

MINING ENGINEER

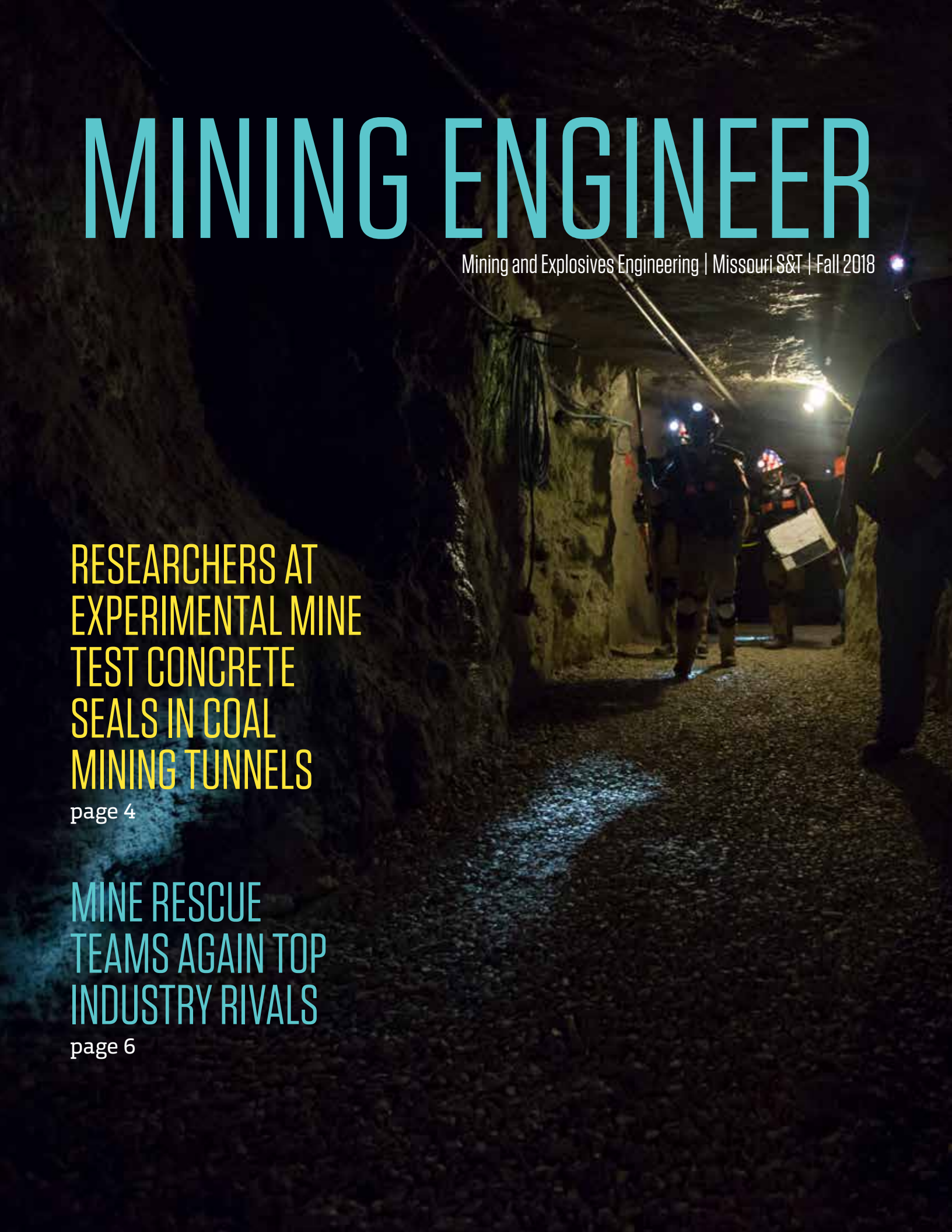
Mining and Explosives Engineering | Missouri S&T | Fall 2018

RESEARCHERS AT
EXPERIMENTAL MINE
TEST CONCRETE
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MINE RESCUE
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NO ONE KNOWS MINERS DIG DEEPER BETTER THAN WE DO

In mining engineering, digging deeper is a way of life. Because it's hard work to tap natural resources with the potential to transform lives. From rock mechanics and explosives to environmental reclamation, our students are learning the skills that drive innovation and next-generation leadership.

Your annual support of the mining engineering program makes a difference in many ways. And helping Miners dig deeper is one. Because every dollar you contribute supports scholarships and field trips to the mining operations where students see theory put into practice.

So next time you receive a phone call from a mining engineering student eager to share what's happening in our department and on campus, we hope you'll take time to connect and catch up. We also hope you'll mine the possibilities by giving back.

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DEAR ALUMNI, FRIENDS AND COLLEAGUES

We are glad that you have taken the time to read through this edition of the Mining Engineer. We are always happy to share the good things happening in the program with you. And a lot has happened in the last year that excites us. As you look through these pages, I'm sure you'll agree with me.

In the past year, our students continued to do amazing things in the classroom as well as in student competitions and in their interactions with industry. Our faculty continue to teach and conduct research at the highest levels and were honored by national and international organizations for their outstanding work. Our staff have continued to support our programs with the same dedication you have come to know. We believe we are moving in the right direction.

I am sure many of you have already heard that Braden Lusk left Missouri S&T at the



end of June to take a position with Dyno Nobel. We will miss Braden's leadership. He was a strong advocate of the program. I am honored that Dean Wlezien asked me to serve as interim program director for mining engineering. It is my hope that we can carry on the work and continue the Rolla tradition of educating hardworking mining engineers for diverse roles in the mining and construction industries.

We look forward to working side by side with you to lift mining engineering at S&T to even greater heights. If you are ever in the Rolla area, don't hesitate to stop by the department office. We will be glad to show you around and share the exciting things going on.

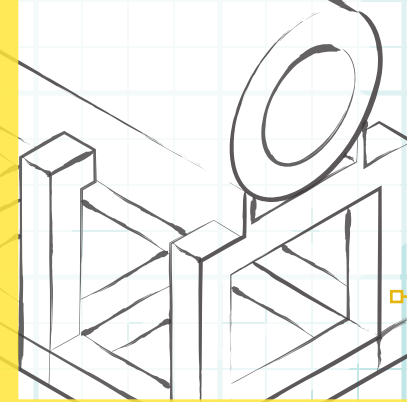
Kind regards,

Kwame Awuah-Offei, PhD, PE
PhD MinE '06
Interim Program Director



EXPERIMENTAL MINE FEATURED ON A&E'S OZZY OSBOURNE TV SHOW

Missouri S&T's Experimental Mine and two professors were featured on episode five of the third season of rock star Ozzy Osbourne's TV show, "Ozzy and Jack's World Detour" on the A&E Network. Ozzy and son, Jack, and daughter, Kelly, are traveling across the country in an RV and made several stops in Missouri. They visited the S&T mine where they met fellow Brits and S&T mining and explosives faculty **Catherine Johnson** and **Paul Worsey**. The Osbournes enjoyed blowing up Jack's doll named Robert and spelling out Ozzy with explosives. Watch the episode at aetv.com.



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BOTLHE MASEDI: THE MIND OF AN ENGINEER

Before mining engineering alumna **Botlhe Masedi**, MinE'18, Econ'18, crossed the stage to collect dual bachelor's degrees during commencement ceremonies this past May, she headed to the podium to address her fellow graduates as one of two student speakers chosen to represent S&T's College of Engineering and Computing.

"I am a social, bubbly person who loves going after what I want and never lets an opportunity pass me by," says Masedi, a native of Botswana. "College has taught me a lot of endurance and how confidence in what you do can change your path."

After graduation, Masedi joined Kiewit as a mining engineer in the underground tunneling division. She says S&T prepared her well for this next step.

"During my stay here, I have learned so many concepts that are very applicable to the line of work I wish to pursue," she says. "I have learned to ask the relevant questions and think with the mind of an engineer."

Masedi was a member of the Mine Rescue and Mine Design teams. She hopes to eventually own a non-profit organization to eradicate unemployment in her home country by equipping youth with the right resources.



EXPLOSIVES IS ALL IN THE FAMILY FOR CALVIN AND TONY KONYA

When your explosives engineering apprenticeship unofficially begins as a toddler, chances are pretty good that you'll wind up in the family business.

For **Tony Konya**, MinE'16, MS ExpE'17, joining his father's company, Precision Blasting Services, a global consulting firm, was a no-brainer. So was following Dad — aka **Calvin Konya**, MinE'66, MS MinE'68, PhD MinE'72 — to Missouri S&T (though the campus was first known as the Missouri School of Mines and Metallurgy and then University of Missouri-Rolla during Calvin Konya's time in Rolla).

"I was doing all the different blasting things out on the bench, tied all the shots, loading explosives, all of that," Tony Konya recalls of accompanying his father to job sites as a child. "I've been doing that since I was about 3. I can still remember my first blast."

Twenty years later, Tony Konya works as a senior project engineer for a company with clients across the world. He's also a Ph.D. student in explosives engineering at S&T, where he's worked as an instructor and graduate teaching assistant for courses such as Mine Health and Safety, Blasting Design and Technology, Specialty Uses of Energetic Materials and Demolition.

"We've worked on projects on just about every continent, other than Alaska and Antarctica," Tony Konya says.

Calvin Konya, who after graduating from Rolla spent eight years on the mining engineering faculty at West Virginia University and then a decade at Ohio State University, called his decision to study mining and explosives engineering here "the best decision I ever made in my life." Also a prolific researcher and author, he's known in the industry for helping to form the International Society of Explosives Engineers in 1974, also serving as the group's first president and executive director.

Tony Konya is actually Calvin's biological grandson, but was legally adopted by him as a child.

"I'm very proud that he decided to follow in my footsteps," Calvin Konya says.

As for his own path? At 75, Calvin Konya has no plans to slow down, whether at the company he started 45 years ago or at the Academy for Blasting and Explosives Technology, a training site he formed in 2007 in suburban Cleveland, Ohio. Konya will also join his son on the S&T faculty, with plans to teach an online course on underwater blasting in spring 2019.



FAMILY HISTORY DRIVES SENIOR TO SALT MINES

For senior **Eli Rychtarczyk**, engineering is a family affair that spans both centuries and oceans.

Rychtarczyk's father immigrated as a child to the United States from Maniowy, Poland, when the farming town and surrounding coal mining communities became uninhabitable after Maniowy was flooded to expand a reservoir.

"Many of the families moved elsewhere in the country and to Chicago, which is where my Dad ended up," says Rychtarczyk. "There is a large Polish population in Chicago, and they still have a yearly celebration downtown to gather the families who used to farm or work in the coal mines."

While on co-op, Rychtarczyk worked as a production manager engineer at Cargill Deicing Technology in Cleveland, Ohio, where Cargill mines and manufactures salt for food, water purification and roads.

For someone who grew up in the small town of Plainfield, Ind., the sheer size of the Cargill facilities, equipment and salt mine was awe-inspiring.

"The first time I went underground beneath the Great Lakes, I was 1,800 feet from the surface, and I never wanted to leave," says Rychtarczyk. "Actually, one of my first major projects at the co-op was to figure out how to renovate and replace a service cage that goes up and down the shaft at 500 feet per minute."

Salt corrodes metal, and the problem is even greater in salt mines where corrosion of mining equipment has always been a significant issue. Corrosion repairs to machinery is costly and can affect operation procedures.

"So, it was my responsibility to figure out how to get this massive unit (the service cage) modified. It was a big engineering problem getting the new prefab service cage into the shaft itself," says Rychtarczyk.

Rychtarczyk hopes to return to Poland later in his career to help make the mines there safer and more efficient.

ALUMNI UPDATES

Fiorella Giana, MinE'05, received a 2017 Distinguished Young Alumni Award from the Miner Alumni Association.

Richard Bullock, MinE'51, MS MinE'55, DE MinE'75, professor emeritus of mining engineering at S&T, edited and wrote parts of *Mineral Property Evaluation: Handbook for Feasibility Studies and Due Diligence*, which was published by the Society for Mining, Metallurgy & Exploration.

James Pinkley, MinE'83, was among nine S&T graduates inducted into the Academy of Mines and Metallurgy in April. A resident of Aurora, Colo., Pinkley is vice president of civil and safety for the Jennmar Corp.

Braden Lusk, MinE'00, PhD MinE'06, recently completed service on a National Academies of Sciences, Engineering and Medicine committee that studied occupational exposure to coal mine dust in underground mines.

A committee report release in June recommends a "fundamental shift ... in the way mine operators approach exposure control" and urges a number of actions by the National Institute for Occupational Safety and Health (NIOSH) and the Mine Safety and Health Administration (MSHA).

To read more about the 10-member committee, whose members included former S&T mining engineering chair **R. Larry Grayson**, visit bit.ly/2uqfDGi. A report summary can be found at bit.ly/2KRDW17.



RESEARCHERS AT EXPERIMENTAL MINE TEST CONCRETE SEALS IN COAL MINING TUNNELS

Mining engineering researchers at Missouri S&T will use explosives combined with common mining materials to test how well concrete seals in coal mine tunnels withstand high-speed projectiles. Their research could lead to improved seal design, which could improve coal mine safety.

“We’re going to build an explosively driven projectile generator, and basically what that means is a big cannon,” says **Kyle Perry**, assistant professor of explosives engineering at Missouri S&T. “It will be 10 to 20 feet long. We will add explosives, concrete blocks, hard hats, roof bolts and other materials that could be left behind in a mining tunnel, and we’ll throw that at a seal.”

S&T researchers hope to determine the size and speed a projectile would need to travel to damage the seal.

Perry is working with Strata Worldwide, a mining safety services provider in Atlanta, to build two concrete seals like the ones in active coal mines for the project at the Experimental Mine.

“We will be building two seals — one 120 psi and one 50 psi, and then Kyle will do his best to destroy them,” says Mike Fabio, senior development engineer at Strata.

Fabio is coordinating the concrete plan for building the seals to be used in the S&T experiment.

“This testing could really help with future designs of seals,” he says. “Are they actually strong enough to withstand the explosive forces? Are they too strong? Do we need to do anything more to modify the seal designs?”

S&T received a \$249,000 grant from the Alpha Foundation for the Improvement of Mine Safety to test seal integrity in



DONORS SUPPORT MAJOR LAB UPGRADE IN MCNUTT HALL

A major renovation of the rock sample preparation lab in McNutt Hall has been funded by two long-time supporters of the mining and nuclear engineering department.

Thanks to matching gifts of \$40,000 from Newmont Mining Corp. and \$2,000 from **Dianna Tickner**, MinE'79, the department has fully funded an \$84,000 renovation of the lab where undergraduate students learn the core discipline of rock mechanics. The College of Engineering and Computing provided the initial \$42,000 for the project.

The upgrade includes a new floor plan, new ventilation, drainage and electrical systems that will provide a safer and more efficient lab environment, and new equipment including a core drill and two saws. Newmont Mining Corp., headquartered in Greenwood Village, Colo., is one of the world's leading gold producers. Tickner is a member and former chair of the Academy of Mines and Metallurgy.

"We are grateful to our donors for investing in this vital renovation," says **Kwame Awuah-Offei**, associate professor and interim director of mining engineering. "Thanks to their generous support, our students are acquiring the foundational skill of rock mechanics in a state-of-the-art undergraduate research lab. The dust and mud generated in rock sampling is significant, and the upgrade has greatly improved the environment and tools essential to providing students with the best possible learning experience."

underground tunnels that miners close off after finishing with them. The S&T mine was chosen because of its large-scale testing facilities and expertise.

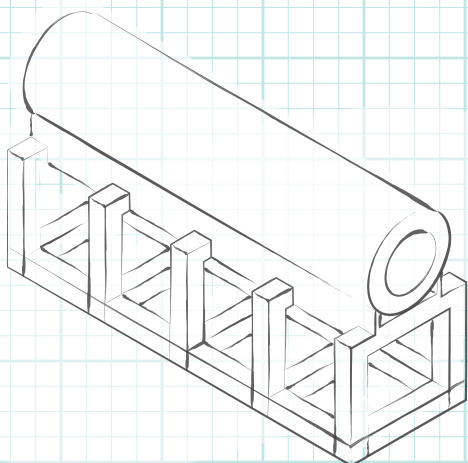
"Damaged seals could start leaking methane into the active portion of the mine," says Perry. "That could become an explosive mixture and would be dangerous for the miners."

The Mine Improvement and New Emergency Response (MINER) Act was

prompted by a 2006 mining accident at the Sago mine in West Virginia that killed 12 miners after lightning ignited methane gas in a sealed-off section of the mine. The explosion and mine collapse sent debris and carbon monoxide into the working sections of the mine. The seal's failure and leakage of carbon monoxide killed all but one of the 13 trapped miners.

The S&T seal testing started in August 2018 and should be complete by April 2020. □

Kyle Perry, pictured above right, is developing a cannon of sorts to test how well concrete seals in mine tunnels withstand high-speed projectiles. His work will help improve coal mine safety. Pictured left is a CAD drawing of the concept for the cannon Perry plans to construct.





MUCKING AROUND

Four Missouri S&T mucking teams traveled over 4,000 miles across the Atlantic to compete in the 40th Intercollegiate Mining Competition, held at the end of March at Camborne School Of Mines at King Edward Mine in Camborne, Cornwall, England.

The teams — one women's, two men's and one alumni team — competed against approximately 40 other teams from around the world in timed events like gold panning, surveying, hand-mucking, hand-steeling, track-standing, Swede sawing and jackleg drilling.

The alumni team, named "Tater Patch," earned fourth place overall, winning its jackleg drill event. The women's team earned third place, winning the swede saw event. The men's teams placed sixth and ninth.

First held in 1978, the games were created to honor 91 miners who died in a fire at Idaho's Sunshine Mine in 1972. The competition celebrates traditional mining practices and helps create a global community of mining students. Mining colleges and universities around the world rotate hosting the Intercollegiate Mining Competition.



MINE RESCUE TEAMS AGAIN TOP INDUSTRY RIVALS

Missouri S&T was once again well-represented at the annual Southern Regional Mine Rescue Contest, with the Black and Gold squads the only collegiate participants in a field otherwise filled with professional teams.

The 48th annual contest, which simulated a mine emergency, took place in New Iberia, La., April 30–May 3. The squads from private industry represented companies such as Doe Run, Vulcan Materials Co. and Morton Salt.

The competition consists of a written skills test; two hands-on simulated underground mine disasters; a first-aid portion with a written test, hands-on CPR and a first-responder scenario; and a team technician portion with a written test and technical troubleshooting of breathing apparatuses and gas instruments. Sixteen S&T mining engineering students participated.

S&T's Gold team finished in second place in the first-aid category, third place in the team tech portion and tied for sixth place overall. The Black team finished third in the first-aid event, eighth in team tech and eighth place overall.

The competition was judged by officials from the U.S. Department of Labor's Mine Safety and Health Administration (MSHA) and the Missouri Department of Labor Cave and Mine Safety

Both Missouri S&T teams were trained by **DeWayne Phelps**, senior lab mechanic in mining and nuclear engineering at S&T.

EXPLOSIVES RESEARCHERS TEAM WITH U.S. ARMY, ROLLA HOSPITAL ON TBI PROJECT


While in the Marine Corps, explosives engineering Ph.D. student **Barbara Rutter** saw the effects of traumatic brain injury (TBI) on her fellow Marines' lives firsthand.

Those experiences led Rutter to devote her graduate research to the relationship between physical building damage and TBI occurrence, so that the military can easily determine if an improvised explosive device (IED) explosion has caused such an injury.

"It's really difficult to quickly assess people's injuries in combat after an IED has gone off," she says. "Being able to give the military an easy guide to identify the severity of the TBI right away allows them to start preventative treatments immediately."

With funds from a U.S. Department of Defense grant, Rutter is working with **Catherine Johnson**, assistant professor of explosives engineering, to investigate how exposure to explosives affects the brain. They're mapping blast waves that reflect off the ground and damage structures in an explosion.

A partnership with the University of Missouri-Columbia School of Medicine and the federal Department of Veterans



Catherine Johnson, pictured above, detonates a charge of composition C-4 at the S&T Experimental Mine.

Affairs allows Johnson and Rutter to use the blast model to better understand behavioral and neuropathological changes to people with blast-induced TBIs.

It's one of several S&T research projects associated with the Acute Effects of Neurotrauma Consortium, a partnership with Phelps County Regional Medical Center, the U.S. Army at Fort Leonard Wood and the Army's Leonard Wood Institute to prevent, detect and treat TBI.

Much of the related research on explosives and brain trauma is conducted using shock tubes, a tunnel-like device in which blast waves can be directed at sensors to mimic explosions, using compressed gas rather than detonation.

S&T's Experimental Mine, though, offers enough open space above ground to perform open-field blasting, which can more effectively replicate battlefield explosions by enabling the blast waves to bounce off buildings, the ground, military vehicles and other objects.



TINA ALOB Aidan HONORED FOR STAFF EXCELLENCE

Tina Alobaidan, our administrative associate, was one of nine S&T staff members to receive Staff Excellence Awards this past May. Interim chancellor **Chris Maples**, pictured above right with Staff Council chair **John Cook**, presented each winner with a plaque and a check for \$600.

Alobaidan was recognized as the department's go-to person who is always courteous and quick to offer help.

"With a stunning work ethic, upbeat and people-centered attitude, (Tina) demonstrates excellence in navigating multiple tasks with a calm and friendly manner," her nominator wrote. "Even when her work is challenging, this nominee goes the extra mile to make sure everything is done precisely to help the department thrive."

Her "incredible work ethic demonstrates dedication to the university by always thinking about what is in the best interest of the students and the department."

Alobaidan joined S&T's international affairs office in 2011. She has been in our department since October 2013. Congratulations, Tina.



ROCK MECHANICS ENGINEER SHERIZADEH JOINS FACULTY

Please join us in extending a warm Rolla welcome to our program's newest faculty member, **Taghi Sherizadeh**, assistant professor of mining engineering.

Sherizadeh is a rock mechanics engineer who most recently worked in private industry for Golder Associates Inc. in Portland, Ore., where he worked since 2014 with clients including Kennecott Utah Copper, the Diavik Diamond Mine in the Canadian Arctic, and BHP in Australia (formerly known as BHP Billiton).

He holds a Ph.D. in mining engineering, with a focus on geomechanics, from the University of Arizona, and a bachelor of science in mining engineering from Sahand University of Technology in Iran.

Sherizadeh's research interests are in computational geomechanics, with an emphasis on analytical and numerical modeling of surface and underground rock engineering products.

He will work out of the renovated rock sample preparation lab in McNutt Hall (see p. 5), a modernized space that will benefit both students in the mining engineering program as well as their counterparts in the geosciences and geological and petroleum engineering department.



NEW ACADEMIC ADVISOR MAKES MOVE FROM FULTON TO MCNUTT

The mining and nuclear engineering department's new academic advisor didn't have to travel very far to begin work in his new position.

Stephen Casey was a familiar face to the nuclear side of our department, having worked since October 2016 as an office support staffer on the second floor of Fulton Hall. He joined the department's office in McNutt Hall a little more than one year later.

In addition to his advising duties, Casey also travels with student organizations to conferences and competitions, assists leaders of the nine student organizations affiliated with the department, works with the S&T admissions office on targeted recruiting and helps manage departmental websites. Come Halloween, he'll also oversee the Haunted Mine.

Prior to his campus arrival, Casey spent 23 years in the U.S. Army and Missouri National Guard, with his most recent assignment as a recruiting and retention non-commissioned officer based out of Guard headquarters in Jefferson City.

He's also a part-time student, working toward an undergraduate degree in business and management systems after having attended S&T for two semesters in the late '90s

LEADERSHIP CHANGES IN MINING AND NUCLEAR ENGINEERING

Braden Lusk, MinE'00, PhD MinE'06, chair and professor of mining and nuclear engineering since August 2016, resigned from S&T effective July 1 to take a position with the commercial explosives company Dyno Nobel.

In the interim, **Kwame Awuah-Offei**, associate professor of mining engineering, will serve as interim director of mining engineering, while **Hyoung-Koo "Hank" Lee**, associate professor of nuclear engineering, will serve as interim director of nuclear engineering.



FACULTY UPDATES



ISEE AWARDS FOR JOHNSON, WORSEY

Paul Worsley and **Catherine Johnson** brought home a pair of honors from the 2018 annual conference of the International Society of Explosives Engineers in Orlando, Fla.

Worsley, a professor of explosives engineering, received the group's Industry Service Award for his efforts to build an ISEE campus chapter, as well as his work with the S&T mucking teams and the Haunted Mine fundraiser.

Johnson, an assistant professor of explosives engineering, received the ISEE President's Award for "unselfishly contributing ... her time, talents and efforts" to the explosives industry.



JOHNSON NAMED PRESIDENTIAL ENGAGEMENT FELLOW BY UM SYSTEM

Johnson was also named a Presidential Engagement Fellow by University of Missouri System President **Mun Choi**, a role that will see her and others in the select group represent S&T and the UM System at a number of speaking events throughout the state.



FRIMPONG RECEIVES JACKLING AWARD

Samuel Frimpong, professor and Robert H. Quenon Missouri Endowed Chair in Mining Engineering, received the 2018 Daniel C. Jackling Award from the Society for Mining, Metallurgy and Exploration (SME).

The Jackling Award, established in 1953, is presented for significant contributions to technical progress in mining, geology and geophysics. Frimpong was cited for his "long-term contributions to mining engineering education, research and professional development and for his international recognition as an outstanding scholar in mining engineering."



ALAGHA GAINS TENURE

Faculty member **Lana Alagha** has been promoted to associate professor of mining engineering after gaining tenure at Missouri S&T.

Alagha, whose research interests include clean coal technology, management of tailings' wastes, extraction of rare earth and simulation of mineral processing beneficiation circuits, joined S&T as an assistant professor in August 2012. She earned a Ph.D. in chemistry from the University of Texas at Dallas and was a postdoctoral fellow in chemical and material engineering at the University of Alberta in Edmonton, Canada.



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GRADUATION DOESN'T MEAN GOODBYE.

It's easy to stay in touch with your department. Just say hello when a student representative calls from Phonathon or drop us a note at tinaa@mst.edu. Tell us how you're doing with a degree in mining or explosives engineering so we can feature your accomplishments among our alumni achievement stories.

With your support, there's no limit to what we can achieve.

