faculty Fellows in Engineering is a fantastic program, and I am extremely grateful to Wayne and Kathy Richards for their strong and continued support to our College and our faculty," said **Pedro Mago**, Glen H. Hiner Dean of the Statler College. "Piyush and Berk are exceptional faculty members in the College and very deserving of this honor. I am proud of their accomplishments and I look forward to their continued success."

Natives of South Charleston, West Virginia, the Richards' have a history of support to the Statler College and to WVU athletics. In 2012, the pair pledged \$250,000 to the Statler College Building Fund to help fund construction of its new Advanced Engineering Research Building. In 2013, they pledged \$1.25 million to the Mountaineer Athletic Club for enhancements to the football complex.

Richards has dedicated years of service to the College and University on the Statler College Advisory Committee and WVU Foundation Board of Directors. After earning his bachelor's degree in mining engineering from WVU in 1981, he spent 25 years in a number of senior operational, and sales and marketing positions with Schlumberger. He currently serves as president and CEO of GR Energy Services in Sugar Land, Texas. Kathy earned her degree in dental hygiene at WVU Tech in Montgomery.

DEPARTMENT AWARDS AND SCHOLARSHIPS

The Charles T. Holland Award: **Alec Elliott** (1)

The Charles E. Lawall Award: **Heriberto Perez** (2)

MRAC Award: **Mackenzie Stone** (3)

SME Officers Mining Engineering Student Award: **Mackenzie Stone** (3)

The Old Timers Award: **Samantha Fowkes** (4)

The West Virginia Coal Mining Institute Award: **Maxwell Schaefer** (5)

The Careers in Coal Award: **Brian Welsh** (6)

Mining Engineering Faculty Awards (undergraduate): **Dawson Apple** (7); **Emily Carroll** (8) and **Gabriela Kosakowski** (9)

Mining Engineering Faculty Awards (graduate): **Mustafa Suner** (10) and **Yun Zhao** (11)

The Calvin Kidd Fellowship Award: **Cory Krall**

Outstanding Faculty Member: **Qingqing Huang**

SME Officer Outstanding Faculty: **Brijes Mishra**

Watson Scholarship: **Zoey Carper, Jared Broyles, Kayla Gibson, Takoda Kelly, Mackenzie Stone, Garrett Boram**

Department of Mining Engineering Scholarship: **Alec Elliott, Brian Welsh, Dime Keita, Dmitri Agnew, el Hacen Saleh, Emily Carroll, Emily Horowitz, Gabriela Kosakowski, Jared Broyles, Maxwell Schaefer, Megan Sibley, Samantha Fowkes, Shannon Seitz, Takoda Kelly**

Wells Fargo Energy Group Scholarship: **Alec Elliott, Nyeer Burley, William Burow**

Syd S. and Felicia F. Peng Family Endowed Scholarship: **Alexis Hartman, John Samonsky**

Hardy Tait COMER Endowed Scholarship: **Alexis Hartman, Dmitri Agnew**

Research Trust Fund Wells Fargo Endowment Scholarship: **Andrew Martin, Brett Duft, El Hacen Saleh, Emily Carroll, Emily Horowitz, Maxwell Schaefer, Megan Sibley, Samantha Fowkes**

Doris H. and J. Banner Bise Memorial Scholarship in Mining Engineering: **Chase Mowery**

Mineral Resources Alumni Chapter Mining Engineering Scholarship: **Chase Mowery, Dylan Powers, William Burow**

James Sterling Farinash Scholarship: **Christopher Prince**

Larry Family Scholarship: **Colin Bourn**

Robert C. Long Engineering Scholarship: **Colin Bourn**

Ralph and Geraldine F. Dado Mining Engineering Endowed Scholarship: **Connor Baker, Lucas Poe**

CNG Endowed Engineering Scholarship: **Connor Baker**

Peter's Creek Coal Association Scholarship: **Dawson Apple**

Royce J. and Caroline Baker Watts Family Endowed Scholarship: **Dawson Apple**

Robert L. Raines Mining Scholarship: **Djime Keita, Erica McCauley, Lucas Poe, Richard Campbell**

Raymond H. Blowers, Jr. Scholarship: **Donavon Key**

Lloyd Selby Student Aid College of Engineering: **Dylan Powers**

Remember the Miners Scholarship for Mining Engineering: **Gabriela Kosakowski, Shannon Seitz**

Julius W. Singleton, Jr. Scholarship: **Heriberto Perez, Mackenzie Stone**

Raymond E. Salvati Memorial Scholarship: **Jared Broyles**

A. Wahab and Judith B. Khair Endowed Scholarship: **Jared Morse**

R. Larry Grayson Endowed Scholarship: **Jared Morse**

Terry and Frances Seelinger Scholarship: **Mackenzie Stone**

Jack White Memorial Scholarship: **Maureen Ghee**

McKamish Endowed Scholarship: **Maxwell Gustafson**

Warren D. and Grace W. Sharpenberg Scholarship: **Richard Campbell**

Jack and Pat Caffrey Endowed Scholarship: **Takoda Kelly**

Westmoreland-Sprague Scholarship: **Zoey Carper**

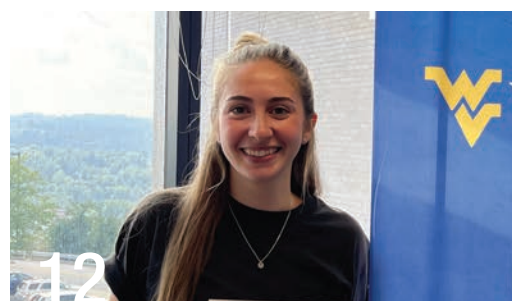
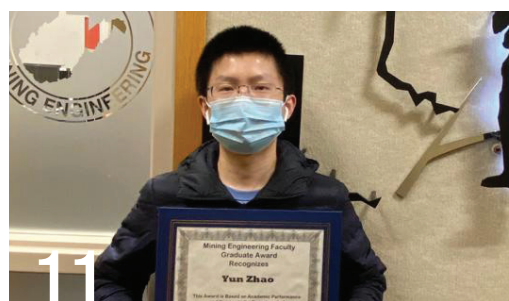
Joseph W. Leonard IV Memorial Scholarship: **Mackenzie Stone** (12); **Dawson Apple** (13); **Layne Gumowski** (14), **Joshua Riffle** (15)

Mark Sansone Memorial Scholarship: **Takoda Kelly** (16)

McElroy Scholarship: **Jared Broyles** (17)

Charles R. Nailler Memorial Scholarship: **Kayla Gibson** (18)

Northern WV Coal Preparation Society Scholarship: **Takoda Kelly; Mackenzie Stone; Joshua Riffle**



STUDENTS AND FACULTY ON THE MOVE

Mining Engineering students and faculty have attended a number of professional conferences and visited several mines in 2021. Our appreciation and thanks are extended to our alumni, friends and mine managements for hospitality and hosting our students and faculty.

Underground mining engineering class students had an opportunity to visit Arch Resources underground longwall mine in West Virginia. (1)

A group of 24 students and faculty visited Luck Stone aggregates mine in Virginia, near Washington, D.C. (2, 3)

Aggregates production class students had an opportunity to visit Laurel Aggregates underground limestone mine in Pennsylvania. (4, 5, 6)

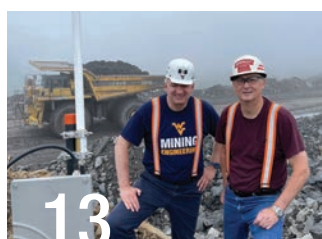
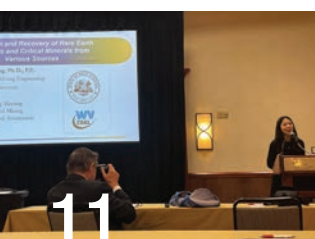
Twenty-one students attended this year's SME/PCMA meeting in Canonsburg, Pennsylvania in October. (7)

A group of 16 students and faculty attended 2021 West Virginia Coal Mining Institute and West Virginia Coal Association Meeting, and Coal Hall of Fame Ceremony in Morgantown, West Virginia (8). They had the opportunity to meet

with industry professionals at the conference along with Benjamin Statler (9) and West Virginia Governor **Jim Justice** (10 – photo courtesy of Bill Reid).

Qingqing Huang gave the presentation on extraction and recovery of rare earth elements and critical minerals from various sources during the 2021 West Virginia Coal Mining Institute and West Virginia Coal Association Meeting in Morgantown, West Virginia (11), while **Berk Tulu** presented a robotic system to inspect stone mine pillars at the 2021 SME/PCMA meeting in Canonsburg, Pennsylvania (12).

Department Chair **Vladislav Kecojec** had the opportunity to conduct his research project on dust monitoring at the surface coal mine (13) and coal loading facility (14) in West Virginia, visit lignite coal mine in Serbia (15) and gold mine in Colombia (16), attend the Coal Symposium in Charleston, West Virginia (17) and the annual meeting of international Society of Mining Professors in Colombia (18). He gave presentations on the WVU mining engineering graduate program to students and faculty at the Universidad Nacional Mayor de San Marcos in Lima (19) and Universidad Nacional del Altiplano in Puno, Peru (20).



A WHIRLWIND FIRST YEAR

BY JOHN CRAYNON



My first year in the Department of Mining Engineering at WVU has been full of a great deal of activity. As a part of my teaching load, I got to know the graduating class of spring 2021 pretty well. Seeing their hard work in the senior design classes, advising them on career choices and other facets of life, and walking with them through the ever-changing landscape created by COVID made for a wild ride. Interacting with students is absolutely the best part of my job. This fall has brought a new class of seniors and a new excitement to watch them wrap up their undergraduate experience.

In addition to teaching, I also had the opportunity to get involved in committees within the college related to undergraduate academic standards and academic affairs, such as new courses and program changes. These committees gave me the opportunity to get to know the administration in the Statler College (particularly Dean Pedro Mago and Associate Dean for Academic Affairs, David Wyrick) and many faculty members in other departments.

As a teaching assistant professor, part of my role is to help ensure that the Department has adequate course options for the students. Working with Vlad, I submitted proposals and got approval for two new undergraduate courses, MINE 441 – Mine Pollution Control (which will be offered in Spring 2022) and MINE 451 – Mining Business Practices (which is slated for Fall 2022). These courses spring from the feedback of students and alumni on how the program could be enhanced, and it's great to be a part of implementing these suggestions for improvement. We have also submitted advanced versions of both classes to be approved as graduate courses for masters' and PhD students.

When I arrived in Morgantown last fall, one of my assignments was to lead the charge for the bachelor's of science, mining engineering program ABET review. As you may know, ABET is the organization that provides accreditation for engineering and other programs. This review happens every six years and requires development of a report detailing the program structure, courses, faculty, students, accomplishments, and continuous improvement, among other things. With the cooperation of all the faculty and staff in the Department and in coordination with the College, I was able to prepare our report and all the supporting materials. In September, ABET conducted a virtual visit to WVU, reviewing 15 programs, including mining engineering. At the end of the visit, the bachelor's of science in mining engineering program was complimented for our dual major programs with geology and civil engineering, and no shortcomings were found.

This year's senior design cohort consists of seventeen students in five teams. Two of the teams are working on coal mining projects, two on aggregates, and one on copper. The copper team has taken the plunge into the new SME student metals design competition. Additionally, one of the aggregates teams has, with support of a couple of additional team members, submitted their entry in the SME aggregates competition. I'm proud of the students who are representing WVU and the mining engineering program with these efforts. It's clear to me that the internship opportunities that many of our alumni and supporting companies continue to provide our students have given them the practical background necessary to take on these challenges.

I'm currently working on a report for the Board of Governors' five-year program review. This cycle, the review is focusing on our undergraduate and masters' programs. Based on the successful ABET review, the undergraduate section of the report is straightforward. While the focus of our graduate program is on producing PhDs, our program continues to produce masters' degrees and has a number of fine students currently pursuing a degree at that level. I think it will be easy to demonstrate to the Board of Governors that the program is successful.

WVU MINING ENGINEERING STUDENTS WIN NATIONAL SENIOR DESIGN COMPETITION

A team of three West Virginia University mining engineering students were face with a lofty feat—create a plan for a full-scale operating mine from the ground up using knowledge acquired from their varied academic work and summer mining internships as part of the 24th Annual Carlson Software National Senior Design Competition.

The Statler College students were given 30 core holes from Mettiki Coal, which allowed the students to map the geology, design a mine and all facilities associated with it. From there, the students had to determine if constructing the coal mine would be a good investment or not, as if it were a real-life project in the students' careers.

This joined effort earned **William Burow**, **Samantha Fowkes** and **John Dickson** first place in the prominent mine design competition.

"This was an important project for us to bring all of the courses we have covered over the years, using them together to make a pre-feasibility study," Burow, a Friendsville, Maryland, native said. "The College provided us with all of the software we needed, as well as making sure to bring in plenty of people from the industry to help us and answer any questions we had."

Fowkes, a New Eagle, Pennsylvania, native, said achieving this accomplishment was a representation of every class the students took within the Department.

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"This project was important because we finally combined all of our knowledge gained over the last four years to create a product, we are proud of," Fowkes said. "We were able to represent every class that we took in the Department of Mining Engineering in our project which helped showcase how much we've learned and the importance of each class."

Dickson, originally from Salisbury, Maryland, said help from Statler College mining faculty was crucial to their success.

"This project establishes confirmation that you have retained the knowledge learned and can utilize that knowledge in a real-world application. Assistance from the professors in the Department was crucial to completing the project. Their assistance provided us the information to get past some of the complications that arose from this project," Dickson said.

The student's project was submitted for the competition by Statler College faculty **Dan Alexander** and **John Craynon**, based on the quality of their work.

"We encourage students to complete their capstone mine design projects as if they are evaluating a potential mining property for a client who needs a pre-feasibility study to decide if additional investment is justified," Alexander said. "This national award is a recognition of their significant accomplishments and I believe it will enhance their professional opportunities."

The Department of Mining Engineering has won the Carlson Software National Senior Design Competition six times since 2000, while also taking home second place three times and third place twice. In the same period, WVU took home 11 first places and three second places in the Society for Mining, Metallurgy and Exploration and Pittsburgh Coal Mining Institute of America's Senior Student Design Awards.

The Annual Senior Mine Design Competition has been held each spring semester since 1998. WVU students received \$2,000 for placing first ahead of Virginia Tech and the University of Alaska Fairbanks. WVU also took home software, training and a competition plaque.

While Burow is finishing his degree at the Statler College this fall, he has accepted a job with Mettiki Coal as the manager of environmental affairs in Oakland, Maryland, and Davis, West Virginia. Fowkes graduated with her bachelor's degree in mining engineering in May 2021 and hopes to start her career in a position that allows her to grow. Dickson will graduate this coming fall and plans to obtain his professional engineer license and a Master of Business Administration.



WVU WINS FOURTH SME MINE RESCUE COMPETITION

The Statler College Mine Rescue Gold Team took home its fourth straight first place finish in the Society for Mining, Metallurgy and Exploration – 2021 Eastern Collegiate Mine Rescue Competition.

WVU beat out teams from the University of Kentucky, Virginia Tech and a second team from WVU to win the event, which was held at the West Virginia Training Center in Julian, West Virginia.

The competition tested teams' ability to locate and rescue missing miners.

"Students must communicate what is found in the mine to make logistical decisions on how to handle mine fires, injured miners, irrespirable atmospheres, bad ground control conditions and mine flooding," **Joshua Brady**, director of mining and industrial extension and WVU Mine Rescue adviser said. "Then the students must correct those conditions systematically before removing any survivors."

In preparation for the competition, the team trained at WVU's Academy for Mine Training and Energy Technologies. Team members worked through problems designed by their trainers to teach them skills they would need to accomplish the goal of the given scenario.

"The students displayed unwavering problem-solving skills, clear communication and leadership for over two years," Brady said. "I'm appreciative of the students for attending practice on Tuesday and Thursdays at 6 a.m. They are asked to display hard work, dedication and passion toward mine rescue, and they have done everything we asked as trainers."

The team was led by senior mining engineering major **Jay "Bird" Pollock** from Pittsburgh, Pennsylvania. Joining Pollock on the team were **Max Schaefer**, **William Geldhauser**, **Ashton Crawford**, **Joshua Riffle** and **Mackenzie Stone**. Trainers include **George "Smurf" Rannenberg**, **Sean Rhodes** and **John Helmick Jr.**

"This was my last competition with the WVU Mine Rescue Team, and I couldn't be happier with the outcome," Pollock said. "Our success has shown me that with hard work and dedication, anything is achievable. All the team members and trainers have sacrificed so much. From showing up at the Dolls Run Mine Safety Training Facility at six in the morning for practice to spending our Sundays in the Mine Lab. This success can be attributed to the tireless efforts of the team and our dedicated trainers."

MINING ENGINEERING STUDENTS SELECTED FOR SCHOLARSHIPS BY GIMME FOUNDATION AND MARTIN MARIETTA

Mining engineering undergraduate students in the Statler College have been selected for scholarships by the Gimme Foundation and Martin Marietta to support their academic studies at WVU.

Eight mining engineering students have received a total of \$38,500 from the Gimme Foundation Board of Directors. To be selected for the scholarships, students were required to go through an extensive interview process, competing for scholarships ranging from \$1,500-\$8,000 per student.

The Gimme Foundation was established in 2004 to provide scholarships to mining engineering students enrolled at Pennsylvania State University and West Virginia University.

"I am grateful to the Gimme Foundation and Martin Marietta Materials who financially supported our students through these scholarships," Robert E. Murray Chair and Professor of Mining Engineering Vladislav Kecojevic said. "These funds make a significant positive impact on our students, and we thank them for continuous support over the years."

Gimme Foundation Scholarship Recipients

Gabriela Kosakowski, a senior mining and civil engineering student from Cleveland, Ohio.

"I appreciate being able to give 110% to my education," Kosakowski said. "Working throughout the school year is very challenging and I am thankful that I have the opportunity to direct my focus towards classes rather than how I will be able to pay for next semester's tuition."

Maxwell Schaefer, a senior mining engineering student from Medina, Ohio.

"As a student pursuing a degree in mining engineering, while paying my own way through college, the scholarship from the Gimme Foundation relieves financial stress," Schaefer said. "This has allowed me to focus my studies and work hard towards landing a dream job within the field of mining. I am forever thankful for the Gimme Foundation's graciousness towards me."

Jared Broyles, a senior mining engineering and civil engineering student from Princeton, West Virginia.

"The Gimme Foundation will help me to relieve the financial burden of school," Broyles said. "This will

give me the opportunity to focus on my degree and my future career."

Emily Carroll, a senior mining engineering student from Salisbury, Maryland.

"I am truly thankful for this scholarship to help relieve the stress from financial burden and be able to focus more on schoolwork and achievements," Carroll said.

El Hacen Saleh, a senior mining and civil engineering from Mauritania.

"The Gimme Foundation scholarship means a lot to me as it will help me reduce some of the financial loads along my journey of completing a bachelor's degree," Saleh said. "I am very grateful for this gift."

Jared Morse, a senior mining engineering student from Earleville, Maryland.

"My grandfather once told me that the value of education is priceless, and will forever be my greatest tool," Morse said. "With the cost of attending a four-year program getting higher, the generously awarded the Gimme Foundation scholarship will better enable my ability to afford my degree and pursue a career as a mine engineer."

Dawson Apple, a senior mining engineering student from Franklin, West Virginia.

"The Gimme Foundation's generous support to myself and fellow students will make up the difference in higher education costs and allow me to attain a degree and go on to improve the public's perception of the mining industry," Apple said.

Mackenzie Stone, a senior mining engineering and geology student from Wellsburg, West Virginia.

"I am so thankful to receive one of these scholarships so graciously provided by the Gimme Foundation this year," Stone said. "This award not only helps me with funding my final year of college at WVU but removes the worry of the financial burden so many students like myself can face as a completely independent individual. I'm in the

final stretch and this is the last push I need to graduate and become a successful engineer in my professional career."

Martin Marietta Scholarship Recipients

Four students received scholarships from Martin Marietta, totaling \$7,000. These scholarships are given to mining engineering undergraduate students on an annual basis.

Gabriela Kosakowski, a senior mining and civil engineering student from Cleveland, Ohio.

MiKy Alves, a junior mining and civil engineering student from Bryans Road, Maryland.

"This scholarship will allow me the privilege of financial stability in my efforts to continue my college education," Alves said. "In hopes that one day, I could not only work and contribute to the engineering field but hopefully start my own engineering firm. With this, I hope to have a greater impact on my community and the world as a whole."

Megan Sibley, a senior mining and civil engineering student from Tampa, Florida.

"This scholarship is helping ensure that I can afford a fifth year of college so that I can pursue my dual degree in mining and civil Engineering," Sibley said.

Brian Welsh, a senior mining and civil engineering student from Brookeville, Maryland.

"My family and I are greatly appreciative of this scholarship for it will be able to support me through the semester, so I am able to focus entirely on my college studies to perform to the best of my ability and use what I have learned for my future career," Welsh said.

EXTERNAL SCHOLARSHIPS, AWARDS AND RECOGNITIONS

A number of mining engineering students received external scholarships through professional societies, organizations and foundations. These include:

MMSA/SMEF Presidential Scholarship, The Society for Mining, Metallurgy and Exploration: **Deniz Talan** (1) and **Sena Cicek** (2)

Syd S. and Felicia F. Peng Ground Control in Mining Scholarship: **Haochen Zhao** (3) and **Mustafa Can Suner** (4)

Raja V. and Geetha V. Ramani Graduate Thesis Scholarship, The Society for Mining, Metallurgy and Exploration: **Deniz Tuncay** (5)

Henry DeWitt Smith Graduate Scholarship, The Society for Mining, Metallurgy and Exploration: **Amir Eskinlou** (6)

Robert E. Murray Innovation Scholarship, The Society for Mining, Metallurgy and Exploration: **Sena Cicek** (7)

Mineral and Metallurgical Processing Division Undergraduate Scholarship, The Society for Mining, Metallurgy and Exploration: **Djime Keita** (8)

Mineral and Metallurgical Processing Division (MPD) Outstanding Junior Scholarship, The Society for Mining, Metallurgy and Exploration (SME): **Emily Carroll** (9)

John Sidney Marshall Memorial Scholarship, Coal and Energy Division, The Society for Mining, Metallurgy and Exploration (SME): **Brian Welsh** (10)

The Pennsylvania Western Section of WAAIME: **Joshua Riffle** (11) and **James Pollock** (12)

Jerry McDowell Memorial Scholarship, The Society of Explosives Engineers Education Foundation: **Jared Morse** (13)

The Society of Explosives Engineers Education Foundation: **Mario Bendezu** (14)

WAAIME Scholarships: **Dawson Apple, Gabriela Kosakowski, Jared Broyles, Mackenzie Stone, Connor Baker, Emily Carroll, John Dickson, Kayla Gibson, Jared Morse, Rylan Nemesh, Dylan Powers and Maxwell Schaefer** (15)

WAAIME Graduate Student Scholarships: **Francisco Patino, Yinan Zhang, Haochen Zhao, Yun Zhao, Mustafa Suner, Qingwen Shi, Samuel Escobar Gil, Mustafa Ates, Mario Bendezu, Zeynep Cicek, Emmy Muhoza** (16)

SME Pittsburgh Section Student Grant Award: **Mackenzie Stone** (17)

Mining Career Development Scholarship by SRK Consulting: **Mustafa Can Suner** (18)

Ring Container Technologies Scholarship, administered by Scholarship America: **Chase Mowery** (19)

We would like to extend our sincere gratitude and appreciation to Remember The Miners organization, WVU Men's Basketball Coach **Bob Huggins**, and **Erik Ryan Muendel** for raising the scholarship funds for mining engineering students at WVU. These funds make a significant positive impact on our students and we thank them for continuous support over the years. (20)

Students continue to garner awards for their design work from national contests and competitions.

Zeynep Cicek won 1st and **Kayla Gibson** placed second at the SME/PCMIA Graduate Student Presentation Competition (21), while **Deniz Talan** placed first at the 2021 SME Environmental **Division Poster** Competition (22).

Sena Cicek, Deniz Talan and Deniz Tuncay are recognized by the PCMIA Board of Directors and SME Pittsburgh Section for organizing and managing the 2021 graduate student short presentation competition. (23)

In 2021, **Richard Campbell, Erica McCauley, Shannon Seitz, Mackenzie Stone** finished second, while **William Burow, John Dickson, Samantha Fowkes** were placed third in the 29th SME/PCMIA Senior Design Award competition. They were guided by **Dan Alexander** and **John Craynon**. The competition is open to all U.S. ABET accredited mining engineering programs. WVU has taken first or second place in this contest 14 times in the last 20 years.

Berk Tulu, assistant professor of mining engineering, was named Statler College Outstanding Researchers of the Year/Junior.

Vlad Kecojevic was recognized by SME for his service to SME Education and Professional Development Strategic Committee and SME Responsible Mining and Underground Construction Strategic Committee (24); and for his outstanding academic management in support to the Universidad Nacional de Colombia, Facultad de Minas, Medellin, Colombia during the Annual General Meeting of Society of Mining Professors (25). He was also acknowledged as one of the endowed chairs in Statler College by the Dean **Pedro Mago** (26).

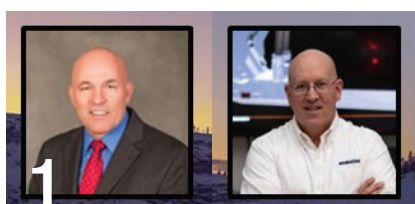


Let's go.™

MINING PROFESSIONALS HELPING WITH UNDERGRADUATE CLASSES

We are very appreciative of **Jim Carlson** and **Tyler Faulkner** of Carlson Software for coming to campus and taking part in mine surveying class for our students (1, 2).

Katarina Gump (3), manager of surface engineering with Iron Senegy, provided a virtual mine tour for the senior mine design class spring semester on March 18th. She narrated and reviewed all the support facilities on the surface of the Cumberland Mine that engineers are responsible for including specifications, construction, operation management, maintenance and environmental monitoring.



Joseph Hirschi and Clint Glover (left). Robert J. Farmer and Gregory M. Stanish (below).



MINING ENGINEERING GRADUATE SEMINAR

The Department was pleased to continue the Graduate Seminar Presentation Series for the spring and fall 2021 semesters under **Dan Alexander** and **John Craynon's** guidance. Mining professionals and alumni that spoke at the graduate seminar included **Bruce Bancroft** (CONSOL Energy – retired), **Amy Pridemore** (WVU Chambers College of Business and Economics), **Onur Golbasi** (Middle East Technical University, Turkey), **Anastasia Xenaki** (University of Kentucky), **Kwaduo Osseo Asare** (Penn State), **Joseph Hirschi** (Komatsu Smart Solutions Group) (1), **Clint Glover** (Komatsu Mining Corp.), **Arnaldo Leon** (Peru), **Murali Gadde** (Peabody Energy), **Robert Farmer** and **Greg Stanish** (John T. Boyd Company) (2), **Stephen Kan** (RESPEC), **Tugçe Besir** (Eti Soda, Turkey), **Zhigang Wang** (Daniels Company), **Vlad Kecojevic** (WVU Mining Engineering), **Yuting Xue** (NIOSH); **Wu Xiao** and **Wanjie Wang** (Journal of Coal Science and Technology, Beijing); **Stephen Hoffman** (USEPA); **Khaled Mohamed** (NIOSH); **Azalea Hulbert** (WVU Academic Integrity) and **Martin Dunlap** (WVU Engineering Librarian); and **Marie Hetherington** (Chemours Mining Company)



INDUSTRIAL INFORMATION SESSIONS AND JOB INTERVIEWS

The Department was pleased to host a number of mining companies in 2021 including Martin Marietta, RESPEC, Blackhawk Mining, CEMAX, American Consolidated Natural Resources, Alpha Metallurgical Resources, Pennsy Supply, Rosebud Mining, Coronado, Piedmont Lithium, Arch Resources, Nevada Gold Mines and Robindale Energy. We appreciate them giving info sessions and interview our students for both full-time positions and summer internships.

SOCIETY FOR MINING, METALLURGY, AND EXPLORATION

The West Virginia University Student Chapter of the Society for Mining, Metallurgy and Exploration looks to get involved in more ways than ever with the return to in person events as the year progresses.

Throughout the spring semester, the WVU SME Student Chapter provided a variety of online events and meetings for our members to participate in while still abiding by the University guidelines for COVID-19. During this time, three monthly meetings allowed students to participate in Zoom technical sessions with **Arnaldo Leon Vega**, **Kathleen Benedetto** and **George Schuller**. There were also opportunities to attend webinars with companies like Victaulic as well as the MINEXCHANGE 2021 SME Annual Conference. With this, students enjoyed a virtual conference experience where they had the opportunity to network with industry professionals and learn more about the latest research within mining. Although the organization faced some challenges the officers worked tirelessly to provide avenues for the members to stay active in these trying times. This included virtual volunteering events such as the Statler College's EngineerFEST, department visits and more.

As we moved into the fall 2021 semester, students were excited to return to campus and take advantage of in-person meetings. During this time, the organization saw a significant increase in involvement across the board and the officers worked to create even more ways for these students to get involved. In just a few months student members of SME were able to volunteer at outreach events like High School Visitation Day (1), Discover WVU Day (2), and the mining engineering department visits (3). Many also participated in the SME Mineral Kits Pittsburgh Section volunteer event where boxes were folded and filled with a variety of minerals to be distributed to local schools and give younger students a greater understanding of geology and what makes mining so important (4 and 5). We were eager to invite our guest speakers back to campus for our monthly meetings, where students were able to listen to presentations from **Jim Dean** and **Keith Heasley**. The department also had the opportunity to hold its annual William N. Poundstone Lecture Series which featured **George Schuller**, WVU Alum and Chief Operations Officer of Compass Minerals.



WOMEN IN MINING (WIM)

Women in Mining (WIM) is an international organization composed of individuals employed in, associated with, or interested in the mining-related industries. The mission of WIM includes educating members, industry, and academia about the evolving and advancing mining industries, improving diversity and inclusion in the mining industry, and enhancing networking in the industry.

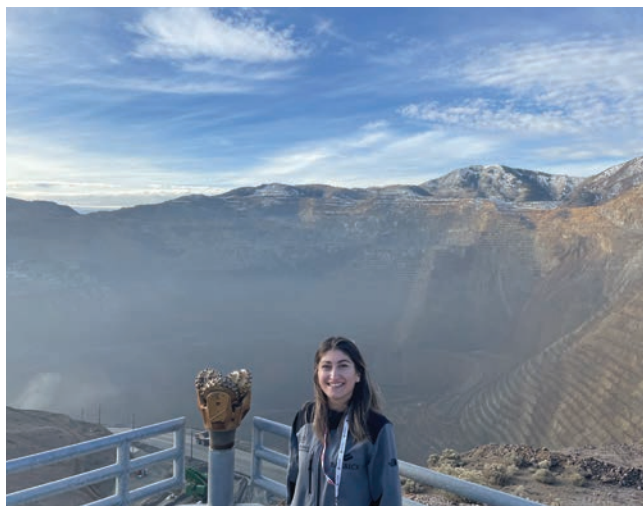
The Women in Mining West Virginia University Student Chapter serves as one of the six student chapters in the United States. The chapter seeks to promote women's involvement and diversity in the mining industry, facilitate networking opportunities between students and professionals, along with providing our members with a real-world perspective on their major of choice through various events like webinars/seminars, mentorship and volunteer events.

From October 21st to 23rd, WIM WVU officers —**Zeynep Cicek**, **Emily Carroll** and **Kayla Gibson**—attended the WIM USA Annual Conference which was held in Salt Lake City, Utah. The aim of the conference was to influence public perception to attract changes in the industry through diversity, inclusion, eradicating unconscious bias and more. A total of 140 in-person and 242 virtual participants attended the conference from 8 different countries, 37 different states and 64 different companies.



The first day of the conference started with a keynote presentation from **Elaina Ware**, regional general manager of Coeur Mining, on improving the mining industry's reputation and expectations from next generations. She summed up her speech in three motivating action items, "be bold, push back and dig deeper!" Another keynote speech was given by **Crystal Drager**, a project engineer at Rio Tinto Kennecott Mine, who highlighted that opportunities come from the greatest challenges, "From

Mom to Miner," and there is no comfort in the comfort zone. It was also inspirational to hear the personal stories and advice of amazing industry leaders through panel discussions. Between the panels, we were involved in round table discussions about various topics, including how to accelerate diversity and inclusion in mining-related industries, attract and retain women to non-traditional/operational roles, attract youth to choose mining as a career, improve the industry's reputation, and the difference between equality and equity.



Two different mine field trip opportunities were provided for the second day of the event. Cicek attended the mine trip to Rio Tinto Kennecott Mine, one of the top producing copper mines in the world, with 150,000 tons per day of copper ore production.

"It was an unforgettable experience to be in Rio Tinto Kennecott Mine, the largest man-made excavation and deepest open-pit mine in the world," said Zeynep.

The other two officers, Carol and Gibson, went to Redmond Underground Salt Mine where they gained insight into what an underground salt mining operation looks like, with in-situ grinding of the food-grade salt, and blasting of all other grades. They also learned about the unique qualities that Redmond mine contains, such as a diapir that is so strong that ground control measures are unnecessary, and the only naturally-occurring pink salt in the U.S. The opportunity to see such a large, multilevel underground operation was a fantastic experience which these students will remember forever.



On the third day, the Quarterly Board Meeting of WIM USA was held. After each chapter summarized their work done and achievements of the past quarter, break-out discussions were made to recap what we learned from

guest speakers and round table discussions on the first day of the event. Strategies to apply this new knowledge in a way that furthers the organization and its mission by fostering collaboration within the WIM chapters was a large portion of this discussion. There was an emphasis on sharing resources amongst student chapters to organize collaborative events via video conferencing programs. It was great to have a smaller group where students' ideas were highly valued.

Apart from the conference, WIM WVU is trying to strengthen our activity by organizing events and volunteering throughout Statler College. The first two meetings, in September and October, focused on recruiting new members, detailing our chapter's goals, and planning the types of events we would organize and participate in for the semester. In the November meeting, we hosted **Marie Hetherington**, a mining engineer at Chemours Mining Company, and the former president of the WIM Nevada Chapter, via Zoom. She shared her career path and experiences in different operations as a young professional in the industry, along with technical information on heavy mineral sand mining, a new concept for many of us. She also highlighted the importance of volunteer events and gave some essential tips to keep a work-life balance. We also attended the Discover WVU Day to attract high school students into the mining engineering program. Many of our members are involved in multiple other student organizations, such as Society for Mining, Metallurgy and Exploration, so we have been collaborating in some events, especially volunteering, and want to continue this partnership. We are excited to strengthen our presence in the University and the mining industry in the upcoming semester.



SUMMER INTERNSHIPS

Gold metal mining in Nevada

BY GABRIELA KOSAKOWSKI



As my previous internship wrapped up in 2020, I was eager to get more hands-on experience that you can only find on a job site. I enjoyed my time working in aggregates, but to give me a greater understanding of the mining industry, I decided to look into other commodities. I applied for jobs in coal, silver, salt and more, in locations all over the globe. In doing so, I earned myself an offer to move across the country and join Nevada Gold Mines in Elko, Nevada. NGM is a joint venture between Barrick Gold Corporation and Newmont Corporation and is one of the largest gold producing complexes in the world.

During my time at NGM I was given the opportunity to work with the ventilation team at their Goldstrike mine. There, I was able to balance my time between the office and underground to gain both technical skills and hands-on experience. This included collecting data for ventilation surveys, reviewing project proposals, completing file conversions and more. I learned how to use software like Deswik as well as a variety of equipment including anemometers and kestrels. My main project, however, was to design a system to measure the total respirable dust underground with equipment that we had on site. To do so I coordinated with the Industrial Hygiene department to use the TSI SidePak to collect preliminary data. This data was used to determine which locations would benefit from increased observation. I then implemented a TSI DustTrak in these areas of interest to monitor the dust in real time. With this data, adjustments can be made to the ventilation and dust control quickly and efficiently and, in turn, create a safer working environment for the miners. Moving forward, the samples will be used to create a data bank can be created to help detect any significant changes in the air quality as well as determining a correlation between total dust and percent of silica.

This, along with the other projects that I worked on this summer, have allowed me to apply what I learned in the classroom to real world situations. I was able to expand my knowledge of not only ventilation but also metal mining as a whole. The gold industry is exciting to be a part of and I am glad to know that I played a role in the success of Nevada Gold Mines' safety and production, and of course the health and wellbeing of their miners.



Aggregates mining in Pennsylvania

BY JOHN DICKSON

As a fifth-year senior in mining and civil engineering, I have had a lot of industrial experience through internships. I have traveled to a variety of places throughout the United States and this past internship landed me in central Pennsylvania working for Pennsy Supply. Pennsy Supply is a subsidiary of CRH, a world leading building materials business employing over 90,000 people worldwide. Pennsy is a vertically integrated company that does everything from mining the stone to paving the road. This was not my first experience in mining but it was my first experience working at a surface mine. Pennsy operates 12 active surface mines and, two sand dredging operations.

During my Internship, I was able to work on projects for all of the active sites. Some of my smaller projects included things like machine controls feasibility, underground surveying, and the 2021 SEC resource/reserve estimations. The large project I was working on was an exploration analysis at one of the surface mines. The driller and I spent two days drilling seven air rotary holes at the bottom of the existing pit. I collected samples every five feet then took them to the lab for analyzing. After drying the samples, I was taught how to make the pellets and run them through the x-ray machine. With the results of analysis, I used Carlson software to create a geologic model. This geologic model was then used to create a preliminary mine plan. The experience that I gained being able to work with such great mining engineers is something that I will use in the rest of my career.

I will be graduating in December 2021, and after I reflect on my time here at WVU in the mining engineering program, I am so glad to have been a part of a program that encourages and supports students in their academic careers. The information I learned in classes was valuable but the application of that knowledge in a real-world industrial experience is what is really important.



Copper metal processing in Arizona

BY FRANCISCO PATINO

This summer gave me what was undoubtedly one of the best experiences in my personal life and professional career. I had the incredible opportunity to work in the copper mining industry in Arizona doing what I am passionate about, metallurgy. I was eager to learn as much as I could, get dirty and gain hands-on experience in the processing plant.

My journey started with a long road trip of over 2,000 miles from the heart of the Appalachian Mountains in West Virginia, to the deep canyons' land in Arizona. After driving through 10 different states, I finally got to Miami, Arizona, a small historic town surrounded by massive copper mines. Although it took me a bit to get used to the sweltering, dry summer heat, my enthusiasm and motivation were intact.

Since this was my first internship in the U.S., I was able to rotate through the entire processing plant including primary crushing, fine crushing, grinding, flotation, moly plant, and the assay and X-Ray laboratories. I spent time collecting different samples from all over the plant, conducting daily tests, testing new reagents for the moly plant and tailings thickeners, as well as shadowing operators, supervisors, and engineers. My main project over the summer was the inspection of ball mills, hydrocyclones and flotation banks. So, I had to go into the mills, get to the cyclones or walk through the flotation banks taking certain measurements to evaluate the performance of the equipment. Hazard identification was also a great part of my work, the company and all miners were committed to keeping safety as a top priority and fostering a positive work environment.

My summer internship was such a rewarding experience. I cannot thank Capstone Pinto Valley Mine enough for giving me the opportunity to explore a new culture in the western U.S., meet amazing people, and to get valuable experience that I will apply during my career.

Aggregates mining in North Carolina

BY EMILY CARROLL

When most people think of the mining industry, they think of all the associated negative connotations that the industry as a whole is constantly working to improve, such as safety and environmental factors. My internship with Vulcan Materials Company at a granite quarry just outside of Charlotte, North Carolina, was a great experience that truly showed me these improvements.

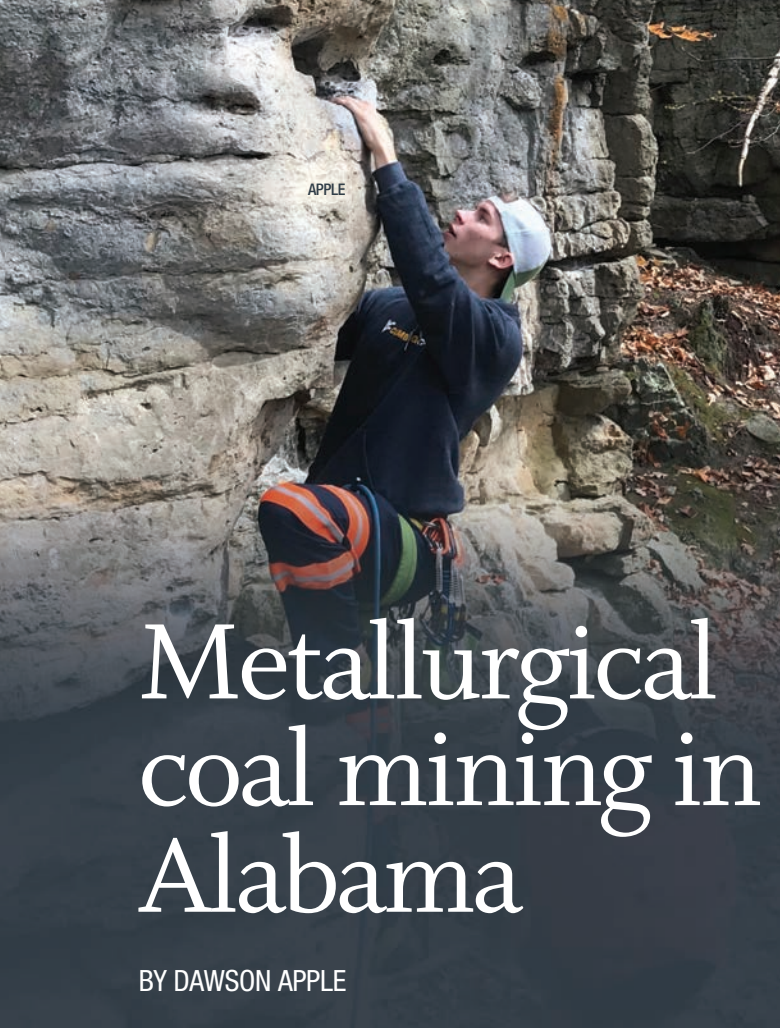
Despite having two prior internships, one in an underground coal mine in West Virginia, and one with a contracting company in West Virginia, South Carolina, and Pennsylvania, I was still nervous upon first arriving at the quarry yet thrilled to try something new. I originally did not enter school in the mining engineering program, have no family in mining, and the closest large quarry is almost three hours away from my hometown in Maryland, so each new experience has been an exciting adjustment. With Vulcan, I learned a lot and got to try something new almost every day. It was definitely my most hands-on internship, starting in the quality control lab, operating and maintaining various mobile and plant equipment, participating in Safety, Health, Environmental walks, and my favorite part, helping during every blast.

In the quality control lab, I performed many gradation samples to confirm that the particle size distribution met North and South Carolina state DOT specifications for different gravel products. The quality control technician was also responsible for maintaining environmental standards through various methods, such as taking water samples of settling ponds and planting wildlife-supporting plant species. The days I spent operating equipment gave me a larger appreciation for these important production roles and I gained hands-on knowledge to relate back to classwork. Though the jobs may be very repetitive, the employees at this quarry take them seriously, ensuring safe and productive shifts. In the processing plant, belts, crushers, and screens were inspected daily and preventative maintenance performed on a schedule, reducing downtime and allowing for groundmen to focus on other tasks, such as increasing productivity, helping the quality control technician, and overall housekeeping. These tasks help increase skill and overall awareness in how the plant connects the pit to a final product.

Vulcan's SHE walks were a unique safety check, in which all production halts and employees check areas of the mine that they do not normally work in. For example, someone who typically works in the plant would check the



pit for berm height, highwall cracking, and other potential hazards that pit personnel may accidentally become blind to. This safety measure proved its effectiveness, considering that the quarry was over 1500 days accident-free when I finished my internship. We typically blasted once a week, allowing me to learn a lot about and actively participate in the process. I was able to help layout shots, profile the faces, drop caps and detonators, check wires, plug and stem holes, connect wires, and even press the button to blast on my first shot. My main project throughout the summer was a drill hammer performance study. I performed a time study on three different hammers, compiled and evaluated the data, made a cost analysis, and recommended a hammer. The quarry managers did end up taking my recommendation. Overall, my internship was a fun and practical experience that truly focused on safety.



Metallurgical coal mining in Alabama

BY DAWSON APPLE

Most people shy away from the thought of working in the coal mining industry, widely thought of as a disappearing industry. Those with knowledge of the market know it is not that simple. Coal exists in many different grades, some with higher energy value, some cleaner-burning, and some suited specifically for steel production, called metallurgical coal. This coal fetches a higher price on the global markets, has steadier demand, and has few industry-displacing alternatives, unlike thermal coal used for electricity production. As a young mining student, these qualities are important in reassuring me that a career in coal mining is stable.

Considering the advantages metallurgical coal provides, I chose to intern with Warrior Met Coal this summer. The company operates two longwall coal mines in significant metallurgical reserves near Brookwood, Alabama. I spent most of my summer in mine operations, where I believe all young mine engineers should start their training to better expose themselves to the challenges of mining. Warrior's intern program rotated me throughout the mine with various crews, providing a hands-on look at many of the topics we learn in school. I gained experience with continuous mining processes, longwall mining, ventilation, high voltage power systems, equipment maintenance, mine surveying, compliance, and much more. I learned more than I could have asked for, and now am much better prepared for my senior design course and future projects in my career.

Outside of work, I enjoyed the local lakes and hiking trails of Alabama. The warm weather and many lakes provided opportunities to swim, kayak, fish, and cliff jump, all within minutes of the city of Tuscaloosa, Alabama, where the interns were housed. Overall, the summer surpassed my expectations for learning and I sincerely enjoyed my time in Alabama.



Aggregates mining in Iowa

BY RYLAN NEMESH

This past summer, I was fortunate enough to have my first mining engineering internship of my college career with a CRH Americas subsidiary in Iowa. This internship occurred between my sophomore and junior year of college after I had only one semester of mining engineering experience under my belt. I initially started my college career in the mechanical engineering department, but after my third semester, I realized it wasn't for me, so I investigated other options. I have always been interested in geology, heavy equipment, and explosives, so I took a leap of faith and changed my major to mining engineering. After experiencing my summer internship, I am happy to say that I made the right decision.

I was based in Burlington, Iowa, during my summer, working at Cessford Construction Company in eastern Iowa and western Illinois. However, I also worked closely with Hallett Materials in central/western Iowa and Minnesota Paving and Materials in southern/central Minnesota. I got to experience many different facets of the aggregates industry, from exploratory drilling to crushing to surveying. A team of three interns throughout the state worked together and independently on various projects last the summer.

One of my significant projects involved working independently and in small teams to combine ground and aerial surveying methods using Carlson GPS units and DJI Phantom 4 Pro V2's to create three-dimensional models of a few dozen mine sites. These models were used to determine quarterly stockpile data as well as for updated aerial images for use in mine planning and contour line creation. Regarding mine planning, the intern team took charge of creating a standardized mine plan template that we used to effectively outline all relevant information about each operation for both internal uses and an SEC report.

Other projects I worked on included blasting optimization at the oldest limestone quarry in Iowa, learning to effectively operate one of the only sonic sample drills in North America, and aiding in electrical resistivity testing pertinent to future mine expansion.

I will never forget the unique experiences and the fantastic people I met during my summer internship. This summer is one to remember, from driving my company vehicle 6,500 miles across the Midwest to flying drones hundreds of miles to operating various forms of heavy equipment. This internship solidified my love for the mining industry, and I am excited to see where I go next.

Zinc metal mining in Tennessee

BY MACKENZIE STONE



Coming from a small town in West Virginia, unsure of where my life would take me after graduating high school, I find myself in my fifth and final year here at West Virginia University. The past two years have brought many hardships to everyone around us; opportunities have been sparse and somewhat lack luster. Fortunately for me, I have been able to push past the many obstacles' life has been throwing my way and make the most of the situation. This summer I was granted the opportunity to work in underground zinc for Nyrstar's East Tennessee Mines located just outside of Knoxville, Tennessee. My internship experience this summer with Nyrstar exceeded my expectations and has provided me with new skills and knowledge that I look forward to applying to my future career after graduating.

Prior to my internship this summer, I worked in underground limestone in Pennsylvania and underground salt in Louisiana. I made a goal for myself that before graduating, I wanted to secure an internship in metal mining, specifically underground. I am happy I was able to achieve that goal this summer and expand my horizons once again in preparation for my final year at WVU.

I was stationed primarily at one of the three mines in their east Tennessee division. During my time at the mine, I worked closely with mine engineers, geologists, managers, superintendents and miners. Everyone welcomed me with open arms which made me eager to learn as much as I could in the short amount of time I had there. Having a dual degree in both mining engineering and geology, I wanted to make sure I was learning the application on both sides of my degrees. I had no prior industry experience in geology application, so I initially started out my internship working with the exploration geologists on site. During my time with them, I was able to learn about the formation of the deposit, logging core and travel to drill sites to conduct drill rig audits. This allowed me to form an understanding of the initial work that must go into the development of the company's underground mines, how would you know where to mine if you don't know where the zinc is?

After my rotation with exploration geology, I decided to situate myself at one of their sites to really learn more about the mining process. I worked closely with the mine engineer in charge of short-term planning and the geologists on site. I was able to learn more about stopes and random room and pillar mine design. I learned a lot about the different geologic units, formation of the deposit and grading of the faces. I was utilizing software such as Maptek Vulcan, AutoCAD and Minesight. Eventually, I was able to fill in for the mine engineer and help with daily logging of production, planning and mapping.

One of the hardest things for me this summer was learning more about how they determine what should be mined and what shouldn't. I primarily had experience in deposits dealing with massive units of the targeted material. Therefore, I spent a lot of time learning how crucial modelling and exploration drilling was to the mining process of metal mining.

During my time at Nyrstar, I not only learned a lot about the mining and geologic processes but the culture surrounding the mines. I was provided a lot of independence this summer, which allowed me to grow and achieve a lot of things in such a short amount of time. I even had the opportunity to showcase other passions of mine such as art through the means of designing and painting a mural for the mine site I worked at.

Reflecting on my years as a student in the mining department at WVU, I can say without a doubt I have accomplished so much. I never would have pictured myself in mining, but here we are. I feel as if the hard work I have put in over the past three years is certainly setting me up for a lifetime of success. I am forever grateful for the experiences, opportunities and internships I have had over the years and I can't wait to see where my path takes me upon graduating next spring.

Coal mining in West Virginia

BY JARED MORSE



My grandfather always said that education was the most powerful thing a man or woman could have. An education provides leverage against your industry's competitors while separating you as a qualified individual. Although my grandfather's words were wise, they miss the whole truth behind the effectiveness of education. Education remains a powerful tool but must be paired with practical hands-on experience to maximize its potential. As an engineering intern at Blackhawk Mining's Speed Complex, I sat down with the engineering manager my first day and discussed how I was to apply myself towards what an underground coal mine had to offer. My response was simple and defined the remainder of my time at speed mining. I wanted to see, touch, operate, plan and draft anything and everything the mine had to offer.

Following this conversation, a basic outline of how my internship was to be conducted was created. My time at speed was to be spent surveying underground and surface locations, working on the producing sections and outby, as well as assisting in any relevant engineering projects. Looking at the schedule, I was intimidated despite having conceptual knowledge from school, but eager to see how I would perform and what knowledge I would retain from the experience. My first couple weeks were spent surveying alongside two world class men who wanted nothing more than to show me how they complete their assignments. By doing so, I not only gained an understanding of surveying, but also an appreciation for their work ethic and dedication to precision. Despite having multiple weeks to set spads, identify gas wells and locate stockpiles, the time came to transition into outby work.

My experience conducting outby work was also very beneficial to my understanding of mining processes. During this period, I was tasked with structure recovery on speed mining's final longwall panel, and then transitioned into various maintenance tasks all over the mine. As for my time recovering longwall structure, I learned how to effectively cut with an acetylene torch while gaining experience disassembling the head drive and its surrounding mechanical components. Additionally, I was trained to run a duck bill, more formally referred to as a shield hauler. For the remainder of my time working outby, I performed track maintenance, provided structural supports and built various ventilation controls.

From outby work, I transitioned into working on one of speed's producing sections referred to as Unit 2. Working with the men on Unit 2 was more than beneficial to my understanding of coal mining as they offered me limitless hands-on experience with equipment and operational procedures. On a daily basis I was operating a battery-scoop, shuttle car and roof bolter. When I was not operating machinery, I was constructing ventilation controls and assisting in bossing the section. Each day on the section my respect for the men around me grew. It was apparent that the wellbeing of all miners on the section was of upmost importance, and only made the work more enjoyable.

After working underground on Unit 2, it was brought to my attention that I had the choice of working a week at the wet branch preparation plant. This was an opportunity to see all I had learned in coal processing in action, and I committed to doing so. The first day at Wet Branch I was walked through the entire plant and explained how both sides of the plant processed coal to industry standard. In that time, all grey area left over from class was no more. Walking every floor and seeing how coal is washed and classified made me more interested in the process. As a result, I took every opportunity to work on the machinery. I was able to apply my knowledge of acetylene cutting while learning how to heat weld and plasma cut. All of which occurred in the process of refurbishing and maintaining machinery. The men at Wet Branch were great people to work with, and certainly aided my understanding of coal processing.

The remainder of my time working for Blackhawk was in the engineering department at Speed. Here, I was given every opportunity to work on and absorb ventilation and roof control planning as it was conducted. For ventilation planning, weeks were spent walking airways with the purpose of updating maps and taking air readings at various locations in the mine. From here, I was able to set up a Vnet model of the previously surveyed airways to better understand the behavior of the mine's ventilation system. During this period, I also conducted and submitted a major ventilation revision that will allow for a more efficient use of intake air. For roof control, a large amount of my time was spent stability modeling current and future retreat panels. This modeling was conducted using Carlson software in correspondence with LaModel, which accurately locates stresses that may induce structural failure. Lastly, when I was not working on stability mapping, I was underground hazard mapping active sections. Using this information with respect predetermined geological conditions, I was able to adjust and submit roof control plans to MSHA while staying up to date with the behavior of the mine. This information was reported to those who work on section and taken into consideration to improve the safety of production.

Although my internship was outlined by working various roles that define the coal mining process, opportunities to learn new skills and principles were always being offered by the engineers when I returned to the surface. For that, I am more than grateful for the time and effort these men invested in me. No matter where I was working, my understanding of what defines mining improved at an hourly rate. Yet there was no homework. There were no exams. There was practical hands-on experience that solidified with all knowledge I brought with me from school. One thing is for certain, my grandfather would be proud to know that working for Blackhawk has not only provided me leverage in my studies, but made me a more qualified mine engineer.

Copper metal mining in Utah

BY SAMUEL ESCOBAR



I am an international graduate student from Colombia, and my research project mainly focuses on ground control applied to underground limestone mining. This summer, I had the great chance of working at one of the world's biggest and most famous mines: Rio Tinto Kennecott Copper or formerly known as Bingham Canyon Mine. In addition to professional and technical skills, I learned a lot in a more personal aspect, such as interacting with other people from various backgrounds or defending a position about a technical aspect with my colleagues.

At Rio Tinto, I worked as a geotechnical engineer intern for the Underground Drainage Galleries and Kennecott's new underground development mine. It was a wonderful experience because I was performing the activities of a geotechnical engineer and had to report directly to the Principal Engineer of the Underground team.

I had several projects while I was in Rio Tinto: (i) initialize the mapping system for recording the underground geotechnical logging data, (ii) perform pull testing of underground rock bolts, (iii) measure convergence in the critical areas of the mine, (iv) start LiDAR scanning in the underground mine and (v) performing the face call for ground support in the blasted face. All of them were relevant for the geotechnical and operational parts of the project. This was very rewarding for me because I felt that I was helping the company.

The knowledge learned in the technical aspects of my internship was immense. I learned new techniques such as performing and evaluating a pull test or using software like Vulcan or Deswik. Moreover, I had the chance to work side by side with experienced engineers and miners, and they were more than willing to teach me new techniques or methods. I am very thankful that they gave me many responsibilities in something so important such as geomechanics.

Furthermore, this experience allowed me to explore the west coast and visit places like Idaho, Montana, Wyoming, Utah, Nevada or Colorado. Thus, proving that a summer internship experience enriches the technical aspects and allows you to grow as a person.

Finally, I want to thank Rio Tinto Kennecott for allowing me to live such a wonderful experience and enabling me to be part of one of the world's largest mining companies. Furthermore, be able to work at a historic mine site such as Bingham Canyon Mine. I also want to thank my supervisors for always being so willing to provide me knowledge and guidance in every aspect of my summer internship experience.



Copper metal mining in Arizona

BY MARIO A. BENDEZU DE LA CRUZ

BENDEZU DE LA CRUZ

I am an international graduate student from Peru and my research area is in ground control of stone mines. During the summer of 2021, I had the opportunity to work for Freeport-McMoRan, and I was assigned to the Morenci mine which is an enormous open-pit copper mining complex located in Greenlee County, Arizona. Being an intern for Freeport was a truly gratifying experience since the company cares about forming efficient, safe employees as well as a challenging, supporting, and friendly environment for everybody.

I was a mine operation engineer intern in the Dispatch department where all data related to the Fleet Management System is stored and analyzed to ensure the most productive way to transport mine material. During my internship, I learned how to use the DISPATCH Modular program to execute data reconciliation regarding mismatched material transported, origin and destination of the material moved, and working equipment (Haul trucks or shovels). My daily tasks and training in DISPATCH let me understand the complex process that is behind the FMS performance such as the linear and dynamic algorithms which create all the possible solutions to optimize the hauling and loading resources. Likewise, Freeport offers the interns the opportunity to shadow different areas; I certainly appreciated the chance to gain a general view about how the company operates to extract, process and produce the copper ore mineral.

I was assigned a project as well which could reflect a positive impact and my growth as an intern. My project consisted of analyzing a substantial set of data about the performance of the Fleet when using a specific linear programming configuration setting that when enabled, identifies the most productive shovels to allocate the haulage resources most efficiently to meet the production quota. This setting would use as inputs shovel location, cycle time, production capacity, available trucks, dumping locations, best path, among several other factors to create best productive circuit. I learned to code in Snowflake program the desired key performance indicators (KPI's) and I used Python and other statistical programs to assess and represent the evolution of data through time and by crew in charge. The results I obtained showed how this tool worked and how much of the production efficiency came from human factors or how much from the program algorithms. The project and its conclusions were well received by my boss, mentors, and managers of the mining operation department and the DISPATCH area will use my project as a starting point to improve their understating and usage of the DISPATCH Modular program.

This internship was very valuable to me and all the achievements I reached could not have been attained if it were not for my boss and mentors who always supported, encouraged, and taught me; they made this experience truly meaningful. I am really grateful to them and Freeport McMoRan for having me as intern, communication lines between workers and bosses are great, everybody is always willing to help you, and I learned a lot and had really enjoyable time. This internship has had a great positive impact in me as a professional and as a person.

ALUMNI SPOTLIGHT



Adam G. Patterson, P.E. is the recipient of the Pittsburgh Section 2021 John T. Boyd Young Engineer Award.

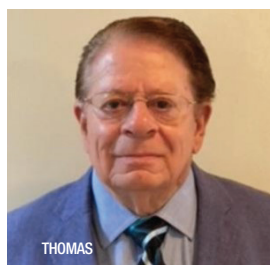
Patterson is an 8th generation coal miner who recognized the opportunities in the coal industry early on. He is a mining engineer with 12 years of full-time experience in longwall, room-and-pillar, construction and coal processing. He

graduated in 2009 with a Bachelor of Science degree in mining engineering (Summa Cum Laude) from West Virginia University. Patterson is a registered professional engineer in Colorado and Pennsylvania. His background includes project engineering, operations management, MSHA compliance, and extensive work in underground mine ventilation and coal processing. He has steadily progressed in engineering and mine operations beginning as an engineering intern at CONSOL's Loveridge mine while at WVU, then full-time at Peabody's Twentymile Mine, and now with Robindale Energy & Associated Companies of Latrobe, Pennsylvania, as vice president of operations, LCT Energy, LP.

Patterson joined Robindale Energy as a senior mine engineer in 2017, where he developed budgets for underground mines, a surface anthracite mine, and a new one million ton-per-year coal processing plant for which he then managed construction and commissioning. This year, he was promoted to vice president of operations for two underground room-and-pillar mines and a 600,000 ton per year plant. He also implemented continuous improvement initiatives across the company.

From 2009 to 2017 Patterson developed his mining engineering skills at Peabody Energy's Twentymile Mine near Steamboat Springs, Colorado. He started as an operations associate running a maintenance crew and new mine dewatering system. Then he became a section foreman on a continuous miner production crew and longwall utility crews. By 2011 he moved into a senior mine engineer position for short- and long-term planning, ventilation modeling, bid documents, and mine plans with Carlson Software. In 2013 he transitioned into compliance manager responsible for MSHA regulation compliance, roof control and ventilation plan approvals, violation mitigation, and testifying before the Federal Mine Safety and Health Review Commission. Patterson's last position at the Twentymile Mine was as the continuous miner coordinator.

Patterson was an outstanding student at WVU, serving as the 2007 vice president and 2008 president of the SME Student Chapter, Student Advisory Council, and a National Society of Collegiate Scholars member. He holds a West Virginia Underground Coal Miner's Certificate and is a registered professional engineer in Colorado and Pennsylvania. This fall he made a presentation at the 2021 SME/PCMA Annual Joint Meeting titled "Construction of LCT Energy's Laurel Preparation Plant."



Robert O. Thomas (1967 WVU Mining Engineer) was recognized as the 2021 Pittsburgh Section Distinguished Fellow.

Thomas began his mining career in 1965 working part-time at Jones & Laughlin's Vesta - Shannopin Coal Division while a student at the WVU School of Mines. Some of his early assignments included surveying work,

engineering tasks, operation of mine drainage treatment plants, and performing time studies at all four of J&L's underground mines.

In 1967, Thomas graduated from WVU with a bachelor's degree in engineering of mines and began full-time employment in J&L's Engineering Department. At the same time, he attended evening classes at WVU and earned his master's degree in engineering of mines. Later, he enrolled in evening classes at Wheeling University and earned a master's of business administration.

Thomas held several positions during his tenure with J&L. These assignments included mining engineer, chief engineer, and manager of engineering. On the production side, he served as section foreman, shift foreman, mine foreman, assistant mine superintendent, mine superintendent, and manager of coal preparation. In 1980 he was promoted to general manager of Gateway Coal Company and remained in that position until the mine closed in 1991.

One of Thomas's most memorable assignments while at J&L was to participate in the design, selection, and installation of the first longwall system in the Pittsburgh Seam in Pennsylvania. This project involved visiting longwall mines and equipment manufacturers in Germany and Great Britain, as well as some of the few longwall mines operating in the United States at that time. The selected longwall equipment was installed in the Gateway Mine in November of 1970. Two years later a similar project was completed for J&L's Vesta Mine.

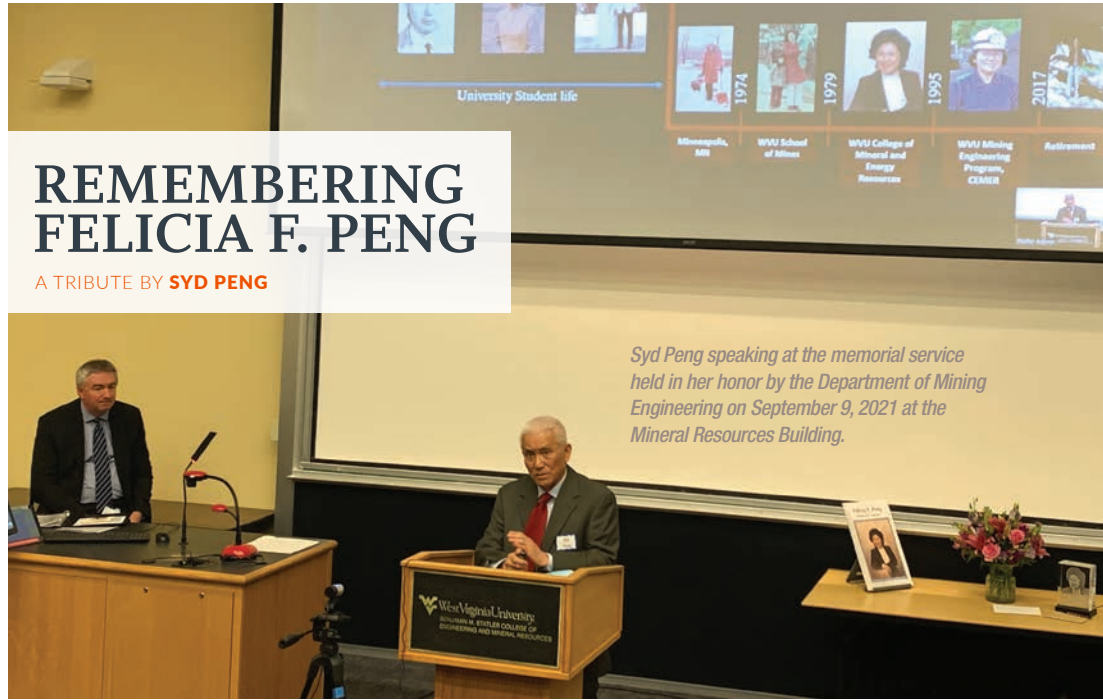
After his tenure at Gateway, Thomas held various engineering and management positions at other area mines. He also worked several years with the John T. Boyd Company performing consulting engineering assignments throughout the U.S. as well as some projects in Central Europe.

Thomas began his association with AIME/SME while a student at WVU and has remained an active member ever since. He is a registered professional engineer in four states, and holds mine foreman certifications in Pennsylvania and West Virginia. He is a member of SME's Legion of Honor and has been a member of SME for more than 55 years.

In Memoriam

REMEMBERING FELICIA F. PENG

A TRIBUTE BY SYD PENG



Felicia F. Peng died peacefully on June 10, 2021 on her hospital bed at Monongalia General Hospital, Morgantown, West Virginia, surrounded by her husband, Syd and Son, Wildon at the age of 83. She was born on October 22, 1937 in Taiwan.

She was raised and grew up throughout her childhood in one of the five noble families in Taiwan. After high school, she passed the entrance exam and majored in textile engineering and graduated from Taipei Technical Junior College in 1959. She then went to Waseda University in Tokyo, Japan, in 1960 to study and received her bachelor's and master's in applied chemistry in 1963 and 1965, respectively. She was admitted to chemical engineering in 1966 and received an engineering degree in 1970 from Stanford University, Stanford, California. At Stanford, she met Syd and got married on June 15, 1968 in one of the most magnificent wedding ceremony at the Stanford University Church. She completed her PhD in engineering from West Virginia University in 1989 while she was a full-time faculty member of mineral processing engineering.

She joined the mineral processing engineering faculty when it was first established in 1975. Her special interest was coal preparation which she taught throughout her career with WVU preparation, she taught AutoCAD in mining engineering, computer applications to mining engineering and mineral processing. Her research covered all aspects of coal preparation with special interest and published prolifically in the areas related to fine coal processing including froth flotation.

She was a girl of many talent, mother, teacher, researcher, athlete, gardener, chef, newsletter editor/reporter, singer/musician. She had a life-long unwavering passion for teaching in coal preparation related subjects and interacting with students, both in and outside classroom.

A memorial service in her honor hosted by the Department of Mining Engineering was held on September 9, 2021 at the Mineral Resources Building.

She is survived by her husband, Syd, two sons, Stanford and Wildon, and three grandchildren, Avery, Charlotte and Clara.



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Alumni Update 2021 YEAR IN REVIEW

PLEASE WRITE TO US! We want to know where life has taken you since you left West Virginia University. Complete and return this form with your news and comments. Pass this newsletter on, or let us know any alumni who are not receiving Black Diamonds.

Send to: Department of Mining Engineering
West Virginia University | 365A MRB | PO Box 6070 | Morgantown, WV 26506-6070

Or, email updates to karen.centofanti@mail.wvu.edu. Name: _____

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Brief News of Professional and Family Activities for Future Newsletters:

Suggestions/Comments: _____

This newsletter is published once a year to keep our alumni and friends informed of departmental news and ongoing activities. For additional information, visit our website: mine.statler.wvu.edu