

# 2019 LONGWALL USA

Exhibition & Conference





**RETURN TO  
DOWNTOWN  
PITTSBURGH**

May 19-22, 2019  
Longwall USA 2019, Pittsburgh, Pennsylvania

## Longwall USA Provides Useful Information for Underground Coal Operators

*Trade show highlights the best in longwall mining operations, while offering educational benefits that also include room-and-pillar mining*

Longwall mining is the safest, most-productive form of underground coal mining. For more than 20 years now, industry leaders have gathered at Longwall USA, which takes place every two years on odd years, to see the latest in underground coal mining equipment and technology and to learn from and network with their peers.

*Coal Age* has always been affiliated with Longwall USA and its publisher, Mining Media International (MMI), purchased the conference and exposition. Improvements were made to the technical program. In addition to the excellent technical presentations on longwall mining and development that delegates expect, MMI and the Longwall USA steering committee worked with the National Institute for Occupational Safety & Health (NIOSH) to organize two training workshops. All coal operators will be interested in these workshops, not just longwall miners. Professional development hours will be credited to professional engineers.

The Longwall USA executive committee has also worked with the major universities to add a poster contest for engineering graduate students. The logic behind this move was to get more youth involved in the event. Interest and participation has been high. This will be a great opportunity to see the future of our industry.

The other major component of Longwall USA is the exhibition, which currently has more than 75 suppliers showcasing equipment and technology. MMI will soon launch an app that will allow conference delegates to interact with the exhibitors and participate in the program.

Longwall USA begins Sunday evening, May 19 with a reception on the show floor. The 2.5-day technical program kicks off on Monday, May 20. On Tuesday, May 21, *Coal Age* will present the Longwall USA Top Performers Awards. On Tuesday, attendees can participate in the Longwall USA night at PNC Park. Prime seats for the Pirates game are available at cost (\$29).

While we will honor walk-up registrations, we are asking people to preregister at [www.longwallusa.com](http://www.longwallusa.com). Plus, preregistering will save your company a couple of bucks. Miners who purchase a full - conference registration will have access to the papers after the event. We are also offering an exhibit-only rate. Those people can listen and participate in the technical program, but they won't have access to the papers after the event and they will not receive credit from MMI for professional development hours.

I hope to see you soon at Longwall USA 2019 in Pittsburgh.

Thank you.

Steve Fiscor  
Publisher & Editor  
Mining Media International  
+1 904-721-2925  
Email: [sfiscor@mining-media.com](mailto:sfiscor@mining-media.com)



# RATES & SCHEDULE

# Hotels & Event App

## Sunday

### Registration

8 a.m. – 6 p.m.

### Welcome Reception

6 p.m. – 8 p.m.

## Monday

### Keynote Speaker

9 a.m. – 9:30 a.m.

### Session 1: Advanced Technology

9:30 a.m. – 11 a.m.

### Workshop No. 1

2 p.m. – 4 p.m.

## Tuesday

### Session 2: Advanced Health & Safety

9:30 a.m. – 11 a.m.

### 2019 Longwall USA Top Performers Awards

12 p.m. – 12:30 p.m.

### Panel Discussion Diversity in Mining

1 p.m. – 1:50 p.m.

### Workshop No. 2

2 p.m. – 4 p.m.

## Wednesday

### Session 3:

### Development & Logistics

9 a.m. – 11:30 a.m.

## Advanced Registration

4/1/2019 - 5/8/2019

<b>3-Day Coal Operator's Exhibit-Only Pass</b>	<b>\$119</b>
<b>1-Day Coal Operator's Exhibit-Only Pass</b>	<b>\$59</b>
<b>3-Day Coal Operator's Full-Conference Reg</b>	<b>\$295</b>
<b>1-Day Coal Operator's Full-Conference Reg</b>	<b>\$175</b>
<b>3-Day Full Conference (non-coal operator)</b>	<b>\$895</b>
<b>1-Day Full Conference (non-coal operator)</b>	<b>\$595</b>

## On-site Registration

<b>3-Day Coal Operator's Exhibit-Only Pass</b>	<b>N/A</b>
<b>1-Day Coal Operator's Exhibit-Only Pass</b>	<b>N/A</b>
<b>3-Day Coal Operator's Full-Conference Reg</b>	<b>\$320</b>
<b>1-Day Coal Operator's Full-Conference Reg</b>	<b>\$200</b>
<b>3-Day Full Conference (non-coal operator)</b>	<b>\$1,000</b>
<b>1-Day Full Conference (non-coal operator)</b>	<b>\$700</b>

**Coal Operator:** Only available for engineers and management personnel from coal and trona operations, academics, regulators, etc.

**Full Conference:** Includes access to all presentations and credit for professional development hours through the Longwall USA app.

New to the conference this year will be our Longwall USA Mobile Event App!

This feature-packed digital event guide will provide interactive content and activities, engaging attendees and suppliers alike.

Top features include:

- Session agendas
- Personalized agendas
- Speaker information & presentations
- Show floor plan
- Exhibitor information
- Activity feed
- Messaging
- Networking
- And more!



Mining Media International has reserved rooms downtown near the David L. Lawrence Convention Center.

Please visit [longwallusa.com/accommodations](http://longwallusa.com/accommodations) to reserve your room

Drury Plaza Hotel  
Best Value = \$184/night

Marriot Courtyard  
Limited Rooms Available = \$209/night

Westin Hotel & Resorts  
Nearly Sold Out = \$239/night

**MONDAY**  
May 20, 2019



## **Keynote Address**

9 a.m. -9:30 a.m.

### **Coal Exports and its Influence on World Markets**

Nicholas Cron, general manager-portfolio optimization and marketing for XCoal Energy & Resources

While domestic coal output and consumption has continued to decline over the past decade, growing U.S. shipments into the global coal export market has renewed levels of optimism within the industry. With exports now making up a larger percentage of U.S. coal production than ever before, Nick Cron of Xcoal will share his experiences from this transitional period and provide an outlook for the near-term market direction.

## **Session 1: Advanced Technology**

9:30 a.m. -11:30 a.m.

### **Operational Benefits When Running Longwall Automated Face Alignment & Horizon Control Systems**

Jeff Ley, shearer product lead, Komatsu Mining Corp.

Maintaining face alignment and horizon control for longwall systems are complex operational challenges that the mine operator has to manage. To help address these difficult mining problems two key solutions were developed and deployed: automated face alignment control and shearer pitch steering (enhanced horizon control.) Komatsu has working closely with an Illinois Basin mine and has been successful in improving coal recovery and strata stability through the deployment of these key technologies. Both these systems require close integration between the shearer and roof support control systems to achieve the desired results.

### **The Positives and Negatives of Operating Longwalls From the Surface**

Peter Henderson, engineering manager for underground operations, Glencore (Australia)

During 2017, one of the Glencore longwalls in Australia was faced with a tough situation. An excessively high concentration of carbon dioxide was found in a section of the current longwall block. This concentration was so high, the risk of injury due to coal outburst was intolerable. The area of high risk was approximately 200 m of retreat. Two options were considered: move the longwall around the high-risk area or mine through the area with no people on the longwall face. The latter option was selected based on shearer floor steering using LASC-enhanced horizon control protocols. As many functions as possible were transferred to a room on the surface that became known as “the bunker.” Not only did this method of mining successfully mine through the high-risk zone, but the mine continued to use this method even when people were allowed back on the longwall face. This presentation discusses the positives and negatives from this experience and other initiatives Glencore has undertaken since.

### **Operating a Fully Mechanized Face Remotely From a Control Room in China**

Benfu Yan, Guizhou Zhongyi Jincaiqian Mining Group Co. Ltd.

China has been promoting the increase of mechanization level for underground coal mining throughout the country. Being the largest coal-producing province in southwest China, Guizhou has been taking active measures to encourage coal companies in this province to adopt more advanced mining technologies including fully automated longwall (FA LW). Guizhou Zhongyi Jincaiqian Mining Group Co. Ltd. (GZJM) employs multiple new geophysical prospecting techniques/approaches, including radio wave imaging, in-seam seismic survey and advanced detection (with geological radar) to identify the mining/geological conditions prior to production. Using real-time seismic survey techniques, developing 3D dynamic geologic models, establishing fully automated and remote-control working face, and facilitating the real-time sharing and dynamic interaction of the 3D geologic information of working face and the automatic cutting operation of the shearer. In the past few years, this has led to GZJM realizing the remote monitoring and automatic control of shearer, AFC and support for thin seams, and has successfully installed the first “intelligent working face” designed for longwall mining of thin seams. This operation has been proved safe and productive, marking a solid step toward the “Age of Intelligent Working Face.”

### **Using Dynamic Elemental Modeling for AFCs and Drums**

Daniel Sharpe, longwall mining engineer, Komatsu Mining

The use of Discrete Element Modelling (DEM) in the mining industry has applications from conveyor systems to shovel bucket loading efficiency. The ability to build in design changes and the implications these have on material transfer or interaction gives greater confidence before new generations of equipment are tested in the field. In longwall applications, Komatsu has been applying DEM technology to simulate bulk flow behavior along the armored face conveyor. Analyzing flow-critical areas such as the main gate corner, BSL discharge and the crusher, DEM has been used to validate design changes and as a development tool to test empirical designs. The software has been used to simulate extraordinary operational conditions. Simulations of large particles can analyze the effect of blockages on the AFC to account for mines prone to large slabs of material or poor face conditions. With exciting potential to simulate particle breakage, wear contacts and particle residence times among others, the capabilities of DEM for longwall applications continues to grow into a significant design and problem-solving tool for engineers.

## **Workshop No. 1**

2 p.m. – 4 p.m.

### **Preparing Miners and Responders for Emergency Decision-Making**

Launa Mallett, Angela LaFollette, and Blaine Connor, NIOSH, Pittsburgh Mining Research Division

In a mine emergency, chaos can lead to tragedy. To take charge in an emergency, by law (30 CFR 75.1501), coal mines must designate an on-site “responsible person” (RP). The RP’s duties include ordering miners to evacuate, notifying the Mine Safety and Health Administration (MSHA) and others for help, and establishing an orderly overall response. Analyzing past disasters, MSHA reasoned that mines could achieve better outcomes if everyone at the mine knows who is in charge and if that person knows current mine conditions and sound emergency management practices. The use of tabletop exercises for mine emergency response development will be reviewed.

**TUESDAY**  
May 21, 2019

## Session 2: Health & Safety

9 a.m. -11:30 a.m.

### Personal Longwall Proximity Detection

Todd Moore, general manager of safety, CONSOL Energy,  
and Craig Dickerson, assistant superintendent-Bailey mine, CONSOL Energy

CONSOL Energy Inc. and Komatsu Mining Corp. jointly deployed a personal proximity detection system in a high production longwall face in 2017. The National Institute of Occupational Safety and Health (NIOSH) Mine Safety and Health Technology Innovations Award in Coal was awarded to Consol and Komatsu in 2018 for making a monumental effort in applying this technology and improving mine operator safety underground. The presentation will briefly cover the technology and challenges experienced during the development and deployment of the personal proximity detection system for use in an underground mining application.

### A Laboratory Investigation of Underside Shield Sprays to Improve Longwall Water Directional Spray System

Randy Reed and Scott S. Klima, NIOSH Mining, Pittsburgh

Historically, longwall workers can be exposed to harmful respirable dust from multiple dust-generation sources, including intake ventilation, stageloader/crusher, shearer and shield advance. Longwall shearer operators and jacksitters have had the greatest difficulty in meeting the applicable respirable dust standard during compliance sampling by the Mine Safety and Health Administration (MSHA). Recently, MSHA passed a new dust rule that will reduce the respirable dust permissible exposure limits (PEL) from 2 mg/m<sup>3</sup> to 1.5 mg/m<sup>3</sup> in August 2016. In a benchmarking survey of U.S. longwall operations, NIOSH researchers observed dust clouds created by the fracturing and spalling of coal immediately upwind of the headgate drum that was migrating toward the walkway and exposing workers. In response, NIOSH has been conducting research to increase the effective zone of the directional spray system through utilization of underside shield sprays in the headgate drum area. The underside sprays on each shield can be automatically activated/deactivated by the position of the shearer along the face. The goal is to create a "traveling water curtain" to stop the migration of the dust cloud from the coal face toward the walkway by redirecting the dust toward the face where it can be captured by the directional spray system on the shearer. NIOSH has completed laboratory tests to evaluate the performance of water sprays mounted on the underside of the canopy. Five conditions for underside canopy sprays were examined: spray location, spray type, spray pressure, spray orientation, and gallery ventilation rate. This paper discusses laboratory tests to assess the performance of water sprays mounted on the underside of the canopy that when properly aligned and directed toward the face with appropriate water pressure and volume, and have the potential to be an effective tool that expands the envelope of clean air created by the shearer's directional spray system.

### Using Safety Climate Trends in the Coal Industry to Improve the Identification and Use of Leading Indicators

Emily J. Haas and Cassandra L. Hoebbel, NIOSH Mining, Pittsburgh

Researchers traveled to various mine sites and administered a 59-question survey between February 2016 and March 2018. Participants consisted of 2,683 mineworkers — both salary and hourly — at 39 mine sites. Three of these mines were in Canada and the remaining 36 were dispersed throughout 17 states in

the U.S. The 39 mines represented nine major companies and three mined commodities (i.e., coal, sand stone and gravel, and industrial minerals). To our knowledge, everyone who was present on site during data collection completed the survey. The breakdown of participation by commodity was stone, sand, and gravel (n=1,418, 53%); industrial minerals (n=907, 34%); and coal (n=358, 13%).

The results showed coal workers have significantly lower perceptions than those workers in other commodities. After qualitative debriefs with the mine sites and a better understanding of trends among various mined commodity sectors, NIOSH researchers discuss ways the coal industry can improve pieces of their health and safety management system to better support worker health and safety. Actionable results will be provided to mine management that they can integrate immediately into their risk management and measurement efforts.

### Seismic Miner Location System

Max Clark, U.S. Mine Safety and Health Administration

If events at an underground mining operation trap a miner or group of miners, the Mine Safety and Health Administration (MSHA) can deploy the Trapped Miner Seismic Location System to help determine the underground location(s) of the trapped miners(s). The system can utilize miner-generated seismic signals as a means to communicate proof-of-life and location to surface operations. The system is comprised of multiple surface arrays. Each array includes a set of geophones, radio telemetry, digitizer, GPS antenna and a power supply. The arrays communicate digitized seismic data to remote computers for processing. Processing removes interference to facilitate detection and origin of the miner-generated seismic signals.

### Influence of Longwall Mining on the Stability of Shale Gas Wells in Barrier Pillars

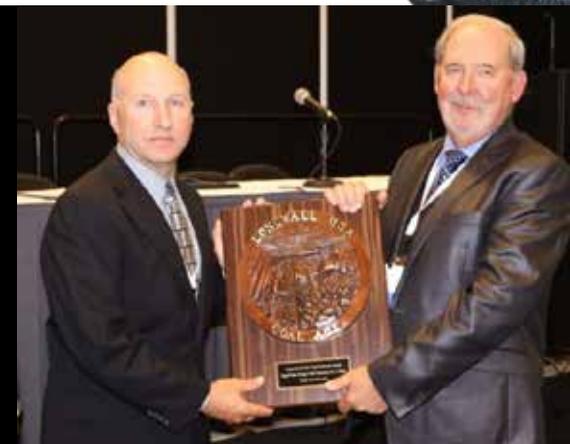
Peter Zhang and Daniel Su, NIOSH Mining, Pittsburgh,  
and Jun Lu, CONSOL Energy

The influence of longwall mining on unconventional shale gas wells located in longwall pillars has been a continuing concern for mining. Over the past decade, many shale gas wells have been drilled through the Pittsburgh coal seam to the Marcellus shale formation. The shale gas wells in longwall chain pillars are subjected to longwall abutment pressure and subsurface deformation. The stability of those gas wells in the chain pillars is primarily influenced by the stability and deformational behavior of the chain pillars as well as subsurface ground movement. In another situation, the gas wells located in the barrier pillars are less influenced by longwall mining as the pillars are larger and the gas wells are farther away from the gob. However, when longwall mining occurs on both sides of the barrier pillars, the influence on the gas wells can be pronounced and they could be potentially compromised. This study involved a case in which a shale gas well was located in a barrier pillar between two longwall bleeders in the Pittsburgh coal seam. The first longwall panel was mined before the gas well was drilled and installed in the barrier pillar adjacent to the longwall setup bleeders. The second longwall setup bleeders were developed on the other side of the barrier pillar and the second longwall panel was subsequently mined. The stability of the gas well was evaluated using numerical modeling approach. The model was set up based on site-specific mining conditions and overburden geology and included details to simulate the gas well casings, mining sequence and longwall retreating. The modeling procedures produced realistic results of stresses and deformations around the barrier pillar where gas well was drilled. The induced deformations and stresses in the gas well casings were also obtained from the model. The modeling results were compared to the actual performance of the gas well during and after the second longwall was mined. There will also be discussion about the effect of longwall mining on stability of shale gas wells in the barrier pillars adjacent to longwall gob.

## 2019 Longwall USA Top Performers Awards

Tuesday, 12:30 p.m.-12:50 p.m.

*Coal Age* will present the Longwall USA Top Performer awards to the three best American mines.



# TUESDAY

May 21, 2019

# SPECIAL EVENTS

## Diversity in Mining

Panel Discussion: 1 p.m.-1:50 p.m.

While the number of women in the mining industry is low, significant progress is being made on the recruitment, retention and growth of women in the industry. The panel members are women who are actively engaged in mining or equipment supply and support. The members, which have more than 45 years of combined industry experience, will highlight their career path, and share recommendations on how other women can find an entry point into the industry, and how best to grow professionally within the industry. They will also speak to some of the work they've seen occurring in the industry to make it a more inclusive and diverse space.

Panel Members:  
Megan Billay, project mining engineer-in-training, BHP  
Michelle Burich, senior mining applications engineer, KMC  
Cheryll Godwin-Abel, manager of project delivery, BHP  
Jez Leeming, global product director, entry development

Panel Moderators:  
Dani Ringrose-Hobbs, principal projects contracts & procurement, BHP

## Workshop No. 2

2 p.m. – 4 p.m.

### Competency-Based Self-Escape Training and Assessment

Maggie Ryan, NIOSH Mining, Pittsburgh, and Jason Diamond, training coordinator, CONSOL Energy

In its 2013 report, "Improving Self-Escape from Underground Coal Mines," the National Academy of Sciences urged that mines should adopt a train-to-mastery system with competency standards instead of focusing on fulfilling time-based training requirements. Competency-based self-escape training and assessment focuses on outcomes, such as the mastery of critical self-escape knowledge, skills and abilities (KSAs), placing the emphasis on task performance and individual proficiency instead of training duration. NIOSH's Self-Escape Study identifies the critical self-escape KSAs that all miners must have and the development of a set of competency profiles for self-escape, including task performance criteria for four different employee roles (e.g., escape group leader, responsible person, face crew and outby workers). Mines can utilize these materials to aid in the development of standardized, competency-based self-escape training and assessment. This presentation will review the research efforts and findings of the NIOSH Self-Escape Study and detail a case study of how one mine has utilized the identified critical self-escape KSAs to develop and implement competency-based training and assessment procedures at their mine, providing an example for how all mines can do the same.



## Graduate Student Research Poster Contest

In addition to offering complimentary admission for engineering students interested in longwall mining, Mining Media Internationals has also organized a Graduate Student Poster Contest. The contest will provide an opportunity for graduate students to showcase their work and to compete for cash prizes based on the quality of their posters as determined by a team of judges. The posters will be on display in a designated area in the exhibit hall for the duration of the exhibit. The contestants will be required to be present and discuss their research with interested attendees. Come see the future generation of underground coal mining professionals.

## Longwall USA Night at PNC Park

*Coal Age* has reserved a block of seats behind home plate for the Pirates game on Tuesday, May 21. Those tickets are available at cost (\$29). Advanced registration is recommended as seats are limited. Come see the Pittsburgh Pirates take on the Colorado Rockies.



# WEDNESDAY

May 22, 2019

## Session 3: Development & Logistics

9 a.m. -11:30 a.m.

### The Autonomous Shuttle Car

S. Schafrik, V. Androulakis, J. Sottile, and Z. Agioutantis  
University of Kentucky

Repetitive tasks, such as moving a vehicle from one point to another, can be moved from human control to robot or autonomous control. When it comes to moving coal from the general face area to the outside, conveyor belts have long been the autonomous means of transportation. However, between the end of the belt at the face and the face-cutting locations, there is still the repetitive task of going between the miner and the feeder. Current research seeks to demonstrate the feasibility of autonomous machinery in the mining cycle underground. By introducing the autonomous shuttle cars, the operator can be removed from dusty, noisy and potentially dangerous conditions, and stay in a relatively safe location while supervising the machine instead of operating it. This paper will present preliminary results for automating shuttle cars in the underground coal mining cycle. Lab-scale prototypes equipped with ultrasonic sensors, inertial measurement unit, and a 2D Lidar are currently being developed and tested in a mock mine plan, simulating several navigation scenarios around a pillar. Success/failure metrics are being used for evaluating the performance of the developed systems. The lab-scale platforms are able to communicate wirelessly with a server through a network covering the mining section. Two-way communication enables supervision of the machine, collecting the data and remotely controlling the autonomous platform.

### Rapid-entry Longwall Development With Continuous Haulage at Murray Energy's Marion County Mine

Toby Cressman and Michelle Burich, Komatsu Mining Corp.

With the increased production and rates of longwall panel retreat, faster entry-development rates for longwall gateroads are key to ensure the next longwall panel is ready prior to the completion of the existing longwall panel. Murray Energy Corp. in collaboration with Komatsu have installed a new rapid-entry development system, including a 14ED25 simultaneous cut and bolt Entry Driver and an FCT (flexible conveyor train) continuous haulage system, which increases the rates of advance by providing continuous cutting, loading and conveying of coal throughout the shift. Productivity comparison models were developed from underground studies of existing mining systems at both Harrison and Marion County mines. The model indicated a potential increase of up to 70% in development rates over the existing mining system forecasting a baseline of 225 feet per shift for the rapid entry development system. Coordination of equipment delivery and assembly was established between mine and KMC personnel to ensure a successful section startup during late November 2018. Initial operations and training, on one shift per day, achieved up to 64 ft per operating hour. By January, the mining system was averaging more than 205 ft per shift with two record shifts of 342 and 372 ft per shift.

This paper reviews the equipment and operating system with simultaneous cutting and bolting and continuous conveying of the material and details the successful integration of the rapid-entry development system. Information will be provided of the installation, startup, operating performance, and the collaboration between Murray Energy Corp. and Komatsu Mining Corp. in resolving any issues to provide a truly game-changing longwall development system.

### Gate Road Development Experience Using Continuous Haulage at Glencore's Ulan West Longwall Mine

Brett Murray, engineering manager for Ulan West, Glencore

Ulan West Underground (ULW) was a new underground longwall operation expanding the Ulan Complex's underground operations to a second active longwall. ULW commenced development in 2012 with first LW coal in 2014. Key to the success of the new underground operation at the Ulan Complex was the extended gate roads, up to 9 kilometers (km), and subsequent longwall blocks in excess of 14 metric tons (mt) to provide continuous coal production removing the "off coal" windows associated with longwall relocations. The method for development of the gate roads traditionally includes a continuous miner (CM) and shuttle car (SC) haulage. Due to the longer gate road drivage and to ensure the economic viability of a longwall operation at ULW, a key consideration for ULW's planning was to minimize haulage constraints associated with using SC haulage by purchasing the 4FCT (flexible conveyor train). Ulan identified this as a key risk early on in the project and in consultation with Komatsu procured a whole integrated development system. This system included 1 x 4FCT; 2 x DMU (Dynamic Move Up) configured to include the panel ventilation system components, DCB, etc., including integration into the panel conveyor; 1 x ventilation and services monorail; and longwall conveyor belt. This paper discusses the challenges faced with the implementation and of the 4FCT currently operating at Ulan West over the previous MG03, MG04 and M05 gate roads where the FCT has been used. Details will be provided of the installation, startup and operating performance of the 4FCT since delivery to ULW.

### Using Contractors to Move Longwalls

David Marcum, manager longwall operations, GMS Mine Repair & Maintenance

Longwall mining is the most-productive underground coal mining method, but can prove costly if operations are disrupted. Equipment installation, coal extraction, and recovery methods require very specialized skill sets. Skill gaps in the industry and geological challenges of existing production faces can lead to expensive disruptions in Longwall Production. This presentation describes the evolution of specialty longwall crews and how their unique services close the mine-site manpower gap, improve safety, and can keep coal production at a maximum. Their exclusive skills sets were developed via expert leadership, job repetition, team-building, and utilizing custom-designed equipment to eliminate hazards and improve proficiency.



# 2019 LONGWALL USA

Exhibition & Conference

**MININGMEDIA**  
INTERNATIONAL

11655 Central Parkway, Suite 306  
Jacksonville, FL 32224

Held every two years, Longwall USA is the conference for underground coal mining professionals. The event, which brings together coal operators and suppliers in a convention format, focuses on improving safety and efficiency at underground coal operations in general and longwall mines in particular. The technical program offers continuing education for mining engineers and mine managers.

## Interested in Attending?

Register at

[longwallusa.com/attend/  
registration](http://longwallusa.com/attend/registration)

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Find out more here

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**Join us May 19-22, 2019**

