Coal Age®

The Magazine for Coal Mining and Processing Professionals

JAN-FEB 2019 | A Mining Media International Publication | www.coalage.com

US Longwall Census

Annual Forecast
— Total US Production Dips, But Opportunities Exist

Fine Coal Recovery

If these are three areas your mine needs to improve — automation technology and complete longwall systems from Caterpillar can help you get there.

SAFETY. PRODUCTION. MECHANICAL AVAILABILITY.

Find out more, contact your local Cat® Dealer or or visit us at CAT.COM/ UNDERGROUND

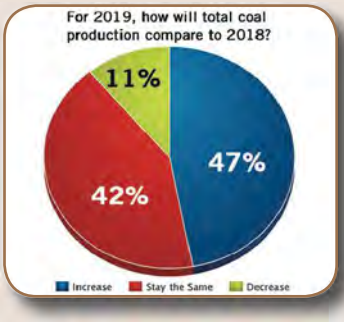
LEARN MORE. Visit cat.com/mining and follow us on social media to learn more about Caterpillar and our support of the mining industry.

CAT®

Coal Age

U.S. NEWS/6

FORECAST SURVEY 2019/20



US LONGWALL CENSUS/24

FINES DEWATERING/30

THIS ISSUE

In addition to the Annual Forecast, this month, Coal Age *offers extended coverage of the longwall mines with its U.S. Longwall Census. On the cover, a longwall shearer cuts coal with water sprays suppressing dust. (Photo: Peabody Energy).*

FEATURE ARTICLES

LEADING DEVELOPMENTS

U.S. NEWS

WORLDWIDE NEWS

DEPARTMENTS

Looking Forward to 2019

BY STEVE FISCOR
PUBLISHER &
EDITOR-IN-CHIEF

With a combined Jan-Feb edition, it seems weird to say it in February, but Happy New Year! We have a lot of ground to cover. So, let's begin with that Super Bowl. Unless you were a Pat's fan, the game was a snoozer, but the Budweiser ads certainly created a lot of controversy for all the wrong reasons. Seriously, the Clydesdales are trotting in front of windmills and people are debating the use of corn syrup or the lack thereof. The two largest coal companies are located within 20 miles of Grant's Farm. Two take-aways here: the Anheuser-Busch executives are not attending the local Rotary Club meetings in St. Louis and the corn farmers have a louder voice than the coal industry.

Have you been following the latest climate change controversy with NBC? Our old friend Chuck Todd from Meet the Depressed recently devoted an entire hour to promoting the views of climate change extremists and refused to offer dissenting opinions. Myron Ebell, director of the Competitive Enterprise Institute's (CEI) Center for Energy and Environment, and his crew are not letting him get away with it. The CEI has launched an ad campaign against the network over its position on climate change, saying that Americans deserve an open debate about climate change and how to address it. "Millions of Americans agree that global warming is not a crisis that requires turning the economy and our lives upside down — but you'd never know that from watching Chuck Todd and 'Meet the Press,'" Ebell said. "CEI has been making the case against global warming alarmism and energy-rationing policies since the 1990s. We have had big victories. Chuck Todd is just the latest to try to win the debate by shutting down his opponents. He won't be the last." You can view the ads and join the debate here: cei.org/nbcclimatedebate.

This edition of *Coal Age* is one of my favorites because it contains the Annual Forecast and the U.S. Longwall Census. Without spoiling it, I would like to offer some of the salient points from both articles.

First, total U.S. coal production is down 22 million tons year-on-year 2018 vs. 2017 or 2.8%. For that reason alone, several equipment makers and service providers have abandoned this market, hoping to sell equipment in other parallel industries. Most of that lost production was from large surface mines in the West. Other medium-sized mining companies in the East actually had a pretty good 2018 and are looking forward to 2019. They have money to invest and they are looking to buy new equipment.

Longwall production increased in 2018. Some longwall mines posted double-digit growth (See Table 2, U.S. Longwall Census, p. 25). Coal production in West Virginia, Indiana, Illinois and Alabama is up. Look closely at the Stats from Coal Country on p. 7. Coal prices in the East are up. Check out Figure 4 on p. 22. Then read the sections on utility stockpiles and exports. Utility stocks are at their lowest levels in decades. Yes, everyone knows that exports are up because met prices are up, but they may not know this. Year-to-date through November 2018, thermal exports are up 12.8 million tons year-on-year from the same point in 2017, while met coal exports have only increased 6 million tons or more for the same period.

It's easy to look at the bottom line, see that the industry is down 2.8% and give up hope, but dig a little deeper and there is some surprisingly good news out there. We hope to bring more of these stories to you in 2019. In the meantime, don't give up on the coal business; it never gave up on you.

Steve Fiscor, Publisher & Editor-in-Chief
sfiscor@mining-media.com

Coal Age

www.coalage.com

Mining Media International, Inc.
11655 Central Parkway, Suite 306
Jacksonville, Florida 32224 U.S.A.
Phone: **+1.904.721.2925**
Fax: **+1.904.721.2930**

Editorial

Publisher & Editor-in-Chief—Steve Fiscor, sfiscor@mining-media.com
Associate Editor—Jennifer Jensen, jjensen@mining-media.com
Technical Writer—Jesse Morton, jmorton@mining-media.com
Contributing Editor—Russ Carter, rcarter@mining-media.com
Latin American Editor—Oscar Martinez, omartinez@mining-media.com
Graphic Designer—Tad Seabrook, tseabrook@mining-media.com

Sales

Midwest/Eastern U.S. & Canada, Sales—Victor Matteucci, vmatteucci@mining-media.com
Western U.S., Canada & Australia—Frank Strazzulla, fstrazzulla@mining-media.com
Scandinavia, UK and European Sales—Colm Barry, colm.barry@telia.com
Germany, Austria & Switzerland Sales—Gerd Strasmann, info@strasmann-media.de
Japan Sales—Masao Ishiguro, ma.ishiguro@w9.dion.ne.jp
Production Manager—Dan Fitts, dfitts@mining-media.com
Marketing Manager—Misty Valverde, mvalverde@mining-media.com

BPA WORLDWIDE BUSINESS

NMA National Mining Association

MINING MEDIA INTERNATIONAL

Coal Age, Volume 124, Issue 1, (ISSN 1040-7820) is published monthly except January and July, by Mining Media International, Inc., 11655 Central Parkway, Suite 306, Jacksonville, Florida 32224 (mining-media.com). Periodicals postage paid at Jacksonville, FL, and additional mailing offices. Canada Post Publications Mail Agreement No. 41450540. Canada return address: PO Box 2600, Mississauga ON L4T 0A8, Email: subscriptions@coalage.com. Current and back issues and additional resources, including subscription request forms and an editorial calendar, are available online at www.coalage.com.

SUBSCRIPTION RATES: Free and controlled circulation to qualified subscribers. Visit www.coalage.com to subscribe. Non-qualified persons may subscribe at the following rates: US domestic addresses a 10 issue subscription, $75.00 USD, All addresses outside the USA a 10 issue subscription $125.00 USD. For subscriber services or to order single copies, contact *Coal Age*, c/o Stamats Data Management, 615 Fifth Street SE, Cedar Rapids IA 52401, 1-800-553-8878 ext. 5028 or email subscriptions@coalage.com.

ARCHIVES AND MICROFORM: This magazine is available for research and retrieval of selected archived articles from Proquest. For microform availability, contact ProQuest at 800-521-0600 or +1.734.761.4700, or search the Serials in Microform listings at www.proquest.com.

POSTMASTER: Send address changes to *Coal Age*, 11655 Central Parkway, Suite 306, Jacksonville, FL 32224-2659.

REPRINTS: Mining Media International, Inc., 11655 Central Parkway, Suite 306, Jacksonville, FL 32224 USA; phone: +1.904.721.2925, fax: +1.904.721.2930, www.mining-media.com

LONGWALL ASSOCIATES
INCORPORATED

FOR THE LONG HAUL

Because maximizing your production is vital, Longwall Associates conveyor systems are powered to perform and optimize production under any circumstance: from low seam to high seam; from the shortest production faces to the longest production faces ; from geologically pristine conditions to impossibly arduous conditions.

Longwall Associates conveyor systems integrate proven and emerging technology to give you reliable, rugged equipment shown to increase productivity while providing the power and performance you expect.

Custom designed with passion and handcrafted in the USA with pride, Longwall Associates delivers *Proven Power*, *Proven Production* and *Proven Performance* - unequivocally, every time. Call our team today to see why more top producing mines trust Longwall Associates to supply their longwall conveyor systems.

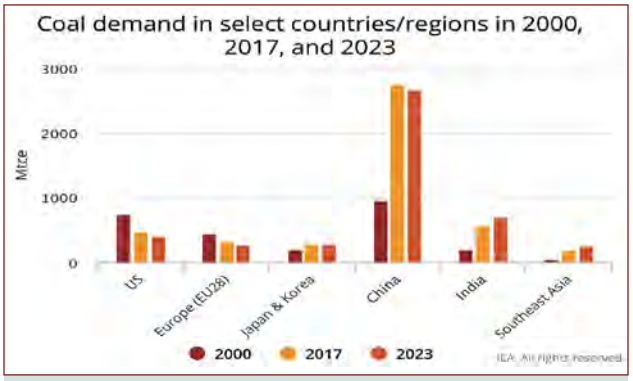
for the long haul

(276) 646-2004 - www.longwall.com

Coal Will Remain Dominant Global Fuel in IEA Forecasts

The International Energy Agency (IEA) released their 2018 Coal Market Report recently with forecasts through 2023. Coal accounts for 27% of total global energy and 38% of global electricity generation, the same market share it held in 1998. In 2017, global coal demand increased by 1% and electricity generation from coal increased by around 3%. IEA's coal market report includes IEA's five-year forecasts for global coal supply, demand, and trade, forecasting that global coal demand will remain fairly stable through 2023 as developing economies increase their coal demand, negating decreases by industrialized countries. IEA said it expects global coal demand to gradually decline from 27% to 25%, mainly due to growth in renewables and natural gas.

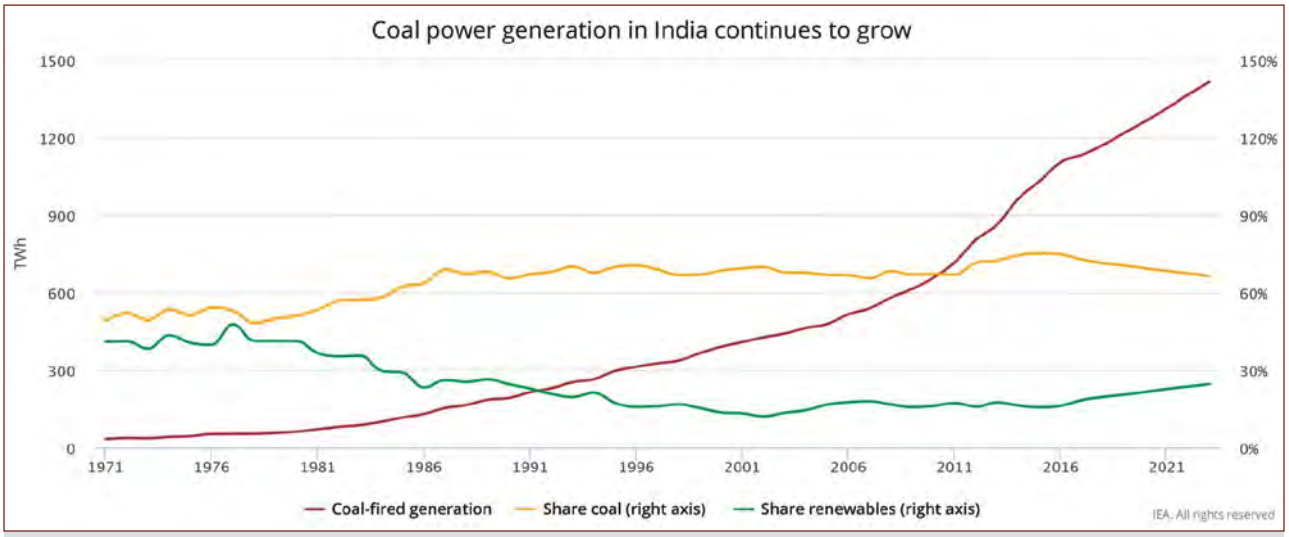
Most Western European countries are lowering their coal demand. By 2023, France and Sweden are expected to have closed their last coal-fired power plants. Germany, which generated 37% of its electricity from coal in 2017, will then be the only significant coal consumer in Western Europe as it replaces its nuclear reactors with wind and solar energy backed up mainly with coal power. In Eastern Europe, coal demand remains stable as most Eastern European countries have not announced phase-out policies. Some new coal-fired power plants are under construction in the Balkans, Greece, and Poland, but IEA said it believes they will replace older and less efficient coal capacity keeping coal use at existing levels. Poland generated 79% of its electricity from coal in 2017.



Coal demand trends in China and India shape world markets.

India's economy is expected to grow by more than 8% per year to 2023 and its electricity demand is expected to increase by more than 5% per year. In 2017, coal supplied 56% of India's primary energy demand and 76% of its electricity. IEA expects India's coal demand growth to increase by less than 4% per year through 2023 compared to 6% over the last decade due to the country's renewable expansion and the use of supercritical technology in new coal power plants that are more efficient than older plants. India's economic growth and infrastructure development is also expected to increase coal consumption in steel and cement production.

South and Southeast Asia's coal demand is expected to increase by more than 5% per year through 2023, the highest growth rate worldwide. Indonesia, Pakistan, Bangladesh, Philippines and Vietnam together account for more than 800 million people, with an average annual per cap-



While it's not quite exponential, coal-fired power generation in India is forecast to increase at an incredible pace.

ita electricity consumption of a little more than 800 kilowatt hours. New coal plants under construction will be the main driver of coal demand growth in the above-named countries. Other countries with higher per capita electricity use, like Malaysia and the United Arab Emirates, have energy mix diversification policies that support new coal plants.

China's coal use represented 60% of its primary energy demand in 2017 and 67% of its electricity demand. IEA assumes that the Chinese economy is in a structural transformation and that its electricity intensity will decline over time, stopping further growth in coal power generation by 2020 with overall coal demand slowly declining at less than 1% per year on average.

In 2017, Chinese coal imports grew by 15 million metric tons, and other large importers either had record imports (Brazil, Chinese Taipei, Korea, Malaysia, Mexico, Morocco, Philippines, Pakistan, Turkey, and Vietnam) or near record imports (Chile, Japan, Thailand). Further growth is expected in 2018 in China and India making seaborne thermal coal trade reach close to 1 billion metric tons.

Thus, the future of coal imports is in south and Southeast Asian demand. Growth is expected in India, Korea, Vietnam, Malaysia, the Philippines, Pakistan, and other Asian countries.

Australia is the expected leader in coal export markets, followed by Indonesia. IEA, however, expects Indonesian coal exports to decline due to increasing domestic demand and lower prices, leaving Australia as the largest coal exporter in the world. IEA also expects increasing exports from the Russian Federation, which is ramping up export infrastructure and targeting the Asian markets. The IEA expects the United States to remain a swing supplier of coal exports.

IEA expects coal to remain a dominant global fuel through at least the next 5 years as developing countries continue to build coal-fired plants to improve their economies and provide electricity to their people. Coal demand growth is expected to be the highest in South and Southeast Asia with many of those countries large coal importers. Australia is expected to be the largest coal exporter while the United States remains a swing supplier.

2018 US Mining Fatalities Were Second Lowest on Record

In 2018, the U.S. Department of Labor's Mine Safety and Health Administration (MSHA) reported that 27 mining fatalities occurred — the second lowest number ever recorded. Eighteen fatalities occurred at surface operations; nine occurred in underground mines. Approximately 250,000 miners work across 12,000 U.S. metal/nonmetal mines, and 83,000 miners work in the nation's 1,200 coal mines.

The leading cause of fatalities was powered haulage, which accounted for 13 fatalities or (48%) of the annual total. The agency said it has taken action to counter powered-haulage fatalities, including publishing a Request for Information seeking stakeholder input on technologies and practices that can improve safety conditions related to mobile equipment and belt conveyors. MSHA also launched a campaign to educate miners and mine operators on the hazards associated with such equipment.

As of 2019, MSHA no longer separates coal and metal/nonmetal fatalities in this space. In 2017 and 2016, the fatality rates for U.S. miners were 28 and 25, respectively.

Production Halts at Donkin Coal Mine

Kameron Collieries, an affiliate of The Cline Group, and owner/operator of the Donkin coal mine in Cape Breton, Nova Scotia, temporarily suspended production at Donkin due to a roof collapse in an older part of the mine. The incident occurred on December 28, during Kameron's scheduled holiday shutdown and no workers were injured. Kameron has been directed by the Nova Scotia Department of Labor to review a variety of engineering and operational measures designed to monitor, control and prevent future mine roof falls. Production at Donkin is expected to resume after Kameron and government inspectors are satisfied that the appropriate measures are in place. The company said its top priority is the safety of its 128 employees and contractors, and it will resume operations as soon as practicable.

Kameron continues to make productivity improvements. In December, it installed a Flexible Conveyor Train (FCT) coal haulage system to replace part of Donkin's shuttle car fleet. It is expected to significantly increase production volumes in 2019 once production resumes.

Production at Donkin is anticipated to reach annual sales volumes of 2.7 million metric tons (mt) to 3 million mt over the next two years. While it is assumed that production at Donkin will resume in a timely manner, the timing of production recommencement is unknown at present and may delay the rate of production increases, the company said.

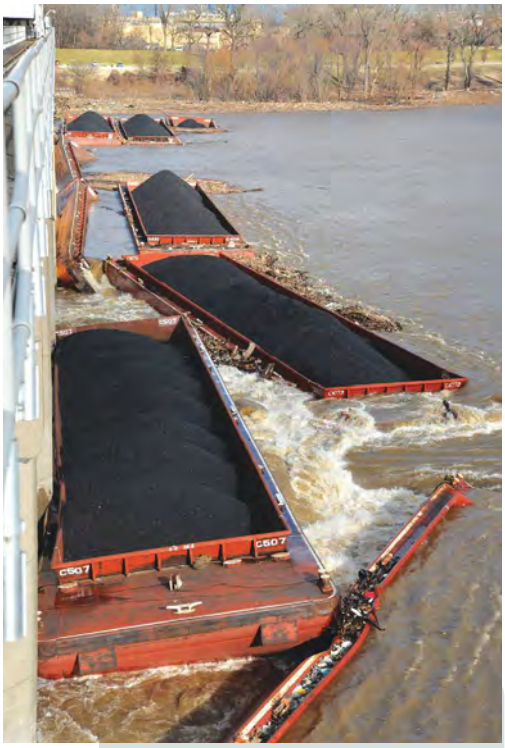
Westmoreland Sells Ohio Assets to CCU Coal and Construction

The winning bidder for Westmoreland Coal's Ohio mining assets was CCU Coal and Construction LLC, owned by Charles Ungurean, according to filings with the U.S. Bankruptcy Court for the Southern District of Texas. These assets include the Buckingham and Oxford mines.

It was determined that Ungurean's bid was the highest, the best and "only viable proposal to acquire the Buckingham mine that included cash consideration," according to court documents.

—Leading Developments Continued on Page 10—

Coal Barges Break Away in Kentucky; Salvage Work Commences



Coal barges are pinned against the McAlpine Dam near Louisville, Kentucky.

The U.S. Army Corps of Engineers and the U.S. Coast Guard accepted a plan to allow salvage operations to begin on January 9 for the barges pinned against the McAlpine Dam on the Ohio River in Louisville, Kentucky. On December 25, a towing vessel, the Debbie Graham, was pushing 15 loaded coal barges upstream to two facilities in Trimble County when a barge hit the Clark Memorial Bridge, causing nine barges to break away and get pinned against the dam. Six barges were recovered, seven capsized and two remain afloat.

The salvage crews, Big River Salvage and McKinney Salvage, under contract with Tennessee Valley Towing, are staged at the upper McAlpine Dam site. Coal will be removed from the sunken barge above the fixed weir portion of the dam closest to the Indiana bank. The coal will be loaded onto empty barges at the scene. Salvage and recovery of the three barges closest to the Indiana bank will begin once the cargo has been removed, the Corps said.

Salvage operations of the remaining barges requires the installation of anchor points in the Indiana bank. Installation of those anchors was expected to begin soon, the Corps said.

The Corps said it will continue to work with all parties to ensure the salvage operations are conducted as safely and efficiently as possible.

The coal was mined in western Kentucky and headed toward LG&E and KU's Trimble County and Ghent power plants, said LG&E spokeswoman Natasha Collins.

American Resources Signs Met Coal Sales Agreement

American Resources Corp. signed a multiyear deal with an existing customer that will lengthen and expand its current agreement to supply at least 50,000 tons per month of metallurgical coal over the next two years, beginning in March.

American Resources will produce, process and load the coking coal for transport by rail at its McCoy Elkhorn Coal subsidiary located in Pike County, Kentucky. The expanded off-take agreement has an annual fixed price and will generate revenue of more than $58 million, with a total contract value of more than $111 million over the two-year term. The contract will reprice in the second year based on market prices and certain pricing collars, and it also has an option to expand tonnages. The customer has also provided a capital investment to finish the Carnegie No. 1 mine rehabilitation and expansion, as well as production at the company's PointRock mine.

"We're very excited about this expanded partnership," said Mark Jensen, CEO at American Resources Corp. "Having these types of relationships allow us to have our coal broadly distributed to a diverse end-user base and enables us to execute on our growth objectives with a certain level of visibility.

"We are actively working to increase the coal production at our Mine No. 15, Carnegie No. 1, and PointRock mines to satisfy this order and other sales opportunities for our metallurgical business, in addition to completing development of our Carnegie No. 2 mine to initiate production there as well."

The current contracted tonnages under this agreement represent approximately 30% of McCoy Elkhorn Coal's met coal production capabilities based on forecasted capex over the next year.

Cloud Peak Breaks the Buck

On December 26, Cloud Peak Energy was notified by the New York Stock Exchange (NYSE) that the average closing price of the company's shares of common stock had fallen below $1 per share over a period of 30 consecutive trading days, which is the minimum average share price for continued listing on the NYSE. Under the NYSE's rules, the company has six months following receipt of the notification to regain compliance with the minimum share price requirement.

As required by the NYSE, Cloud Peak said it would notify the exchange within 10 business days of its intent to cure the deficiency. The company can regain compliance at any time during the six-month cure period if on the last trading day of any calendar month during the cure period, its common stock has a closing

share price of at least $1 and an average closing share price of at least $1 over the 30-trading day period ending on the last trading day of that month.

Trump Officially Nominates Wheeler to Lead EPA

In mid-January, President Donald Trump formally nominated Andrew Wheeler, a former energy lobbyist who has led the Environmental Protection Agency (EPA) in an acting capacity for six months, to serve as EPA administrator.

The White House said Trump had sent Wheeler's nomination to the Senate, making good on a promise he madie in November.

"For me, there is no greater responsibility than protecting human health and the environment," Wheeler said in an emailed statement. "I look forward to carrying out this essential task on behalf of the American public."

Blankenberger Brothers Moves Forward With ILB Mine

After several years of planning, Indiana-based Blankenberger Brothers Inc. finally appears ready this year to move ahead with construction on the newest steam coal mine in the high-sulfur Illinois Basin (ILB).

President Donnie Blankenberger said in early January that the new underground mine will be built near Oatsville in Pike County, Indiana, historically one of southern Indiana's leading coal-producing counties. The mine will be developed by Blankenberger's BB Mining subsidiary, which has mined previously in the region, and could produce up to 3 million tons per year (tpy).

Blankenberger, an excavation company based in Cynthiana, Indiana, has been waiting for the U.S. coal market to improve. While there have been signs of some improvements on the domestic front, including the addition of 3,000 mining jobs, during the administration of Republican President Donald Trump, the export market essentially has been where the action is during the past year or so. And it is forecast to remain strong in 2019.

That's a main reason why Blankenberger is eyeing the seaborne market for the sale of at least some of the mine's 11,300-11,500 Btu/lb, 6 lb SO_2/MMBtu in seams with an average thickness of seven feet. The mine is expected to draw upon an estimated 35 million tons of reserves formerly owned by IPALCO Enterprises, once the main owner of Indianapolis Power & Light Co. (IP&L) IP&L now is owned by AES Corp. of Arlington, Virginia. Blankenberger is in discus-

U.S. News Continued on Page 11

MONTHLY STATS FROM COAL COUNTRY

TOP 10 COAL-PRODUCING STATES AND REGIONS

(Thousands of Short Tons) — Week Ending (12/28/18)

	YTD '19	YTD '18	% Change
Wyoming	301,172	315,295	-4.5
West Virginia	96,391	92,461	4.3
Pennsylvania	48,947	48,950	s
Illinois	48,790	48,133	1.4
Kentucky	39,278	41,659	-5.7
Montana	38,146	35,087	8.7
Indiana	33,911	31,358	8.1
North Dakota	29,930	28,676	4.4
Texas	26,692	36,236	-26.3
Alabama	14,621	12,815	14.1
Appalachian Total	200,369	197,698	1.4
Interior Total	136,559	144,765	-5.7
Western Total	413,521	429,266	-3.7
U.S. Total	**750,449**	**771,729**	**-2.8**

WEEKLY SPOT PRICES

($/ton) — Week Ending (1/25/19)

Central Appalachia	(12,500 Btu, 1.2 SO_2)	$79.50
Northern Appalachia	(13,000 Btu, < 3.0 SO_2)	$67.70
Illinois Basin	(11,800 Btu, 5.0 SO_2)	$38.95
Powder River Basin	(8,800 Btu, 0.8 SO_2)	$13.10
Uinta Basin	(11,700 Btu, 0.8 SO_2)	$40.10

Source: Energy Information Administration

Queensland Coal Exports Hit Record High

Queensland's coal exports have reached a record high and yearly totals are predicted to continue growing, according to the Queensland Resources Council (QRC). The council said 223 million metric tons (mt) of coal was shipped from Queensland ports to 30 different countries and territories last year, trumping the previous record set in 2016 by 2 million mt.

QRC CEO Ian Macfarlane said big players and new entrants to the state's coal industry had driven billions of dollars in investment. He said, "There is a very strong demand out there which is underpinning our economic strength at the moment in Queensland."

Macfarlane said based on early figures, demand and job numbers for this year were promising. He said, "It'll depend on how that demand holds up, but even at this early stage, we're seeing very strong demand, both for metallurgical coal and for thermal coal out of Queensland, we're still seeing lots of job advertisements for people."

He added, "We have a number of projects on the drawing boards in Central Queensland right across the Central Highlands and the Galilee Basin as well, so we are seeing very strong investment and very strong jobs growth that goes with it. We do have those extreme green activists who continually say coal is in decline but these figures clearly show that that is a lie, and the reality is that coal is continuing to grow and continuing to play an important part in our economy."

Illawarra Longwalls Performing Strong

In its latest quarterly report, Australian miner South32 noted exceptional improvement from its longwall mining units at its Illawarra Metallurgical Coal, which allowed it to exceed prior production guidance. Coal production during the last two quarters totals 3.84 million metric tons (mt) compared to 4.24 million tons for fiscal year 2018. The company is expecting 6.5 million mt for fiscal year 2019 with two longwall moves scheduled for the March 2019 quarter.

While metallurgical coal prices have softened a bit, Illawarra realized an average price of $207/mt during the second half of 2018. "We achieved a strong quarter of production, maintaining full-year guidance for all operations with the exception of Illawarra Metallurgical where improved longwall performance has underpinned a 7% increase to our prior estimate," said Graham Kerr, CEO, South32. "The Dendrobium and Appin longwalls continued to perform strongly."

The company said it has stockpiled enough coal to cover the downtime from the two longwall moves.

"We also completed our review of the Eagle Downs metallurgical coal project's development plan during the December 2018 quarter and commenced the feasibility study ahead of a final investment decision scheduled for the second half of 2020," Kerr said.

The company also said it finalized plans to return the Klipspruit dragline to service by the end of January, which will enable a strong recovery for export volumes at South Africa Energy Coal in the June half year. The company is currently trying to sell the South Africa Energy Coal business and said it expects binding bids by end of the June half year.

The company's South Africa Energy Coal production decreased 9% (or 1.25 million mt) to 12.2 million mt during the December 2018 half-year. Export production was impacted when the Klipspruit dragline was taken down to repair structural damage to the boom in August 2018. Domestic production, however, benefited from the commencement of a contract to sell lower quality stockpiled product in the June 2018 quarter. The company said its fiscal year 2019 production guidance remains unchanged at 29 million mt (17.5 million mt domestic and 11.5 million mt export).

Miners perform maintenance on a longwall shearer at South32's Illawarra operations.

Oyu Tolgoi Signs Power Agreement in Mongolia

Turquoise Hill Resources signed a power source framework agreement (PSFA) between Oyu Tolgoi and the government of Mongolia, which provides a binding framework and pathway forward for the construction of a Tavan Tolgoi-based power project, as well as establishes the basis for a long-term domestic power solution for the mine.

"We are encouraged by the pivotal decision to proceed with the power project at Tavan Tolgoi," said Ulf Quellmann, CEO of Turquoise Hill. "Resolving Oyu Tolgoi's long-term power requirements is critically important to the mine's long-term development and today's signing of the PSFA is a positive milestone toward that goal.

"We will continue to work closely and collaboratively with our partners to finalize the details of the power project, which will allow this truly great world-class asset to achieve its full potential for the benefit of all stakeholders."

The PSFA formalizes the role of each party and sets out an amended timetable for Oyu Tolgoi to source power domestically. Construction is expected to start in 2020 following further studies and commissioning of the power plant is scheduled for mid-2023. Oyu Tolgoi will now move forward to confirm the technical design of the project and finalize the commercial arrangements, including financing, underpinning the PSFA. The 300-megawatt plant will be majority owned by Oyu Tolgoi and situated close to the Tavan Tolgoi coalfields.

Severstal Reports Increase in Coking Coal Production

In its fourth quarter earnings statement, Russian steelmaker Severstal report a decrease in pig iron and steel production, but the company said its sales of coking coal from Vorkutaugol increased by 2% to 3.37 million metric tons (mt) in 2018. The company said it plans to grow production volumes of clean coking coal to approximately 5.6 million mt per year (mt/y) at the Vorkutaugol mine and plans to ramp-up Yakovlevskiy mine to approximately 5 million mt/y per year in 2023, which will result in a higher level of vertical integration.

Sedgman Receives EPC Contract for Byerwen Mine in Australia

The engineering, procurement and construction (EPC) contract will deliver an expansion on the first phase of the project, which Sedgman was awarded in February 2018, and includes the duplication of the existing coal handling and processing plant.

The contract will generate revenue of $155 million for CIMIC Group.

CIMIC Group CEO Michael Wright said, "The CIMIC Group has a long standing and successful relationship with QCoal, which started in 2007, providing EPC services through Sedgman and mining services through Thiess.

"This latest contract demonstrates Sedgman's ability to deliver positive and consistent outcomes for QCoal, and is a testament to the Sedgman team's focus on delivering enduring value for our clients."

Sedgman Managing Director Grant Fraser said, "We are pleased to continue our strong, long-term relationship with QCoal and look forward to assisting with the expansion of the Byerwen mine in a timeframe that optimises QCoal's benefit."

Early work has commenced and the project will conclude in early 2020.

The Byerwen mine site is located 20 kilometers west of Glenden in Queensland's Bowen Basin.

Ukraine Increases Coal Imports in 2018

In 2018, Ukraine increased imports of coal and anthracite by 8.1%, 1.61 million metric tons (mt), compared to 21.388 million mt in 2017, according to Open4 Business. According to the state fiscal service, coal was imported for $3.04 billion, which is 10.6% more than in 2017.

At the same time, coal imports from the Russian Federation amounted to $1.82 billion (its share in imports was 60%), the United States to $907 million (30%), Canada to $163 million (5%), other countries to $143.94 million (5%). In addition, Ukraine last year exported about 64,000 mt of coal and anthracite for $8.6 million, in particular to the Russian Federation for $5 million, Slovakia for $3.2 million, Moldova for $724,000, and other countries for $127,000.

Russian Coal Exports, Production Hit 5-year High in 2018

Last year, Russia's production and exports of coal hit their highest levels since 2013. According to S&P Global Platts estimates of data from Russia's Energy Ministry, Russian coal exports increased last year by 3.4% compared to 2017, to reach 191 million metric tons (mt), the highest level since *S&P Global Platts* started collecting data on Russia's coal industry in 2013.

Coal production also reached its highest level since 2013 at 431.76 million mt. Russia's production increased by 6% in 2018 compared to 2017. According to Platts estimates, Russian producers continue to seek domination on the European market.

Last year, the average free on-board coal prices for the Atlantic and Pacific markets were both higher compared to 2017, which could be a big incentive for Russia to continue producing and exporting more coal to seaborne destinations, according to Platts. Russia's Energy Minister Alexander Novak said he thought coal production could reach 433 million mt by 2020.

Indonesia Sets Lower Coal Production Target for 2019

The Indonesian government has lowered its coal production target for 2019 to 480 million mt in an effort to stabilize the global coal price, according to the *Jakarta Post*. Energy and Mineral Resources Ministry Mineral and Coal Director General Bambang Gatot Ariyono said the government considered various factors before deciding on the figure, including the movement of the US dollar.

"The goal is to maintain a good coal price," he said. "There were possibilities that the government might revise the production target this year. We will continue to oversee the situation. Usually, coal miners will revise their production target no later than July. One of the reasons to revise the target was to increase state revenue."

— Worldwide News Continued on Page 14 —

Leading Developments Continued from Page 5

According to court documents, for the Buckingham mine, the successful bid provides a purchase price of $1.8 million in cash, with an assumption of $800,000 of trade payables. For the Oxford assets, the successful bid's purchase price is a reduction of the Net Working Capital Target Amount from $3.75 million to $3.5 million.

Westmoreland, based in Englewood, Colorado, and several affiliates filed for Chapter 11 bankruptcy reorganization on October 9. On November 18, Judge David R. Jones approved bidding procedures for the sale of substantially all of Westmoreland's assets. Westmoreland, the sixth-largest coal-mining enterprise in North America, and its affiliates operate 19 coal mines in six states and Canada. The companies primarily produce and sell steam coal to power plants, industrial customers and barbecue charcoal manufacturers.

According to court documents, Westmoreland last summer retained Centerview Partners LLC to conduct a "comprehensive" marketing process for Westmoreland's assets. Launched in August, that effort proved less than optimal as CCU's offer was the only proposal that the [Westmoreland debtors] received to acquire the Buckingham mine that offered the assumption of significant reclamation liabilities and a cash payment to the Westmoreland debtors, a filing said.

As a result, it was accepted by Westmoreland and submitted to the court for approval. A sale hearing originally set for January 16 was continued until January 28 in the Houston courtroom.

Together, Buckingham and Oxford once produced in excess of 6 million tons of steam coal annually, though that total has fallen in recent years to about half. Buckingham operates the Burr Oak No. 6 underground mine in Perry County. It typically produces approximately 1 million tons per year. Oxford operates several mostly small surface mines that generally produce less than 500,000 tons annually each.

Burr Oak produced a little more than 700,000 tons of coal over the first three quarters of 2018, Mine Safety and Health Administration figures show. It has about 125 employees. The company once operated a sister deep mine, Burr Oak 7, but it has closed.

Court filings indicate that Oxford's assets include 15 different coal mines located near each other in Ohio and Kentucky. Only seven of the mines currently are active, and eight are in reclamation.

Ungurean co-founded Oxford several decades ago and has served as a Westmoreland director, although not currently employed by the company, according to a Westmoreland official.

Buckingham's primary coal supply agreement with American Electric Power's 1,590-megawatt Conesville power plant in Coshocton County, Ohio, is set to expire December 31, and is not expected to be replaced or renewed. Westmoreland acknowledged in a filing, "the principal value of the Buckingham mine is driven by cash flows generated in 2019. It is for this reason [the Westmoreland debtors] believe the value of the Buckingham mine to potential buyers will significantly decline throughout 2019."

PEOPLE IN THE NEWS

Joseph W. Craft III

Robert J. Druten

Alliance Resource Partners announced that *Joseph W. Craft III*, president and CEO of ARLP's general partner, has assumed the additional role of chairman of the general partner's board of directors. Craft replaces *John P. Neafsey*, who retired after serving as board chairman since 1999. *Robert J. Druten* has been elected to the general partner's board of directors and will serve as chairman of its conflict committee and as a member of its Audit and Compensation committees. Druten served as a director of AHGP's former general partner from January 2007 through December 2018.

Arch Coal Inc. elected *Paul T. Demzik* as chief commercial officer. Prior to joining Arch, Demzik was head of thermal coal trading at Anglo American for five years and president of Peabody COALTRADE for seven years.

Peter Freyberg

Glencore promoted coal chief *Peter Freyberg* to head of mining. *Gary Nagle* was appointed as head of coal assets.

Dawson Brisco

Morien Resources Corp. promoted *Dawson Brisco* to president and CEO. Brisco was appointed president in May 2018. *John P. A. Budreski*, who resigned as CEO, will continue with Morien as executive chairman.

Union Pacific named *Jim Vena* COO. He served as executive vice president and COO at Canadian National until retiring in June 2016 after a 40-year career.

Jim Vena

N. Joe Limbaugh

Motion Industries Inc. promoted *N. Joe Limbaugh* to the position of senior vice president of supply chain, operations support and marketing. In 2013, Limbaugh was asked to return to Motion's Birmingham, Alabama, headquarters as vice president of operations, distribution and properties.

Eriez-USA promoted *Dan Zimmerman* to the position of operations director. Zimmerman has been with Eriez since 2004, serving most recently as director of business development.

Dan Zimmerman

U.S. News Continued from Page 7

sions with potential brokers and customers and anticipates one or more decisions this spring.

Mine construction is expected to take 18 months or so to complete, so a late 2020 or early 2021 start of production appears possible.

In September 2016, Blankenberger Brothers received a final permit from the Indiana Department of Natural Resources' Division of Reclamation for a mining permit covering just under 1,000 shadow acres for the new mine.

Although mine cutbacks and power plant retirements have dominated the headlines in recent years, the ILB actually is home to a modest increase in new coal mine development, with Blankenberger only the latest example.

Australia's Paringa Resources soon expects to start production at its Poplar Grove steam coal underground mine near the Green River in McLean County, Kentucky. Paringa has sales commitments in excess of 5 million short tons (st) for Poplar Grove, including a "cornerstone" 4.75 million st/five-year agreement with Kentucky's two largest electric utilities, Louisville Gas & Electric and Kentucky Utilities.

Recently, Hallador Energy's Sunrise Coal subsidiary was issued a final permit for its proposed Bulldog underground mine near Allerton in Vermilion County, Illinois. The company has said Bulldog also would be in the range of 3 million stpy. However, Hallador/Sunrise have not said publicly whether they intend to move forward with developing the mine, which has faced some public opposition in the area.

Proposed Revisions to MATS Regulation Will Come Soon

The Environmental Protection Agency (EPA) announced it will reassess the Mercury and Air Toxics Standards (MATS). It has issued a proposed revised supplemental cost finding for MATS and that the Clean Air Act required "risk and technology review." After taking into account both the cost to coal- and oil-fired power plants of complying with the MATS rule — costs that range from $7.4 to $9.6 billion annually — and the benefits attributable to regulating hazardous air pollutant (HAP) emissions from these power plants (quantifiable benefits that range from $4 to $6 million annually), the agency said it is not "appropriate and necessary" to regulate HAP emissions from power plants under Section 112 of the Clean Air Act.

The emission standards and other requirements of the MATS rule, first promulgated in 2012, would remain in place.

"We welcome the agency's proposal to revisit what stands as perhaps the largest regulatory accounting fraud perpetrated on American consumers," said Hal Quinn, NMA president and CEO. "By suppressing the real costs while double-counting potential benefits, the last administration made American households and businesses pay $960 in exchange for 60 cents in potential benefits. Surely, the EPA will now understand that no rational person would voluntarily agree to such a massively unbalanced arrangement."

While the EPA predicted that the MATS rule would result in less than 5 gigawatts (GW) of coal retirements, the actual result turned out to be nearly 10 times as high, according to the NMA.

After legal challenges from NMA and others, the Supreme Court ultimately found that the EPA had adopted MATS without appropriate consideration of costs, and therefore reversed and remanded the decision of the D.C. Circuit Court. By that time, however, the short lead time required to come into compliance with the unlawful regulation had already passed, and many plant operators had already made the decision to shut down coal-fueled plants rather than incur the extraordinary costs of installing technology that made their plants less efficient.

NTEC Continues Negotiations to Preserve NGS, Kayenta Mine

Navajo Transitional Energy Company's (NTEC) board unanimously approved a resolution on December 29 to continue negotiations with the managing companies of Navajo Generating Station (NGS) and Kayenta mine to acquire operations.

"We believe there is a clear and beneficial path forward to acquire and operate both NGS and Kayenta mine as a vertically integrated entity," NTEC CEO Clark Moseley said.

NTEC's plan would have one entity own and operate the power plant and the coal mine.

"This is a business decision about a business transaction for NTEC," said NTEC Board Chair Tim McLaughlin. "We are going to thoroughly evaluate plans and make sound business decisions that are beneficial for NTEC and the Navajo Nation."

In October, Navajo Nation leaders requested that NTEC explore possible solutions to preserve operations of NGS and Kayenta mine. Since then, NTEC has put in place a technical team comprised of energy experts to work with Moseley and NTEC management. Moseley said continuing negotiations complies with NTEC's operating agreement to "improve the economic, financial, tax and revenue interests of the Navajo Nation and Navajo people."

NTEC will continue negotiations with the Salt River Project and Peabody Energy and conduct further feasibility studies and due diligence, Moseley said.

Moseley cautioned committee members that no agreements or contracts have been signed.

In other news: NTEC presented the Navajo Nation with a check for $3 million during a presentation ceremony on Monday, December 17 at the Navajo Nation Council Chambers. Nearly 20 people attended the ceremony.

"NTEC is proud of its performance over the past year and we want

to share our success with the Navajo Nation," said Moseley. "We have stated that purchasing Navajo mine was a good investment for the Navajo Nation, and now the nation is experiencing the benefit revenues generating from coal sales. The distribution is in addition to the nearly $40 million in taxes and royalties we have paid the Navajo Nation in 2018. We are proud to share our success with the Navajo Nation."

Blaschak Coal Sets Sales Record in 2018

Blaschak Coal Corp., one of the country's top anthracite producers, has achieved record sales tonnage for 2018. The company's prepared coal sales were more than 382,000 tons in 2018 — up from the previous sales record set in 2014, which clocked in at 374,000.

The primary drivers behind the sales growth were increased demand from metallurgical process industries, the home heating sector and the food services market — namely coal-fired pizza, according to Blaschak.

"We are more than thrilled with the record sales numbers we achieved this past year," said Greg Driscoll, president and CEO of Blaschak Coal Corp. "While we've seen demand in traditional markets driving current sales levels, the continued interest in the presence of Rare Earth Elements (REE) in anthracite and other related materials, and the potential for growth in other carbon-related markets, which has fostered a number of new projects, are also positive signs for the future of anthracite.

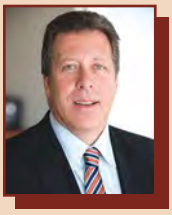
"At Blaschak, we are encouraged by this record, and see it as a sign of continued growth for us and the local industry," he added. "There is a significant remaining reserve of this valuable resource."

Driscoll believes the Pennsylvania anthracite industry will continue to serve existing markets, and that new markets are emerging.

"Even though record regional rainfall provided challenges to mining activities across the industry in 2018, increased demand for our high-quality anthracite products drove strong overall performance," Driscoll added. "We remain committed to being a leader in safe and responsible operating practices while increasing capacity, providing excellent customer service and exploring new market applications."

COMMENTARY

Yesterday's MSHA Withholds Today's Technology From Miners



BY BRUCE WATZMAN

What does it take to drive further improvements in mine safety and health to reduce fatalities, injuries and illnesses? Does it take more than accepting the status quo as being the proper course to attain these improvements? Of course, it does. Does it take engaging all stakeholders to clearly identify the barriers to improvement and the steps required to overcome them? Of course, it does. Unfortunately, neither of these seem to be occurring within the Mine Safety and Health Administration (MSHA).

Throughout its history, MSHA has been driven largely by one metric — the number of fatalities occurring annually across the industry. This almost singular goal, while laudable, ignores the structural changes that have, and continue, to take place across the industry to improve safety. In doing so, mine operators, and more importantly, miners have been denied protections otherwise available if not for the agency's resistance to change.

How many people in the industry believe that seat belts and alarms, technologies already commercially available, are what's needed to continue the long-term reduction in fatalities? We grieve with those who lost loved ones where these technologies may have prevented a fatality, but they alone are not the answer.

Today, safety professionals face many challenges, and technology must be a part of the solution, but fewer and fewer technology providers are bringing new products to market due to the agency's antiquated approval and certification (A&C) process. All applauded the new assistant secretary who, early in his tenure, spoke to the role of technology to drive safety improvement, but what has been done to overcome the structural barriers in the approval and certification process? It is overdue for MSHA to recognize approvals issued by recognized international approval organizations.

MSHA's obsolete A&C process for equipment and technology must be updated to reflect the structural changes under way in the industry so that the policies, procedures and practices that best protect miners can be fully realized. At the district and headquarters level, the agency must update its mine plan approval process to provide for the timely consideration and approval of plans necessary to introduce and implement new safety technology and operational measures that best protect miners.

Miners and mine operators need a willing partner to drive the next breakthrough in safety improvement. Is today's MSHA that partner? I leave that for you to decide. I believe improvements will occur when all parties are willing to have an open and honest discussion about the barriers that exist. MSHA can facilitate the change we all want, continue the progress that has been made in reducing fatalities and improve safety. But, it will require leadership and self-reflection to shake up the status quo. Unfortunately, MSHA has been slow — perhaps resistant — to embrace the change that is needed to move safety forward. Innovation and new technologies are needed to advance mine safety but the biggest barrier to spurring that innovation may be MSHA itself.

Before his recent retirement, Bruce Watzman was senior vice president for regulatory affairs with the National Mining Association. He can be reached at bwatzman55@outlook.com.

Mining World Russia

Mining World

23rd International exhibition of machines and equipment for mining, processing and transportation of minerals

23–25 April 2019
Crocus Expo, Moscow, Russia

Find out more at
miningworld.ru

ufi Approved Event

Will be held alongside

MIOGE Moscow

ANALITIKA EXPO

ITE

Organised by
ITE Group
+7 (499) 750 08 28

Worldwide News Continued from Page 9

Last year's target was 485 million mt, 25% of which was allocated to the domestic market obligation. Data from up to December 27 shows that Indonesia reached 94.02% its annual total target for 2018.

Yancoal Ramps Up Production in Australia

Yancoal Australia produced 50 million metric tons (mt) of salable coal in 2018, up 59% year on year. It attributed much of the increase to the contribution from assets it acquired from Rio Tinto in September 2017 in a filing to the Australian Securities Exchange, and forecast further growth in 2019.

The company, which is majority-owned by China-based Yanzhou Coal, said 32.9 million mt of the total was attributable to Yancoal, up 78% on the year. It said guidance for attributable salable coal production for 2019 was higher at 35 million mt.

Yancoal said its attributable metallurgical coal sales in 2018 totaled 7.2 million mt, up 16% year on year.

Yancoal said it also benefited from a full quarter's impact of new fleet maintenance practices at the Mount Thorley Warkworth open-cut mine operation in the Hunter Valley region of the New South Wales, which reduced truck downtimes and interruptions to extraction and haulage rates.

"Similar maintenance reviews are ongoing across Yancoal's other open-cut mines, including the tier-one joint venture Hunter Valley Operations mine, as the business continues to establish new operating protocols and efficiencies to drive further production gains," the company said in a statement.

Yancoal said it will continue to ramp up exploratory works across its tier one assets.

"Importantly, we are making positive progress regarding the potential development of a proposed 6-million-mt-per-year underground mine at Mount Thorley Warkworth, with exploration drilling for the prefeasibility on the target seams completed at the end of 2018," the company said.

Yancoal acquired Rio Tinto's Hunter Valley Operations and Mount Thorley Warkworth mines for A$2.69 billion in September 2017.

Mongolia's Coal Exports Hit All-time High in 2018

Mongolia's coal exports hit an all-time high in 2018, with total exports of 36.5 million metric tons of coal. The figure is an increase of 3.2 million mt from the previous year, according to *Xinhua*. According to the ministry, the rise was largely attributable to Prime Minister Ukhnaa Khurelsukh's first official visit to China in April since assuming office in 2017. Coal is Mongolia's main export commodity. The country has set a goal to increase coal exports to 40 million tons.

Collapse Kills 21 Miners in China

A coal mine roof collapse in northwest China's Shaanxi province killed 21 miners on January 12, the state-run *People's Daily* reported. It occurred at Baiji Mining Co. Ltd.'s Lijiagou mine in the city of Shenmu, when 87 people were underground, the *People's Daily* said.

Sixty-six miners were rescued but 21 were trapped underground, it reported. Nineteen of the miners were confirmed dead at first while a search continued for the two missing miners; however, they were later found dead.

Some mining firms in major coal hubs in Shandong and Henan provinces and parts of northeastern China have received notices from the National Coal Mine Safety Administration asking them to halt operations for inspections that will last until June, the state-backed *Shanghai Securities News* (SSN) reported.

Xinhua News Agency said Shanxi province, which borders Shaanxi, would also carry out inspections at high-risk coal mines.

CALENDAR OF EVENTS

March 10-13, 2019: *Haulage & Loading*, Hilton El Conquistador Resort, Tucson, Arizona. Contact: Web: www.haulageandloading.com.

April 8-14, 2019: *bauma*, Messe Muenchen, Munich, Germany. Contact: Web: www.bauma.de.

April 12-13, 2019: *SME/Central Appalachian Section Spring Meeting*, Marriott Grin Gate Resort, Lexington, Kentucky. Contact: Geaunita Caylor, Email: g.caylor@uky.edu; Tel: 859-494-1621.

April 23-26, 2019: *Electric Power*, Las Vegas, Nevada. Contact: Web: https://2019.electricpowerexpo.com.

May 20-22, 2019: *Longwall USA*, David L. Lawrence Convention Center, Pittsburgh, Pennsylvania. Contact: Web: www.longwallusa.com.

June 3-7, 2019: *The 9th International Conference on Clean Coal Technologies*, Houston, Texas. Contact: Web: www.cct-conferences.org.

June 4-6, 2019: *The 39th APCOM Mining Goes Digital conference*, Wroclaw, Poland. Contact: Web: www.www.apcom.info.

June 23-25, 2019: *Rocky Mountain Coal Mining Institute (RMCMI)*, Vail, Colorado. Contact: Web: www.rmcmi.org.

August 27-29, 2019: *AIMEX*, Sydney Showgrounds, Sydney, Australia. Contact: Web: www.aimex.com.

September 11-13, 2019: *Bluefield Coal Show*, Brushfork Armory, Bluefield, West Virginia. Contact: Web: www.bluefieldchamber.com/bluefield-coal-show.

October 30-November 2, 2019: *China Coal & Mining Expo*, New China International Exhibition Center, Beijing, China. Contact: Web: www.chinaminingcoal.com.

November 13-15, 2019: *XIX International Coap Preparation Congress & Expo 2019*, New Delhi, India. Contact: Web: www.icpc2019.in/.

China Coal & Mining Expo 2019

第十八届中国国际煤炭采矿技术交流及设备展览会

China's 18th International Technology Exchange and Equipment Exhibition on Coal & Mining

Date : 30 Oct – 2 Nov 2019
Venue : New China International Exhibition Center (NCIEC),
Beijing, P.R. China

Host :
China National Coal Association

Co-host :
China National Coal Group Corp.

Organizers :
Together Expo Limited
China Coal Consultant International

www.chinaminingcoal.com

Worldwide Enquiries
TOGETHER EXPO LIMITED

Hong Kong Head Office:
Tel: +852 2881 5889
Email: info@together-expo.com
Room C, 7/F, Eastern Commercial Centre,
83 Nam On Street, Shau Kei Wan,
Hong Kong

Beijing Office:
Tel: +86 10 8451 0286/0267
Email: info@together-expo.com.cn
Room 12A11, Building A, Kunsha Center
No. 16, Xinyuanli, Chao Yang District,
Beijing 100027 , P.R. China

LONGWALL USA 2019

May 19-22, 2019
Pittsburgh, Pennsylvania

Keynote Address

Monday (9 a.m.-9:30 a.m.)

Coal Exports and its Influence on World Markets

Ernie Thrasher , CEO, Xcoal Energy & Resources

Session 1: Advanced Technology

Monday, 9:30 a.m.–11:30 a.m.

Operating Experience With Longwall Face Alignment and Horizon Control Systems

Rob Colaw, longwall manager, Alliance Resource Partners

The Positives and Negatives of Operating Longwalls From the Surface

Peter Henderson, engineering manager for underground operations, Glencore Australia

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

Benfu Yan, Guizhou Zhongyi Jincaiqian Mining Group Co. Ltd

Using Dynamic Elemental Modeling for AFCs and Drums

Daniel Sharpe, longwall mining engineer, Komatsu Mining

WORKSHOPS

Workshop No.1

Monday, 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

The workshop instructors will demonstrate a computer-based training product for emergency decision-making. Using seven separate escape scenarios based on actual events, workshop participants will work through situations where decisions must be made. At every decision point there are four options to rate in terms of how likely each is to protect the escaping miners. After finishing a scenario, trainees can compare their scores to those of subject matter experts. The trainers will discuss how the product was developed, the response from initial trainees, and ways it can be used for emergency response training.

Session 2: Health & Safety

Tuesday, 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

A Laboratory Investigation of Underside Shield Sprays to Improve Longwall Water Directional Spray System
James P. Rider and Scott S. Klima, NIOSH, Pittsburgh Mining Research Division

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, Pittsburgh Mining Research Division

Using Seismicity to Locate Trapped Miners
Max Clark, U.S. Mine Safety and Health Administration

Influence of Longwall Mining on the Stability of Shale Gas Wells in Barrier Pillars
Peter Zhang and Daniel Su, NIOSH, Pittsburgh Mining Research Division, and Jun Lu, CONSOL Energy

Session 3: Development & Logistics

Wednesday, 9 a.m.–11 a.m.

The Autonomous Shuttle Car
Zach Agioutantis, professor, University of Kentucky

Rapid Entry Longwall Development With FCTs and a 14ED at the Marion County Mine
Ryan Murray, COO, Murray Energy Corp.

Rapid Longwall Panel Development Using FCT and a Boring Machine
David Rea, mine engineer, Solvay

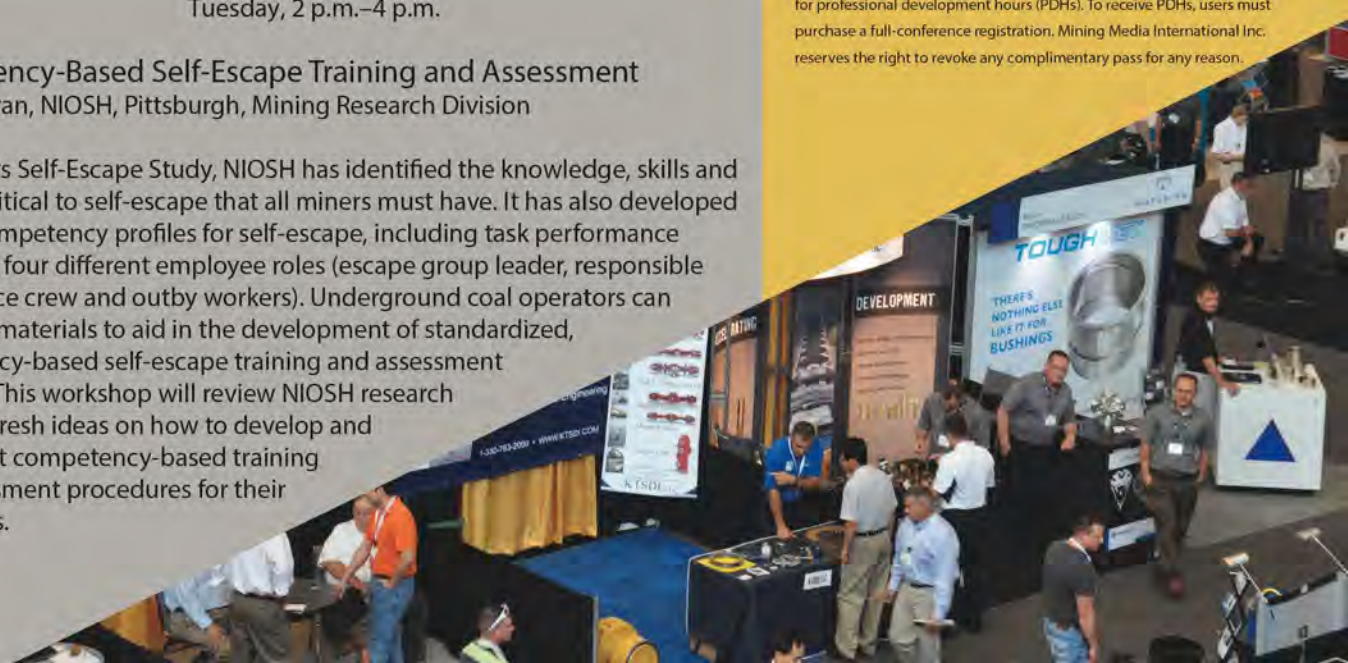
Using Contractors to Move Longwalls
Josh Helbig, GMS Mine Repair & Maintenance

Workshop No. 2

Tuesday, 2 p.m.–4 p.m.

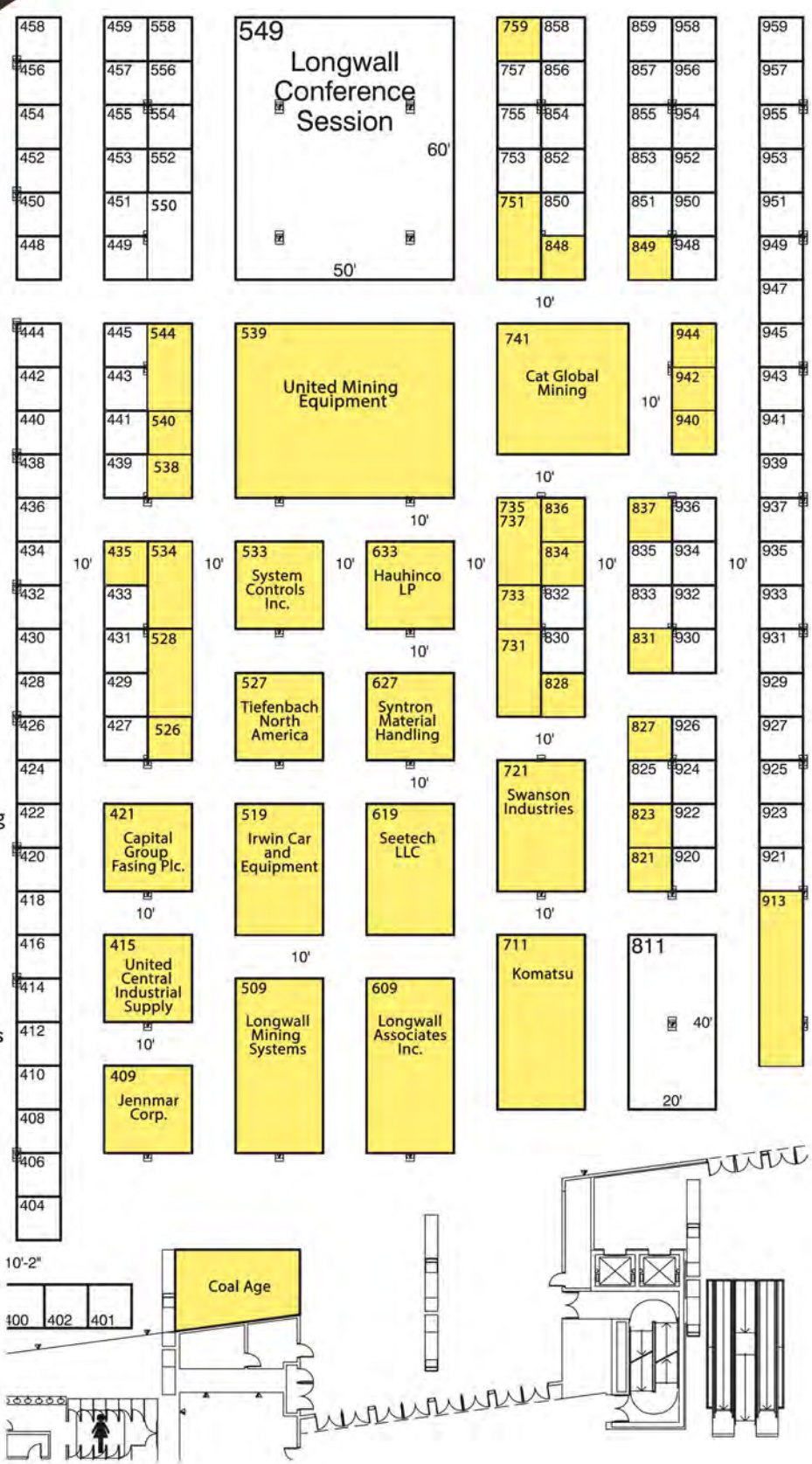
Competency-Based Self-Escape Training and Assessment
Maggie Ryan, NIOSH, Pittsburgh, Mining Research Division

Through its Self-Escape Study, NIOSH has identified the knowledge, skills and abilities critical to self-escape that all miners must have. It has also developed a set of competency profiles for self-escape, including task performance criteria for four different employee roles (escape group leader, responsible person, face crew and outby workers). Underground coal operators can use these materials to aid in the development of standardized, competency-based self-escape training and assessment program. This workshop will review NIOSH research and offer fresh ideas on how to develop and implement competency-based training and assessment procedures for their operations.



Booth No./Exhibitor

No. 409 / Jennmar
No. 415 / United Central Industrial Supply
No. 421 / Capitol Group Fasing
No. 435 / Civil & Environmental Consultants
No. 509 / Longwall Mining Systems
No. 519 / Irwin Car and Equipment
No. 526 / Megator-Pumps 2000
No. 527 / Tiefenbach North America
No. 528 / Quaker Chemical
No. 533 / System Controls
No. 534 / Hilliard Brake Systems
No. 538 / Innovative Wireless Technology
No. 539 / United Mining Equipment
No. 540 / J.H. Fletcher & Co.
No. 544 / US Synthetic Mining
No. 609 / Longwall Associates
No. 619 / Seetech
No. 627 / Syntron Material Handling
No. 633 / Hauhinco
No. 711 / Komatsu Mining Systems
No. 721 / Swanson Industries
No. 731 / Richwood
No. 733 / Betek Tools Inc.
No. 735 / Miller Contracting
No. 741 / Cat Global Mining
No. 751 / Intermountain Electronics
No. 759 / Brookville Equipment
No. 821 / Frontier-Kemper Constructors
No. 823 / Comtrol International
No. 827 / KH Controls
No. 828 / Becker Global America
No. 831 / Voith Turbo
No. 836 / Austdac Pty Ltd.
No. 837 / Rel-Tek Corp.
No. 848 / Palladian Publications
No. 849 / KSD Enterprises
No. 913 / NIOSH Mining
No. 940 / Huesker
No. 942 / Line Power
No. 944 / Kennametal



LONGWALL USA 2019

Registration Rates & Deadlines

Early Bird Registration
Ends 3/31/2019

3-Day Coal Operator's Exhibit-Only Pass	$99
1-Day Coal Operator's Exhibit-Only Pass	$39
3-Day Coal Operator's Full-Conference Reg	$225
1-Day Coal Operator's Full-Conference Reg	$125
3-Day Full Conference (non-coal operator)	$795
1-Day Full Conference (non-coal operator)	$495

Advanced Registration
4/1/2019 - 5/8/2019

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

On-site Registration

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

- Coal Operator - includes engineers and management personnel from mining companies, consultants, academics, regulators, etc.
- Full Conference - includes access to all presentations and credit for professional development hours through the Longwall USA app.

longwallusa.com

PITTSBURGH PIRATES vs COLORADO ROCKIES

Pirates Baseball Game

Mining Media International has purchased a large block of prime seats for the Pirates game on May 21 at PNC Park. They are available at cost to attendees. Longwall USA delegates can reserve them during the registration process.

Prizes & Awards

Coal Age will present the Longwall USA Top Performer awards to the three best American mines. Delegates will also win valuable prizes daily.

Who will take home the 2019 Mossy Oak ATV?

US Coal Sector Realizes the New Norm

Exports will help offset further declines in western production

BY STEVE FISCOR, EDITOR-IN-CHIEF

Ask American coal operators what they think and the responses will differ greatly depending on their location. A large surface mine operator in Wyoming would likely tell you they plan to mine and ship less coal in 2019. They will still ship a lot by eastern U.S. standards, but it will likely be less than last year. An underground operator in the East producing high-quality bituminous coal could probably mine and sell more coal, but they will likely tell you they are constrained by production capacity and logistics as far as getting more product to market.

As it does every year, *Coal Age* surveyed 500 professionals involved in different aspects of coal mining and processing for its 2019 Annual Forecast. The feeling one would get from the responses is that they are cautiously optimistic. Most of them believe production will increase or at least stay the same. They have money to invest in projects if they can show a return on investment. They are looking at more new equipment rather than upgrades.

While one could look at the 22-million-ton drop in total production between 2018 and 2017 and wonder if this is the beginning of the end, they would be mistaken. There are positive market signals if one searches for them, and *Coal Age* believes 750 million tons per year may be the new norm moving forward. For that to happen, however, coal operators would have to find a way to offset the 15 million tons to 20 million tons of reduced western U.S. production that has already been announced.

It could happen, but a number of things would have to work in coal's favor. First, power generation and steel production would need to continue to grow. Utilities would have to begin rebuilding stockpiles, which could account for production figures exceeding normal demand levels. The prices for coal would have to remain high enough to allow the investment in additional capacity. U.S. coal operators would have to export more coal and the potential exists.

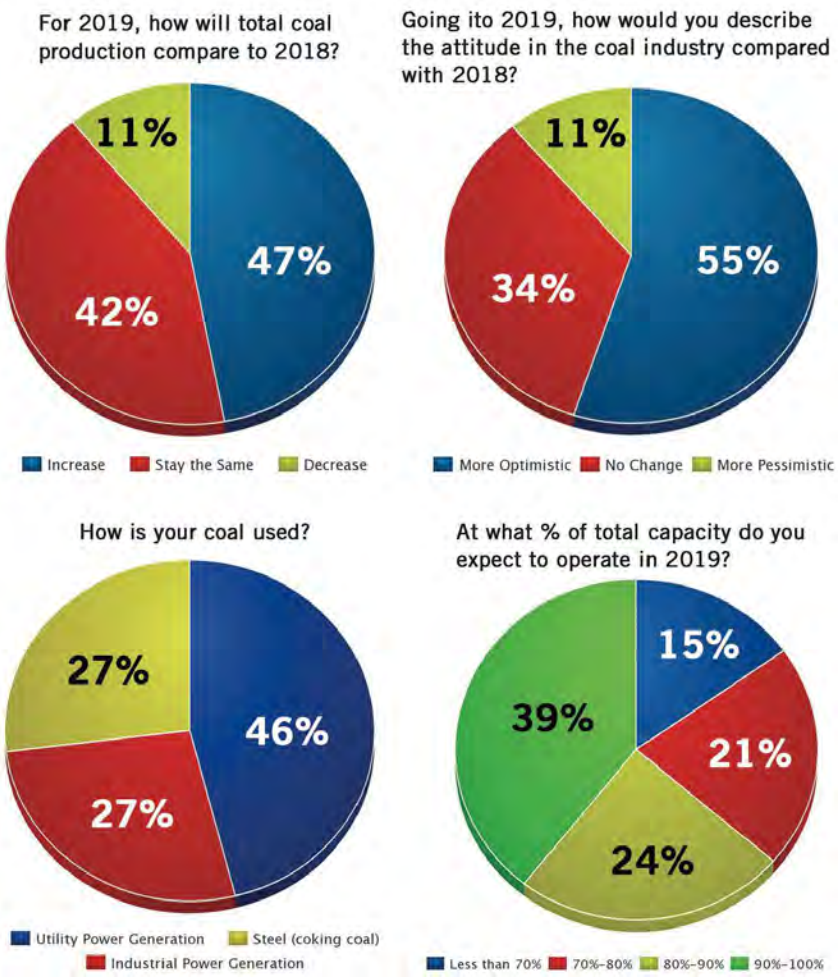
The New Norm

During 2018, U.S. coal production declined 22 million tons (or 2.8%) to 750 million tons from 772 million tons in 2017 (see Monthly Stats from Coal Country, p. 7). Almost all that lost production can be attributed to Wyoming and Texas. Wyoming posted the largest loss, 14 million tons, with total production declining to 301 million tons from 315 million tons in 2017 or 4.5%. Coal production in Texas dropped nearly 10 million tons from 36.2 million tons in 2017 to 26.7 million tons in 2018. For many years, Texas was ranked among the top five coal-producing states.

East of the Mississippi River, the story is different. With the exception of

Figure 1 — Production, Consumption and Attitude

This year, Coal Age received 49 responses from 500 executive surveys



Kentucky, coal production increased among the major coal-producing states. Production in West Virginia increased 4 million tons to more than 96 million tons after increasing 10 million tons in 2017. Production in Indiana increased more than 8% to nearly 34 million tons. Illinois coal production grew slightly (1.4%) to 48.9 million tons. On a percentage basis, Alabama posted the biggest increase in coal production (14.1%), growing from 12.8 million tons to 14.6 million tons in 2018. Kentucky, however, continued to slide as the commonwealth's production dropped 5.7% in 2018 from 41.7 million tons to 39.2 million tons. That comes on the heels of a 2.1% decrease in 2017.

Total U.S. electricity generation rose 4% in 2018, while coal demand fell 4%, according to the U.S. Energy Information Administration (EIA). Year-to-date coal consumption for power generation (November 2018) stood at 580 million tons, compared to 605 million tons at the same point in 2017. Once again, the 25-million-ton differential between 2018 and 2017 emerges.

The EIA also reported total coal inventories at U.S. power plants stood at approximately 104 million tons at the end of November 2018, down by approximately 27% from the same period a year ago, and the lowest end-of-November total inventory tonnage level since 1997.

Year-to-date through the end of November 2018, coal exports totaled 106 million tons compared to 87 million tons at the same point in 2017. The U.S. is exporting on average about 9.7 million tons per month, which will take total U.S. exports up to 116 million tons for 2018, which would be 19 million more tons than the 96 million tons in 2017. Of the that YTD export mix, 56.6 million tons were metallurgical-grade coal compared to 50.2 million tons at the same point in 2017. A total of 49.8 million tons of steam coal were exported (YTD November 2018) and that compares to 37 million tons during the same period in 2017.

Spot prices for coal have improved in the East, but remain soft in the West (see Figure 4). Reaching its highest level in four years, spot prices for Central Appalachian coal improved to $81.40/ton by the end of 2018 from $59.85/ton in 2017. Spot prices for Northern Appalachian coal also increased to $63.75/ton from $46.20/ton at the end of 2017. Spot prices for Illinois Basin coal increased to $38.95/ton in 2018 to $32.60/ton in 2017. Prompt prices for Powder River Basin coal decreased from $12.10/ton to $11.95/ton. Similarly, prices for Western Bituminous decreased slightly from $41.10/ton to $40.40/ton.

Prompt prices for premium hard coking coal remained high in the fourth quarter, averaging $221/mt. The fourth-quarter index settlement price for premium hard coking coal was $212/metric ton (mt) compared to $192/mt in 2017. Pricing for the low-vol PCI product also continued its strength, with a fourth-quarter 2018 benchmark settlement of $139/mt compared to $127.50/mt in 2017. Looking ahead to the first quarter 2019, the low-vol PCI benchmark price has been set at $141/mt.

Coal competes head-to-head with natural gas and its use for U.S. electricity generation largely depends on prices. The price of natural gas delivered to electric power plants averaged $3.42 per million British thermal units (Btu) in 2018, compared to $3.02/MMBtu in 2017. In the past, Peabody Energy said on average, every $0.20/MMBtu movement in the price of natural gas equated to an approximate 25-million-ton change in U.S. coal demand over the course of the year.

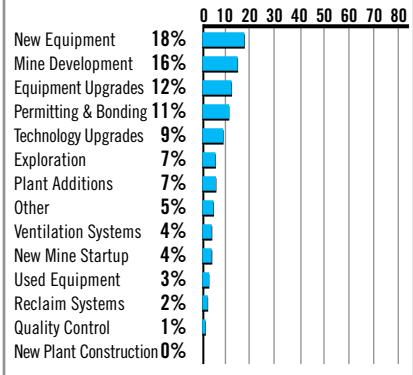
Survey Says

Coal Age contacted 500 professionals, who mine and process coal, and received 49 completed surveys. The majority of them (84%) produced bituminous coal. Subbituminous, lignite and anthracite accounted for 5%, 8% and 3%, respectively. As far as production capacity, most of the respondents represented medium-size mine operators (mining 1-5 million tons, 46%), followed by large (more than 5 million tons, 39%) and small (less than 1 million tons, 14%); 41% described themselves as surface coal operators exclusively, while 38% said they only operated underground mines. The remainder (19%) said they worked for a company that mined coal using both surface and underground techniques. Similar to past years, most of the respondents said their coal was shipped to electric utilities (46%). The remainder said their coal was destined for steel mills (27%) or industrial boilers (27%). Power generation remains the overwhelming use for the majority of U.S. coal production.

Going into 2019, the survey revealed that coal operators were still optimis-

Figure 2 — Capital Expenditures

How will the mine spend the money?



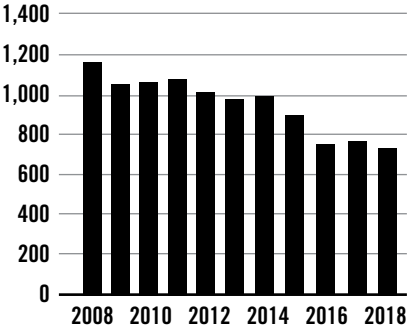
What is the capital expenditure budget for 2019?

Less than $10 million	29%
$10-$25 million	21%
$25-$50 million	17%
$50-$100 million	17%
More than $100 million	17%

For 2019, will capital expenditures:

Increase	54%
No change	35%
Decrease	12%

Figure 3 — U.S. Coal Production, 2008-2018 (million short tons)



Source: Energy Information Administration

Figure 4 — Current Spot Prices for Coal ($/ton)

	Btu/lb	lb SO_2	Dec 14	Dec 15	Dec 16	Dec 17	Dec 18
Northern Appalachia	13,000	< 3.0	$65.30	$48.95	$45.75	$46.20	$63.75
Central Appalachia	12,500	1.2	$56.10	$43.50	$48.05	$59.85	$81.40
Illinois Basin	11,800	5.0	$44.70	$32.60	$35.50	$32.60	$38.95
Powder River Basin	8,800	0.8	$11.55	$10.90	$11.00	$12.10	$11.95
Western Bituminous	11,700	0.8	$37.75	$40.65	$40.90	$41.10	$40.40

Source: EIA/Platts Coal Outlook Weekly Price Survey

tic. A total of 55% (vs. 63% last year) described their attitude as positive, and only a few more were less optimistic (11% vs. 7% in 2018). This year, 34% said they were ambivalent, compared to 8% last year. The overall mood in coal country remains upbeat.

Confirming that feeling, 47% of the respondents thought their coal production would increase in 2019, compared to 51% last year. A large portion (42%) said production would remain the same, compared to 33% last year. Fewer respondents (11%) foresee production decreasing, compared to 16% last year. A majority of the industry (89%), however, sees production remaining the same or growing in 2019, which is about the same as last year (84%).

Coal mining is a capital-intensive business. For 2019, 54% of the respondents said their capital budgets would increase, which was the same as last year. The number of respondents saying their capital budgets would decrease was 12%, which was higher than the 8% response in 2018. More than one-third of the respondents (35%) said their budgets would remain the same, compared to 37% last year. That is an important point for coal marketers: most of the industry (89%) sees their budgets either staying the same or increasing over 2018.

When asked how they would spend the money, they said equipment upgrades: new equipment (18%) and mine development (16%). After five years in the doldrums, new equipment purchases may have finally overtaken the decision to upgrade the existing equipment.

In 2019, coal operators will invest in operations and equipment to produce more coal cost effectively. When asked about their capital budgets, an equal amount (17%) said they would spend more than $100 million, $50-$100 million, and $25-$50 million; 21%, $10-$25 million; and 29%, $10 million or less. This year, 51% of the *Coal Age* survey respondents said they would spend $25 million or more.

When asked about what specific issues will affect the coal industry most in 2018, power plant regulations registered the highest score (4.37/5) as the leading concern. This was followed closely by Politics & Policy and Prices. Coal prices remained ahead of the economy. Reading between the lines, the miners are saying that prices and the economy do not matter if their customers are not allowed to burn coal. Limited production capacity and a retiring workforce were the least of their concerns.

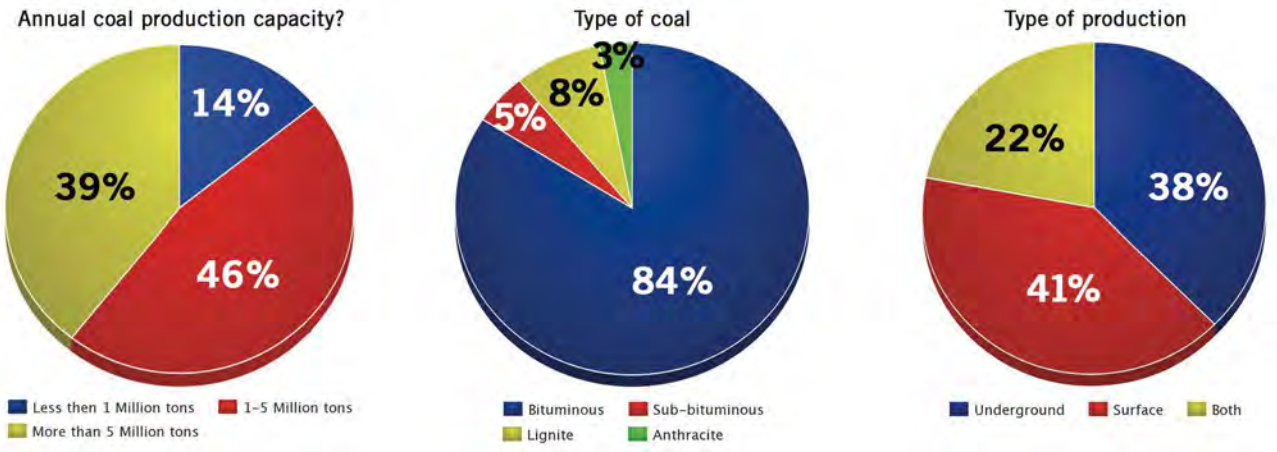
Figure 5 — On a scale of 1 (not very important) to 5 (extremely important), how do the following concerns rate?

1. Power Plant Regulation	(4.37)
2. Politics & Policy	(4.33)
3. Prices	(4.24)
4. Bonding & Permits	(3.89)
5. Economy	(3.86)
6. Retiring Workforce	(3.34)
7. Other	(3.15)
8. Limited Capacity	(2.60)

Figure 6 — What will be the single most expensive item the mine purchases in 2019? ..... What will it cost, in round figures?

Electric Shovel	*$100 million*
Hydraulic Excavator	*$75 million*
New Facilities	*$30-$50 million*
Relocating Infastructure	*$20 million*
Overland Belt Conveyor (4 miles)	*$11 million*
Ventilation Shaft	*$10-$20 million*
Infrastructure	*$5 million*
Consulting Services	*$2.5 million*
Large Mobile Equipment	*$2 million*
Continuous Miners (2)	*$1.8 million*
Dozer/Tractor (2)	*$1.4-$3 million*
Longwall Roof Supports	*$700,000*
Water Treatment Plant	*$400,000*

Figure 7 — Survey Demographics



Evolving World Markets

The importance of the Asia/Pacific region was highlighted in the lead item for the news section this month (see the IEA Forecast, p. 4). Despite import restrictions enacted by the government, China imported an additional 16 million mt of thermal coal in 2018. The country produces more than three times the amount of coal as the U.S., but domestic supply was outpaced by increased power consumption, which grew at the highest rate since 2011. Indian thermal coal imports increased 18% to 167 million mt as its growing coal production could not keep pace with domestic demand. In addition, ASEAN nations expanded imports by 19 million mt in 2018 to support ongoing urbanization. Globally, coal-fired power plants continue to be built, with approximately 56 gigawatts of new capacity added in 2018, with another some 60 gigawatts of additional capacity expected to come online in 2019.

On the supply side, lower-quality Indonesian exports rose 39 million mt in 2018 over the prior-year, primarily in response to increased demand from China and India. Both Australian and U.S. thermal coal exports remained strong, up 4% and an estimated 34%, respectively, year-over-year.

Outlook From Other Majors

Within the U.S., a mix of higher seasonal demand, increased fourth quarter natural gas prices and ongoing strength in exports resulted in continued stockpile reductions despite substantial plant retirements in 2018.

As a result of continued strength in seaborne thermal coal pricing, the Illinois Basin is forecast to be the largest thermal exporting region in the United States.

Getting back to the difference between the western and eastern U.S. coal operators, Peabody expects to reduce production and sales of higher-quality and higher-cost coal from its North Antelope Rochelle mine by 10 million tons.

With the announced closure of the Navajo Generating Station (NGS) by year-end 2019, the company also said that the Kayenta mine's production and sales are expected to cease in the third quarter given plant inventory levels. That would be an additional 2 million tons. Factor in the problems occurring at Cloud Peak Energy and Westmoreland Coal, it's plain to see that western U.S. coal production easily drop 20 million tons or more in 2019.

CONSOL Energy's 2018 sales volume totaled 27.7 million tons, which exceeded the high-end of its guidance and represented record annual sales. This growth was achieved due to improved demand for its products, as well as the company's ability to ramp up production and capture that demand improvement.

"We believe that inventories at several of our key customers' Northern Appalachian rail-served power plants are below normal, and absent any meaningful weather-related demand decline, we expect to ship all we can produce during 2019 as our customers will continue to seek additional coal to replenish their depleted stockpiles," said Jimmy Brock, CEO, CONSOL Energy. The company's guidance for 2019 is 26.8-27.8 million tons, which is close to the previously stated record production level.

U.S. coal operators should be able to maintain the new 750-million-ton norm, but the makeup of the mix will likely shift from West to East. Utility buyers will likely replenish stockpiles. They will be competing with consumers abroad for high-Btu coal from mines with access to the inland waterways. Global markets will continue to affect the U.S. coal business either directly or indirectly by removing tons from the domestic market. Should the trade tensions between the U.S. and China ease, energy generation and steel production could grow considerably.

A significant decrease in natural gas prices and a prolonged trade dispute could, however, also have a negative impact on the market. Natural gas is a by-product and, when petroleum prices are high, excess gas enters the market. For the moment, at the beginning of 2019, the market forces in general are working in favor of the eastern U.S. coal operators. On a tonnage basis, that means more mines and jobs to produce the same amount of coal.

Longwall Production Remains Steady

Fewer longwalls produce more coal

BY STEVE FISCOR, EDITOR-IN-CHIEF

Overall U.S. longwall production grew again in 2018. Collectively, this group of 35 highly productive underground coal operations generated 168.6 million tons, which was about 800,000 tons more than last year. In a year where the U.S. saw total coal production drop by 22 million tons, this is a positive sign.

The total number of faces dropped from 42 to 40 and the total number of longwall mines dropped from 37 to 35. Those figures include two trona mines in Wyoming and five mines that operated two longwall faces. Two longwall faces in West Virginia were removed, Federal No. 2 and Pinnacle No. 50, after those operations were closed last fall. Pinnacle No. 50 was the only plow face operating in the U.S.

The top three longwall operations produced more that 11 million tons per year (tpy) from two longwall faces. Foresight Energy's Sugar Camp mine set a new U.S. record for annual coal production from a longwall mine with more than 14.4 million tons in 2018. Last year, 14 longwall installations produced at a capacity of 5 million tpy or more, compared to 16 in 2017. Several longwall mines reported significant drops in production (See Table 2).

A new name appears this year, Wolverine Fuels. In October 2018, Bowie Resource Partners moved its corporate headquarters from Grand Junction, Colorado, to Sandy, Utah, and changed its name. Wolverine will continue to operate the SUFCO, Skyline and Dugout Canyon mines in Utah and the idled Bowie No. 2 mine in Colorado, and will also maintain a small regional office in Grand Junction. "In conjunction with the recent management changes and recapitalization of the company, we wanted to offer our employees a fresh start and new identity with the name change," said James Grech, CEO, Wolverine Fuels. "Our workforce is tough and resilient, very much like a wolverine, so we think our new namesake will resonate very well with our employees and the communities in which we operate."

Table 1—Longwall Installations by Parent Company (2018-2019)

Company	Ala.	Colo.	Ill.	Mont.	N.M.	Ohio	Pa.	Utah	Va.	W.Va.	Wyo.	Total
Alliance Resource Partners			1							2		3
American Energy (MEC)						1						1
Arch Coal		1								2		3
Blue Mountain Energy		1										1
CONSOL Energy							5					5
Contura Energy							1					1
Coronado Coal									1			1
Foresight Energy (MEC)			4									4
Seneca Coal Resources	1											1
Murray American Energy (MEC)										6		6
Pacific Minerals											1	1
Panther Creek Mining										1		1
Peabody Energy	1	1										2
Signal Peak Energy				1								1
Solvay Chemicals											1	1
Tronox Alkali Co.											1	1
UtahAmerican Energy (MEC)								1				1
Warrior Met Coal	3											3
Westmoreland Coal					1							1
Wolverine Fuels								2				2
Total	**5**	**3**	**5**	**1**	**1**	**1**	**6**	**3**	**1**	**11**	**3**	**40**

Longwall ownership in the U.S. remained relatively unchanged. Robert E. Murray and the companies he controls (American Energy, American Coal Co., Foresight Energy, Utah American Energy and MEC) operate 12 longwall faces spread across Illinois (4), Ohio (1), Utah (1) and West Virginia (6). CONSOL Energy operates five faces in Pennsylvania. Alliance Resource Partners, Arch Coal and Warrior Met Coal own three longwall faces.

More recently, Peabody Energy purchased the Shoal Creek mine in Alabama from Drummond Coal for $387 million and the company plans to add it to its seaborne metallurgical portfolio. For 2019, Peabody said it expects the Shoal Creek mine to ship approximately 2.5 million tons of high-vol A metallurgical coal to Asian and Atlantic steel customers. The company said it has budgeted approximately $20 million and $10 million in 2019 and 2020, respectively, for capital improvements. Shoal Creek's costs are expected to range between $85/ton and $95/ton. High-vol A met coal prices are currently $221 per metric ton. Last year, Shoal Creek produced more than 2.7 million tons, a 28% increase over 2017.

CONSOL Energy's Pennsylvania Mining Complex (PAMC) operates three longwall mines: Bailey (12.7 million tons), Enlow Fork (9.9 million tons) and Harvey (5 million tons). Bailey and Enlow Fork operate two longwalls each and all three are consistently ranked among the most productive coal operations in the nation.

It was a year of many achievements, explained Jimmy Brock, CEO, CONSOL Energy. "We completed our first calendar year as an independent publicly traded coal company," Brock said. "In 2018, we also produced and sold more coal than in any other year throughout the PAMC's 35-year history. I am also pleased to announce that we have made significant improvements during 2018 on the safety front as well. Our total recordable incident rate at the PAMC for full-year 2018 has improved

by 13.5% and our total number of exceptions improved by 12.1% compared to the same period last year. We remain laser-focused on having zero life-altering injuries."

During 2018, PAMC sold 27.7 million tons, which exceeded the high-end of its guidance range. On the operations front, the PAMC mined a record level of 27.6 million tons in 2018, eclipsing the previous record of 26.1 million tons set in 2017 and marking this the third consecutive year of production growth. "During 2018, the complex ran at approximately 97% capacity utilization, highlighting the desirability of our product," Brock said. "Additionally, the Bailey and Harvey mines each set individual production records during the year. Bailey's 12.7 million tons surpasses its previous record set in 2014, while Harvey's 5 million tons exceeds its previous record set in 2017. PAMC production for the full year benefited from strong demand for our products in the domestic and export markets, improving productivity, initial benefits from automation projects, and improving geological conditions at Enlow Fork mine."

For 2019, Brock said they plan to maintain similar production levels and the company would focus on strategically growing its business to diversify its revenue streams.

In Alabama, Warrior Met Coal increased production significantly at the Blue Creek No. 7 mine (15.1%) and the Blue Creek No. 4 mine (15.6%). In its third-quarter earnings report, Walt Scheller, CEO, Warrior Met Coal, explained that the market for high-quality premium met coal remained strong, "with robust customer demand continuing to be supported by steel production in our key markets."

"Warrior is performing in line with our increased guidance for the year as we continue to benefit from a price environment supported by a tight supply/demand balance and favorable Chinese policies," Scheller said. "With the recent successful completion of two scheduled longwall moves, our success in maintaining high levels of production during this time was the result of good planning, preparation, communication, and outstanding work by our employees."

Warrior Met continues to make good progress toward its nameplate annual capacity of 8 million tons, Scheller explained. In 2018, the company produced 7.6 million tons of met coal, according to data from the Mine Safety and Health Administration.

With 11 faces, West Virginia remains the longwall leader, followed by Pennsylvania (6), Illinois (5) and Alabama (5). Looking at the numbers, the average U.S. longwall mine operating in coal produced 5.11 million tpy in 2018 compared to 4.94 million tpy in 2017. On average, it has a cutting height of 96.7 in., a panel width (or face length) of 1,209.3 ft, and a panel length of 12,204.8 ft. Last year, those numbers were 93.8 in., a panel width (or face length) of 1,414.2 ft, and a panel length of 12,804.4 ft, respectively. A total of eight longwall faces have face lengths of 1,500 ft or greater. A total of 15 longwalls operate in the Pittsburgh No. 8 seam. The maximum overburden on average reaches 1,067.4 ft. Except for a few mines in Utah, most are developed with three entry gates. Using an 1,856-hp double-drum, ranging-arm shearer, they take a 40.3-in. cut. The average yield setting on the shield is 1,059 tons. All of the faces except for four are high voltage (4,160 volts). The Cumberland mine in Pennsylvania has the longest face: 1,580 ft. At 22,500 ft, Signal Peak Energy's Bull Mountain mine in Montana has the longest panel. The West Elk mine in Colorado operates a 2,805-hp shearer. Two mines, Lila Canyon in Utah and Oak Grove in Alabama, use ZMJ roof supports, which are made in China.

Table 2—Active US Longwall Mines (February 2019)

U.S. Longwall Mines		Prod. 2018	Prod. 2017	% Change
Foresight Energy	Sugar Camp*	14,460,951	12,812,197	12.9
CONSOL Energy	Bailey*	12,735,390	12,123,618	5.0
Murray American Energy	Marshall County*	11,433,840	11,653,535	-1.9
CONSOL Energy	Enlow Fork*	9,876,324	9,180,468	7.6
Signal Peak Energy	Bull Mountains	7,566,480	5,883,820	28.6
Murray American Energy	Harrison County	7,215,143	7,131,341	1.2
Foresight Energy	Mach Mining	6,887,728	6,335,835	8.7
Alliance Resource Partners	Tunnel Ridge	6,807,214	6,988,112	-2.6
Murray American Energy	Ohio County	6,509,414	6,046,582	7.7
Contura Energy	Cumberland	6,422,579	6,769,916	-5.1
Alliance Resource Partners	Hamilton County	6,298,997	6,129,347	2.8
Murray American Energy	Marion County	6,133,349	6,114,799	0.3
Warrior Met Coal	Blue Creek No. 7	5,597,175	4,864,828	15.1
Coronado Coal	Buchanan	5,188,441	5,352,731	-3.1
CONSOL Energy	Harvey	4,980,569	4,805,208	3.6
Wolverine Fuels	Sufco No. 1	4,904,476	5,883,975	-16.6
American Energy Corp.	Century Mine	4,785,568	5,676,639	-15.7
Arch Coal	West Elk	4,674,833	4,821,281	-3.0
Murray American Energy	Monongalia County	4,404,054	3,889,889	13.2
Wolverine Fuels	Skyline	3,602,708	4,374,500	-17.6
Arch Coal	Leer	3,444,773	3,381,442	1.9
Peabody Energy	Twentymile	3,049,511	3,842,798	-20.6
Peabody Energy	Shoal Creek	2,659,074	2,078,760	27.9
UtahAmerican Energy	Lila Canyon	2,630,631	1,629,311	61.5
Alliance Resource Partners	Mountain View	2,280,219	2,114,258	7.8
Pacific Minerals	Bridger	2,210,433	1,715,801	28.8
Warrior Met Coal	Blue Creek No. 4	2,137,810	1,849,387	15.6
Blue Mountain Energy	Deserado	2,073,860	1,906,894	8.8
Westmoreland Coal Co.	San Juan South	1,848,018	5,327,442	-65.3
Arch Coal	Mountain Laurel	1,763,202	1,509,675	16.8
Panther Creek Mining	American Eagle	1,516,885	1,872,752	-19.0
Seneca Coal Resources	Oak Grove	1,497,321	1,403,123	6.7
Mission Coal (closed)	Pinnacle No. 50	1,016,246	1,237,167	-17.9
ERP Federal Mining (closed)	Federal No. 2	NA	1,103,582	NA
Total U.S. Longwall Production		**168,613,216**	**167,811,013**	**0.5**

*Each of these mines operate two longwall faces.

Mine Company (parent)	Seam	Seam height (inches)	Cutting height (inches)	Panel width (ft)	Panel length (ft)	Over-burden (ft)	No. of gate entries	Depth of cut (inches)	Shearer Total hp	Haulage system	Roof support yield (tons)	Face conveyor type (strand, motors)	Face conveyor width (mm)/ speed (fpm)	Stageloader type width, speed	Crusher	Electrical controls	Voltage to face
ALABAMA (5)																	
Blue Creek No. 4 Warrior Met Coal	Blue Creek/ Mary Lee	45	85	1,115	4,000- 13,000	1,600	4	36	Komatsu 7LS-1D DDR 1,813	Ultratrac 2000	Komatsu 1,300	JWR with CSTs 42 TIB 3x1,200	1,000/ 305	JWR 1,300 mm, 420 fpm	JWR	Line Power	4,160
Blue Creek No. 7 West Warrior Met Coal	Blue Creek/ Mary Lee	53	69	1,060	7,000- 8,000	1,600	4	36	Komatsu 7LS-1D DDR 1,813	Ultratrac 2000	Cat 1,243	JWR with CSTs 42 TIB 3x1,000	1,000/ 305	JWR 1,300 mm, 420 fpm	JWR	Line Power	4,160
Blue Creek No. 7 East Warrior Met Coal	Blue Creek/ Mary Lee	53	80	1,040	4,000- 13,000	1,600	4	36	Komatsu 7LS-1D DDR 1,813	Ultratrac 2000	Komatsu 1,300	JWR with CSTs 42 TIB 3x1,200	1,000/ 305	JWR 1,300 mm, 420 fpm	JWR	Line Power	4,160
Oak Grove Seneca Coal Resources	Blue Creek	50- 55	74	1,088	12,300	785	4	36	Komatsu 7LS-1D DDR 1,625	Ultratrac 2000	ZMJ NA	Longwall Associates 42 TIB 3x1,000	1,000/ 384	Komatsu 1,300 mm, 420 fpm	Longwall Associates	Line Power	4,160
Shoal Creek Peabody Energy	Mary Lee/ Blue Creek	84- 132	84- 132	1,000	11,000	1,150	3	42	Komatsu 7LS5 DDR 2,091	Ultratrac 2000	Komatsu 955	Cat 48 TIB 3x1,000	1,342/ 320	Caterpillar 1,424 mm, 385 fpm	Cat	Service Machine	4,160
COLORADO (3)																	
Deserado Blue Mountain Energy	B	84- 168	132	800	14,000	400- 900	3	30	Komatsu 7LS2 DDR 1,371	Ultratrac 2000	Komatsu 910	Komatsu 38 TIB 2x900	860/ 450	Komatsu 1,220 mm, 410 fpm	Komatsu	Service Machine	2,300
Twentymile Peabody Energy	Wadge	108	108	1,000	12,000- 15,000	1,400- 1,650	3	39.4	Komatsu 7LS5 DDR 2,360	Jumbotrac 2000	Cat 1,327	Cat 48 TIB 3x1,900	1,188/ 371	Caterpillar 1,588 mm, 520 fpm	Cat	Service Machine	4,160
West Elk Arch Coal	E	84- 216	96- 156	1,080	10,250- 16,000	600- 1,200	3	42	Cat EL3000 DDR 2,805	Jumbotrac	Cat 1,271	Cat 48 TIB 3x1,650	1,188/ 371	Caterpillar 1,388 mm, 464 fpm	Cat	Service Machine	4,160
ILLINOIS (5)																	
Deer Run (Idle) Foresight Energy	Herrin No. 6	96	96	1,400	15,000	600	3	42	Komatsu 7LS5 DDR 2,360	Jumbotrac 2000	Cat 1,200	Cat 52 TIB 3x1,900	1,000 371	Caterpillar 1,388 mm, VFD	Cat	Intermountain Electrical	4,160
Mach No. 1 Foresight Energy	Herrin No. 6	68	84	1,400	18,000	400	3	42	Komatsu 7LS2A DDR 2,084	Ultratrac 2000	Cat 1,200	Cat 48 TIB 3x2,200	1,000 383	Caterpillar 1,376 mm, VFD	Cat	Intermountain Electrical/SMC	4,160
Sugar Camp M-Class Foresight Energy	Herrin No. 6	72	86	1,400	19,000	900	3	42	Komatsu 7LS2A DDR 2,084	Ultratrac 2000	Cat 1,200	Cat 48 TIB 3x2,200	1,000 383	Cat/AEMI 1,376 mm, VFD	Cat	Intermountain Electrical/SMC	4,160
Sugar Camp Viking Foresight Energy	Herrin No. 6	72	86	1,400	19,000	900	3	42	Komatsu 7LS2A DDR 2,084	Ultratrac 2000	Cat 1,200	Cat 48 TIB 3x2,200	1,000 383	Cat/AEMI 1,376 mm, VFD	Cat	Intermountain Electrical/SMC	4,160
Hamilton County Coal No. 1 Alliance Resource Partners	Herrin No. 6	76	84	1,400	14,500	1,000	3	42	Komatsu 7LS1D DDR 1,840	Ultratrac 2,000	Komatsu 1,320	Komatsu 50 TIB 3x1,650	1,000/ 370	Komatsu 1,350 mm, 480 fpm	Komatsu	Service Machine	4,160
MONTANA (1)																	
Bull Mountains Signal Peak Energy	Mammoth	102- 204	156	1,250	22,500	200- 850	3	42	Komatsu 7LS5 DDR 2,360	Jumbotrac 2000	Komatsu 1,130	Cat 48 TIB 3x1,650	1,088/ 376	Caterpillar 1,388 mm, 464 fpm	Cat	Intermountain Electrical	4,160

Mine Company (parent)	Seam	Seam height (inches)	Cutting height (inches)	Panel width (ft)	Panel length (ft)	Over-burden (ft)	No. of gate entries	Depth of cut (inches)	Shearer Total hp	Haulage system	Roof support yield (tons)	Face conveyor type (strand, motors)	Face conveyor width (mm)/ speed (fpm)	Stageloader type width, speed	Crusher	Electrical controls	Voltage to face
NEW MEXICO (1)																	
San Juan Mine No. 1 Westmoreland Coal Co.	Fruitland No. 8	136-200	120-156	1,000	12,500	400-1000	3	39	Komatsu 7LS5 DDR 2,092	Ultratrac 2000	Komatsu 1,160	Komatsu 50 TIB 3x1,150	1,100/ 350	Komatsu 1,350 mm, 500 fpm	Komatsu	Service Machine	4,160
OHIO (1)																	
Century Mine American Energy	Pittsburgh No. 8	59	70	1,500	10,942	400	3	30	Komatsu 7LS1A DDR 1,880	Ultratrac 2000	AEMI 692	AEMI 48 TIB 3x1,900	1,000/ 365	AEMI 1,200 mm, 525 fpm	AEMI	MCI	4,160
PENNSYLVANIA (6)																	
Bailey - Dry Ridge CONSOL Energy	Pittsburgh No. 8	62-72	89	1,501	11,980	400-1,000	3	42	Komatsu 7LS2A DDR 1,666	Ultratrac 2000	Cat 969	Cat/Longwall Associates 48 TIB 3x1,900	988/ 378	Caterpillar 1,188 mm, 528 fpm	Cat	Line Power	4,160
Bailey - Crabapple CONSOL Energy	Pittsburgh No. 8	62-72	90	1,576	12,400	500-1,400	3	42	Komatsu 7LS2A DDR 1,666	Ultratrac 2000	Komatsu 1,005	Cat/ PF6 48 TIB 3x1,900	988/ 378	Caterpillar 1,188 mm, 528 fpm	Cat	Line Power	4,160
Harvey CONSOL Energy	Pittsburgh No. 8	68-72	86	1,466	13,620	800-1,400	3	42	Komatsu 7LS2A DDR 1,666	Jumbo Track 2000	Cat 969	Cat 48 TIB 3x1,900	988/ 378	Caterpillar 1,188 mm, 528 fpm	Cat	Line Power	4,160
Cumberland Contura Energy	Pittsburgh No. 8	72-84	96-102	1,580	7,000-11,000	600-1,200	3	42	Komatsu 7LS2A DDR 1,666	Jumbo Track 2000	Cat 1,096	Cat 48 TIB 3x1,900	988/ 371	Caterpillar 1,388 mm, 420 fpm	Cat	Line Power	4,160
Enlow Fork - F Side CONSOL Energy	Pittsburgh No. 8	62-72	88	1,561	10,600	500-900	3	42	Komatsu 7LS2A DDR 1,666	Jumbo Track 2000	Cat 983	Cat 48 TIB 3x1,900	988/ 371	Caterpillar 1,188 mm, 525 fpm	Cat	Line Power	4,160
Enlow Fork - E Side CONSOL Energy	Pittsburgh No. 8	60-70	88	1,566	12,000	500-900	3	42	Komatsu 7LS2A DDR 1,666	Jumbo Track 2000	Cat 969	Cat/ PF6 48 TIB 3x1,900	988/ 371	Caterpillar 1,188 mm, 525 fpm	Cat	Line Power	4,160
UTAH (3)																	
SUFCO No. 1 Wolverine Fuels	Upper Hiawatha	84-216	96-156	1,110	2,400-4,000	800-1,800	3	42	Cat EL3000 DDR	Ultratrac 2000	Komatsu 1,100	Cat 48 TIB 3x1,650	1,342/ 374	Caterpillar 1,388 mm, 464 fpm	Cat	Service Machine	4,160
Skyline Wolverine Fuels	Lower OiConnor A	84-200	96-144	850	6,000	500-1,600	2	36	Komatsu 7LS2 DDR 1,666	Jumbotrac 2000	Cat 1,007	Cat 42 TIB 2x1,200	1,042/ 340	Caterpillar 1,388 mm, 450 fpm	Cat	Line Power	4,160
Lila Canyon Utah American Energy	Sunnyside	168	160	850	4,000	1,000	2	42	Cat EL-1,000 DDR 1,880	Ultratrac 2000	ZMJ 1,250	AEMI 48 TIB 3x1,000	1,000/ 365	AEMI 1,200 mm, 525 fpm	AEMI	Line Power	2,300
VIRGINIA (1)																	
Buchanan Coronado Coal	Pocahontas No. 3	60-76	70	700	11,500	1,400-2,000	4	42	Komatsu 7LS1D DDR 1,290	Super GearRack 2000	Komatsu 1,024	Komatsu/Longwall Associates 42 TIB 3x800	1,000/ 357	Longwall Associates 1,294 mm, 485 fpm	Komatsu	Line Power	4,160

Mine Company (parent)	Seam	Seam height (inches)	Cutting height (inches)	Panel width (ft)	Panel length (ft)	Over-burden (ft)	No. of gate entries	Depth of cut (inches)	Shearer Total hp	Haulage system	Roof support yield (tons)	Face conveyor type (strand, motors)	Face conveyor width (mm)/ speed (fpm)	Stageloader type width, speed	Crusher	Electrical controls	Voltage to face
WEST VIRGINIA (11)																	
American Eagle ERP Compliant Fuels	Eagle	50	64	1,020	16,200	600- 1,000	3	42	Komatsu 7LS1D DDR 1,625	Super GearRack 2000	Cat 1,271	Cat/LW Associates 48 TIB 3x1,200	988/ 320	Caterpillar 1,388 mm, 350 fpm	Cat	Service Machine	4,160
Harrison County Murray American Energy	Pittsburgh No. 8	94	90	1,465	4,315	950	3	42	Komatsu 7LS1D DDR 1,880	Jumbo GearRack Indirect Drive	Cat 862	LW Associates 48 TIB 3x1,900	1,000/ 365	Caterpillar 1,200 mm, 525 fpm	Cat	Line Power	4,160
Leer Arch Coal	Lower Kittanning	54- 96	72- 84	1,200	5,000- 9,000	320- 750	3	42	Komatsu 7LS1D DDR 1,625	Ultratrac 2000	Komatsu 1,040	Komatsu 42 TIB 3x1,000	1,000/ 337	Komatsu 1,294 mm, 443 fpm	Komatsu	Service Machine	4,160
Marion County Murray American Energy	Pittsburgh No. 8	84	90	1,415	7,175	1,000	3	42	Komatsu 7LS2A DDR 1,880	Ultratrac 2000	Cat 890	AEMI/Cat 48 TIB 3x1900	1,000/ 365	Caterpillar 1,200 mm, 525 fpm	Cat	Line Power	4,160
Marshall County West Murray American Energy	Pittsburgh No. 8	72	93	1,500	12,000	1,000	3	42	Komatsu 7LS1A DDR 1,880	Ultratrac 2000	Cat 890	AEMI 48 TIB 3x1,900	1,000/ 365	Caterpillar 1,200 mm, 525 fpm	Cat	Line Power	4,160
Marshall County East Murray American Energy	Pittsburgh No. 8	72	93	1,500	12,000	1,000	3	42	Komatsu 7LS1A DDR 1,880	Ultratrac 2000	Cat 890	AEMI 48 TIB 3x1,900	1,000/ 365	AEMI 1,200 mm, 525 fpm	AEMI	MCI	4,160
Monogalia County Murray American Energy	Pittsburgh No. 8	78	96	1,100	11,800	1,000	3	42	Komatsu 7LS1D DDR 1,880	Ultratrac 2000	Cat 840	AEMI 48 TIB 3x1,000	1,000/ 365	Cat 1,200 mm, 525 fpm	Cat	Line Power	4,160
Mountain View Alliance Resource Partners	Upper Freeport	78- 108	78- 108	850	6,000- 8,000	600- 800	3	42	Komatsu 7LS1A DDR 1,330	Ultratrac 2000	Komatsu 815	Longwall Associates 38 TIB 2x700	950/ 229	Komatsu 1,200 mm, 312 fpm	Longwall Associates	Line Power	2,300
Mount Laurel Arch Coal	Alma & Cedar Grove	84	84	1,000	3,100- 5,000	300- 1,100	3	42	Komatsu 7LS2A DDR 1,853	Ultratrac 2000	Komatsu 1,040	Komatsu 42 TIB 3x1,000	1,000/ 337	Komatsu 1,200 mm, 455 fpm	Komatsu	Service Machine	4,160
Ohio County Murray American Energy	Pittsburgh No. 8	66	87	1,406	14,068	650	3	42	Komatsu 7SL1A DDR 1,880	Ultratrac 2000	Cat 862	AMEI 48 TIB 3x1,900	1,000/ 365	AEMI 1,300 mm, 525 fpm	AEMI	Line Power	4,160
Tunnel Ridge Alliance Resource Partners	Pittsburgh No. 8	62- 72	80- 84	1,200	16,000	400- 725	3	42	Komatsu 7LS1A DDR 1,813	Ultratrac 2000	PSS/CAT 1,020	Komatsu/LW Associates 48 TIB 3x1,200	1,000/ 360	Komatsu 1,294 mm, 443 fpm	Komatsu	Line Power	4,160
WYOMING (3)																	
Bridger Pacific Minerals	D41	96- 144	120	600	10,000	700	3	36	Cat EL 2000 DDR	Jumbotrac	Cat 982	Cat 42 TIB 2x1,200	988/ 357	Cat 1,388 mm, 423 fpm	Cat	Service Machine	2,300
Green River Solvay Chemicals	Bed 17	132	132	625	8,750	1,600	3	34	Komatsu 7LS5 DDR 2,360	Super GearRack 2000	Famur/Cat 800	Longwall Associates 42 TIB 2x1,000	1,100/ 330	Caterpillar 1,388 mm, 477 fpm	Cat	Service Machine	4,160
Westvaco Tronox Alkali Co.	Bed 17	96- 132	96- 132	750	9,400	1,500	4	38	Komatsu 7LS5 DDR 2,360	Ultratrac 2000	Komatsu 870	Komatsu 42 TIB 2x1,072	1,100/ 268	Komatsu 1,294 mm, 385 fpm	Komatsu	Service Machine	4,160

Legend: DDR 2,000 means double-drum ranging arm shearer with 2,000 hp installed. Cutting machines reported are all shearer type unless otherwise indicated.
VFD—variable frequency drive; SS—single strand; TIB—twin strand inboard; 42 TIB 2 x 1,000 means 42-mm chain, twin strand inboard, two 1,000-hp motors. *Note: AEMI=American Equipment and Machine Inc.

MINING MARKETPLACE

Resource Center

FREE TOOLS FOR YOUR CAREER SUCCESS.

Free case studies, white papers, presentations, business forecasts, and more. All designed to help you do business better.

The ASIA Miner · Coal Age · E&MJ Engineering and Mining Journal · Equipo Minero

Cement Americas · Rock Products · Concrete

RESOURCES.MININGMARKETPLACE.COM

Yesterday's Waste is Tomorrow's Boon

New coal fines recovery solutions can help miners go green, save greenbacks and grow optionality

BY JESSE MORTON, TECHNICAL WRITER

History is replete with examples of how what is considered a resource at any given point hinges on the technologies of the day. What today is piped to the thickener or the pond may tomorrow be a cash cow for a company with the right equipment and know-how. Similarly, with the right technological breakthrough, today's waste may be tomorrow's fuel.

For example, three new solutions that recover coal fines from what otherwise might be considered waste use technologies originally designed for metals miners. Glencore Technology's Jameson Cell, proven in Australian coal plants, was originally designed for use on a lead/zinc circuit. Minerals Refining Co.'s first commercial coal fines recovery plant uses a technique based on one originally developed for copper ore processing in Britain in the early 1900s. Arq's new Corbin plant that will produce from coal waste a powder so pure it can be mixed with fuel oil uses flotation technology that is commonly used by metals miners.

These three solutions are now on the market. The companies report they are looking to branch out, form strategic partnerships and innovate further. More importantly, they seek to empower coal miners to turn what was once considered discard into cold hard cash.

Certainty Over Probability

With the 30th anniversary of the first deployment of a Jameson Cell imminent, research and development for the fifth generation of the solution is under way, Virginia Lawson, technology manager, Glencore Technology, said.

"Every 10 years or so, we are assembling changes to address anything that we've learned," she said. "We are just stepping into the Mark V and looking at areas that might improve the performance of the cells for end users."

The current and previous generations featured incremental improvements targeting increased capacity, reduced complexity, and extended wear life. Feedback from the field will guide some of the future design changes, Lawson said.

Future improvements will likely target increased volumetric flowrate and scale, and include bigger cell designs and modifications that make the cell cheaper to install and operate, Lawson said.

Another area of potential improvement is the wash water system, she said. "The dewatering circuit being constrained leads to inferior quality wash water and this results in problems washing the froth," Lawson said.

A "better understanding of the chemistry of flotation" has inspired "better designs," Lawson said. And one possible solution tweaks the wash water system so that it can better tolerate dirty water and self-clean, she said. "We have a trial under way," Lawson said. "Ensuring wash water is maintained at all times will improve product quality." It will also help debottleneck a crucial area of the process, she said.

The Jameson Cell is described as a high-intensity froth-flotation cell.

It creates a high-pressure jet of mixed air and slurry, which shoots through a pipe, called the downcomer, that penetrates and empties into the flotation cell. The downcomer is where particle and bubble contact first occurs. "The plunging jet of liquid shears and then entrains air, which has been naturally aspirated," Glencore Technology personnel reported in a white paper. "Due to high mixing velocity and a large interfacial area, there is rapid contact and collection of particles."

In the tank, secondary bubble-particle contact occurs. "The velocity of the mixer and large density differential between it and the remainder of slurry in the tank results in recirculating fluid patterns, keeping particles in suspension without the need for mechanical agitation," the company reported.

The bubbles gather on the surface of the column, and the resulting froth is removed by froth drainage or froth washing.

Jameson Cells, similar to the one pictured here, are credited with recovering some $30 billion in export coal in 2013 alone. (Photo: Glencore Technology)

The key technology in the system is the downcomer, which feature no moving parts and is based on simple physics to optimize efficiency and cost effectiveness, Lawson said. "You create a hydraulic field and the slurry is drawn up into the downcomer because there is a pressure difference as that plunging jet goes through that orifice," she said. "It naturally draws air from the atmosphere, so you don't actually have to use compressors, or any energy associated with compressing air."

The cell is advertised as excelling at recovering coal particles smaller than 500 microns, which are typically uneconomical to pursue via conventional flotation technologies and usually end up as waste, Glencore Technologies reported. "The fine bubble size, high intensity and froth washing ability offer major advantages over conventional cells for recovery of the highly hydrophobic, fast floating coal fines," the company reported. "These advantages provide superior, more consistent flotation performance, lower ash concentrates and high recovery."

The original seed idea for the downcomer is attributed to Laureate Professor Graeme Jameson of the University of Newcastle. In search of a means to optimize flotation performance of a lead/zinc concentrator, he was commissioned by Mount Isa Mines, in Queensland, Australia, to develop the idea, which he patented in 1986 on behalf of Newcastle Innovation Ltd. That year the resulting pilot cell was tested. Three years later, two full-scale cells were installed in the lead-zinc concentrator at the mine. Two more were built that year for a similar concentrator at the nearby Hilton mine.

Soon thereafter, the solution was adopted by a major coal miner in the Bowen Basin in Australia. Within a half-decade, Newlands Coal employed six Jameson Cells, scaled up for the requisite throughput, at recovering coal fines. In Australia, the Jameson Cell is "now the industry standard," Glencore Technology reported.

The largest installation at Curragh (Australia) treats more than 5 million tons per year of coal, using only 12 cells, Glencore Technology reported. The cells have been deployed to coal operations in Africa, North America, Asia and Europe, the company reported.

In 2013, Jameson was named New South Wales Scientist of the year. That year, Jameson Cells at Australian sites were credited with recovering some $30 billion in export coal. In 2015, the solution won the Prime Minister's Award for Innovation for its role in the Australian economy.

Such accolades and figures hint at the value the cells could bring to a circuit and plant, Lawson said. To bring peace of mind to a plant manager, she said, the cells offer something invaluable: certainty. "Other devices rely on probability," Lawson said. "We are now 100% certain that a particle has an opportunity to attach to a bubble."

Currently, roughly 350 units are operating in almost 30 countries around the globe. In each case, the cells were selected as technical solutions to technical problems, Lawson said. "The Jameson Cell can recover all of the coal fines, usually in a single step, to improve the performance of dewatering and now lower the level of chemicals needed," she said. "By operating the Jameson Cells in series, the second Jameson Cell is able to scalp the tail at lower chemical addition, leading to improved dewatering conditions."

Adoption is easy, as the Jameson Cell "has direct scale-up from pilot testing," she said. "So, if you have an existing operation and we pilot on your site, then we will know exactly how our Jameson Cell will operate."

With four generations in operation, three decades of history, and field results from around the world attesting to the viability of the solution, the primary barrier to adoption now is normalcy bias, Lawson said. "We just have to get over some of those barriers that people have to adopting something different," she said. "The technology does it, and it speaks for itself; they just need to be willing to adopt and reap the benefits of change."

In Q4 2018, Glencore Technologies announced a 25% capital back performance guarantee on the cells. The guarantee formalizes the confidence the company has in how well the cells will perform, Lawson said. "Show us what you need to get done," she said. "Work with us and we will demonstrate what can be done and that we stand behind it."

Recovering Ultrafine Coal

Minerals Refining Co. (MRC) reported it is building the first commercial Hydrophobic-Hydrophilic Separation (HHS) system-based plant at a coal mine in eastern Kentucky.

The plant will process 40 tons per hour (tph) of solids from a fine-coal slurry that would otherwise be destined for the thickener. "Typically, mines throw away 3% to 5% of the coal mined," Dr. Stanley Suboleski, president, MRC, said. "We are focused on recovering that material."

The system should enable the plant to capture 20 tph of high-quality coal fines for market. "About half of the slurry solids is ash," Suboleski said.

The final product will average under 4% ash, he said. "We can control the moisture," he added. "We can dial that in."

The partnership framework with the mine is complicated, Suboleski said, but ensures MRC will have coal to sell.

HHS shares characteristics with traditional flotation systems. Instead of being attracted to bubbles in a water tank, the coal fines are captured using an oil to coat the particles and form agglomerates.

Oil molecules simply perform better at grabbing hydrophobic particles, Suboleski said. "It is a matter of contact angle," he said. The system can recover particles that are both larger and smaller than those recovered by traditional flotation methods. "We've recovered particles down to single-micron size and even smaller," Suboleski said. "We don't know how fine we can go with this technology."

The system employs several steps. In the first step, the oil and slurry are mixed mechanically. "We have to mix this stuff pretty thoroughly, because if we don't get the oil on the coal, it doesn't get recovered," Suboleski said.

The mix is then piped to a second tank to be more gently agitated.

Gentle agitation is a crucial step in separating the coal from the water and ash. "These oil-covered particles are attracted to each other," Suboleski explained. "They bump into each other and form coal-oil agglomerates that float on the water-ash mixture." However, at this stage, those agglomerates contain entrapped water droplets. "The impurities are hydrophilic, so they want to go where the water goes," Suboleski said. "And when the moisture is trapped inside the agglomerate, it also raises the impurity level, which is the reason that agglomeration has not been used widely in the past, even though it was first discovered in the early 1900s."

A group touring MRC's first commercial HHS plant strolls past the low-shear mixer, left, the phase separator, middle, and the Morganizer, right. (Photo: Minerals Refining Co.)

The patented method for releasing the trapped water and waste was discovered and invented by Dr. Roe-Hoan Yoon, director, Center for Advanced Separation Technologies, Virginia Polytechnic Institute and State University (Virginia Tech). "It largely involves the application of the correct amount of energy, although other factors are involved as well," Suboleski said.

The agglomerate-breaking component at the heart of the method and technology is called the Morganizer, after MRC Board Chairman E. Morgan Massey, former CEO of the A.T. Massey Coal Co. "The name came from the developers of the initial test unit several years ago and has stuck, somewhat to Mr. Massey's embarrassment," Suboleski said.

The oil-coated coal fines rise to the top and the now-released impurities and water are drained from the bottom of the Morganizer. The oil-coal mix is then piped into a vacuum filter, and then put through an evaporator, which enable the process to capture and recycle the oil.

The final product, which has at times been of a reportedly high-enough quality to be categorized as "nearly pure carbon," emerges dry from a chute.

It is the result of roughly seven years of research and development.

MRC began brainstorming on, and test-tube-scale tests of, the technology in 2011. After making the process continuous at lab scale, a proof-of-concept unit was constructed that processed 100 pounds per hour. "Based on results of tests from seven different coal plants, we went ahead and commissioned a company that specializes in building pilot plants to build one for us," Suboleski said. "The design and construction consumed all of 2014 and the first half of 2015."

The pilot plant was tested for two years. The feed solids averaged 58% ash, and the resulting clean coal averaged between 4% and 4.5%. "We discovered then that we could control the moisture," Suboleski said, "and typically maintained it between 5 and 9%."

MRC stopped testing in late 2017 and "started our initial commercial plant design," Suboleski said. Because it uses only the existing slurry water and otherwise is self-contained, it will operate under a modification to the existing water and air permits for the processing plant.

With the long-lead-time equipment ordered, and construction initiated, commissioning of the plant is scheduled for late 2019.

Providing Optionality

Energy tech company Arq will start commissioning this quarter an Arq Fuel pilot plant in Corbin, Kentucky, on a site where U.S. Steel previously operated a processing plant. Roughly 75% complete, the $75 million, 50,000-ft^2 plant will produce 12.5 tons per hour of micro-fine hydrocarbon powder from a feed of coal waste.

Commissioning the plant will be a stepping stone on the path to going global, Paul Groves, chief operating officer, Arq, said. "We will scale this very quickly around the globe to become a major player in the coal market by creating a product that feeds into the oil market," he said. "We are entering into three further projects with major coal companies around the globe." For example, within the year, Arq will launch another project in the United States and one at a "big site in Australia," Groves said.

Groves described the Corbin plant as innovatively engineered to allow the company to trial and compare technologies throughout the process and to determine what fits best. "That is a good thing," he said. "We have done everything that we can to ensure that we have a high-quality consistent product that comes out on spec, on time, every time for our customers."

The product, Arq Fuel, is a less-than-10-micron 99% pure hydrocarbon particle with less than 2% moisture and 1% ash by mass. "Actually, 80% of the particles will have a diameter of less than five microns," Tudor said. The particles are so pure they can be blended with oil products or amalgamated into Arq Fuel pellets for mixing with met or thermal coals.

According to company literature, Arq Fuel is produced using equipment commonly used in minerals processing and elsewhere.

Coal discard such as that headed for a thickener or found in a pond serves as the feed. "Particle size reduction is achieved by ball milling, high-shear grinding or a combination thereof," Arq reported. The biggest ball mill at Corbin is 1.5 megawatts, Tudor said.

Micro-separation is achieved using enhanced froth flotation. "This technology has traditionally been used to separate microfine particles in the minerals and precious metal mining industries," Arq reported. The company deploys a proprietary technique to "enhance that process," Tudor said. "We push that to the limit."

The next step, described as a rapid evaporation system, involves de-watering and thermal drying. It leverages "recent technological advancements in the food processing industry," the company reported.

The process ensures the powder is almost entirely void of moisture and ash, Groves said. Thus, "we can put up to 35% by weight of this microfine powder into an oil."

The ratio will depend on the application. The customers are from different

sectors and have different requirements. "There are a lot of applications we are looking at," Groves said. "We have a focus on about two or three at the moment. They are at different ends of the spectrum."

Arq continuously tests various blends to ensure performance, Tudor said. "We are running experiments from 5% up to 35% in various oils and trying to assess that on a case-by-case basis so we have the ideal blend in each scenario for each customer," he said.

Tests reveal Arq Fuel can be used to stretch and improve the performance of certain residual fuel oils (RFOs) that are burned by thermal power stations, large industrial plants and engines, specifically marine engines. Company literature reports the blends, at varying ratios, are proven to meet a range of critical requirements, to include those covering dispersion stability, fuel integrity, flashpoint, pour point, sulfur, vanadium, sodium, clay and carbon. "Importantly, Arq's own market entry does not require changes to the supply chain or to engines, boilers and associated equipment," the company reported. "It delivers significant efficiency improvements for oil distributors, refiners, industrial users and utility customers throughout the value chain."

Perhaps most importantly, it delivers improvements relatively inexpensively, Groves said. "We have a very low-cost source oil component that we can produce for around $10 a barrel," he said. "The ability to augment oil supply by coal discard as your feedstock has some interesting opportunities attached to it."

With those opportunities in mind, two major global energy companies, Peabody and Vitol, invested in partnerships with Arq in July 2018.

Arq and Peabody partnered to identify and prioritize mine sites that are candidates for adoption. "We now have access to all of their sites," Tudor said.

Arq partnered with Vitol, described as the world's largest independent oil trader, to distribute Arq Fuel globally. "Vitol will work to position Arq Fuel as a low-cost blending component with specific customers," Arq reported. "These are initially envisaged to include consumers of fuel oil."

Groves said the three companies were also partnering on "major innovations."

Those innovations may debut at Corbin or at the plant planned for Australia, described by Groves as at least five times the size of the one at Corbin. "That one will be a little different because it is going to be on an active mine site."

The size of the site will mandate a "scaling up of the size of the plant and the output as well," Tudor said.

The company plans to have made final investment decisions on the plant before the close of 2019, Groves said.

Meanwhile, the company, with an office in Lexington, Kentucky, is open to exploring other possible partnerships in the U.S. and abroad, Tudor said. A partnership could present a miner with "a new revenue stream" and "a new line of business," but with an "environmental angle as well," he said.

Which is to say Arq could help a coal miner grow optionality, Groves said. "The coal market has proven to be pretty volatile, especially with the waste angle," he said. "If you could turn that into a product at low cost, and sold into another market, that just gives you some optionality because the coal price doesn't necessarily follow the oil price or vice versa."

2019 Haulage & Loading Preview

Organizers revamp program for open-pit mining conference

BY STEVE FISCOR, EDITOR

Like most mining disciplines, open-pit mining is on an evolutionary track of steady improvement. On one front, autonomous haulage is attracting a lot of attention. That may not be a viable option for every mine, but most mines are definitely interested in getting the most they can from large haul trucks and primary loading tools. This rendition of the Haulage & Loading (H&L) conference will try to get its arms around what's happening, what will happen, and how additional safety and productivity improvements can be made.

In addition to some of the high-tech options available to mine engineers and mine managers, several H&L 2019 presentations will explore strategies for pit management and improving safety on mine sites. The concepts will range from contractors sharing their experience to a haul road expert debating the investment decision for rebuild versus maintenance. Merging all of this together is the human element and training operators to think about on-the-job performance.

The conference, which takes place March 11-13 has been relocated to a different Arizona venue: the Hilton El Conquistador in Tucson. A golf outing and welcoming reception is scheduled for Sunday, March 10. The technical program kicks off Monday morning. In total, there are six sessions (three per day) with three presentations in each session. On Wednesday morning, the final day, a workshop will offer insight to surface mining professionals as to how they can get more from the equipment by using the tools that are currently available to them. Full-conference registrants will receive credit for professional development hours. Seating for the workshop is limited and delegates must pre-register.

The format for the event has also changed. This time the program will be the central focus with exhibitors lining the perimeter of the ballroom. More than 20 vendors will be on hand. Komatsu Mining is a gold-level sponsor for the event. Hilliard, MTU America, Philippi Hagenbuch and TowHaul are also sponsoring the event. What follows is the long version of the program and a description of the exhibitors.

The Hilton El Conquistador in Tucson, Arizona (above), is the new venue for H&L 2019.

Session 1: Modern Open-pit Mining Strategies

The Future of Haulage and Loading

Michelle Ash, CIO, Barrick Gold

Haulage is a fundamental part of mining, but will it be in the future? What are the emerging and current technologies, how fast are they developing and what will be their impact as they start to integrate on the mining process? What will the mine of the future start to look like as we automate, electrify, use, and produce big data and AI?

Mine Design Considerations for the Future

Brian Yureskes, director, global business development, Komatsu Mining

Many mines today are not prepared for and were not designed for immediate full autonomous operation. The systems that guide these machines struggle with complex traffic patterns. Navigating the loading and dump areas is also a serious consideration. This presentation will discuss the different levels of autonomy that are currently available to mine operators and future mine design considerations.

The Future of Mine Safety

Gord Winkel, director, chair of David and Joan Lynch School of Engineering Safety and Risk Management, University of Alberta

Despite many positive achievements, the mining industry remains challenged with safety performance at current levels where major incidents persist in causing significant harm, loss and environmental impacts. This presentation shares leading innovations in safety that effectively reduce ongoing significant incidents while simultaneously bolstering mine operations' business efficiency.

Session 2: Autonomous Mining

Suncor's Autonomous Experience

Anne Marie Toutant, Suncor Energy

Suncor was the first North American miner to adopt autonomous hauler technology on a large scale. Nearly a year ago, the company announced it would incrementally roll out a fleet of autonomous haulers at its oil sands mines over the course of the next six years. This presentation will offer an insight as to how those decisions were made.

Space Age Mining at Home

Greg Baiden, CEO, Penguin ASI

Society needs next-generation mining to forge forward. Underwater mining and

mining in space will require a much different approach. An important consideration will include coordinated networking for multimachine control. Next-generation positioning systems will also play a crucial role in the new methodology. This presentation will focus on this application of Space Age mining to today's terrestrial operations.

Continuous Surface Mining to Zero Waste
Trevor Kelly, Canadian Mining Innovation Council, and Mal Carroll, Syncrude
The requirements for fundamental change from batch to continuous mining platforms has arrived. Industry trends have generally been going in the wrong direction and need to move toward zero waste, improving mining intensity, labor intensity, capital and cost efficiency. The Canada Mining Innovation Council is developing and executing projects that align with the industry requirements, CMIC surface mining road map and enabling elements of open collaboration, flexible mine design, integrated digital platform and autonomous mining, to respond to these grand challenges.

Session 3: Future Considerations

Costing Haul Road Construction or Rebuilds – Where is the value?
Roger Thompson, Curtin University
A question many surface mine operators face is how to justify expenditure on a haul road, either as a new construction or a rebuild of an existing road. Various design methodologies can be used to build a new road, some approaches being more cost-effective than others. Similarly, for a rebuild or rehabilitation of an existing road, how can investment in road improvements be justified in the context of the total cost of material haulage? This presentation examines these questions, from both conventional and autonomous haulage standpoints.

All-electric Drive Truck
Daniel Robertson, Siemens
A mining haul truck driven by electrical wheel motors is proposed with all-electrical power sources; that is, without a diesel engine. On-board energy storage is charged from regenerative braking, and is supplemented with off-board overhead power. This innovative solution offers significant energy savings and productivity increases for haul trucks of all sizes and practically all mine profiles.

Improving Mine Haul Roads by Using Advanced Instruments to Measure Haul Road Parameters
Alok Baranwal, technologist, RM Resource & Mining, Tata Steel
In an open-cast mine, productivity, fuel consumption and speed of haul trucks are key drivers to improve safety and efficiency of mining operations. To ensure efficient haulage, haul road parameters like rolling resistance, gradient, super elevation, curve radius and road friction must be monitored and upgraded regularly. In Tata Steel Ltd. mines, a multiple-sensor-based measuring instrument was used to capture and maintain the parameters for improving haul roads.

Session 4: Safety & Health

Advances in Wearable Safety Products
Dan Bongers, SmartCap
Operator-fatigue technologies have been widely available for years, yet the mining industry remains slow to embrace these. Hesitations range from perceptions of newness through to an unwillingness to engage a workforce for fear of push-back. This presentation shares a decade of learnings from fatigue-technology deployments around the globe, with several example case studies showing results and challenges.

Managing Fatal Risks in Mine Equipment Operations
Douglas Jones, Freeport-McMoRan
An analysis of historical incident trends indicates that the interaction of large mining equipment with light vehicles and/or pedestrians is a significant cause of safety-related-incidents. Engineering, Operations, and H&S personnel within Freeport-McMoRan have developed a policy to reduce or eliminate these interactions within both mining and processing facilities. In 2018, a site-by-site audit was conducted at all of Freeport's North and South American properties to measure compliance with this policy. This presentation will share the findings of this assessment, highlighting best practices in design, engineering and operating procedures.

Actionable Intelligence to Improve Safety
Carey West, Loadscan
Load volume scanning (LVS) systems provide real-time, insightful data (including

2019 Haulage & Loading Technical Program

Session 1: Modern Open-pit Mining Strategies (8:30 a.m. – 10 a.m.)

The Future of Haulage and Loading
Michelle Ash, CIO, Barrick Gold

Mine Design Considerations for the Future
Brian Yureskes, director, global business development, Komatsu Mining

The Future of Mine Safety
Gord Winkel, director, chair of David and Joan Lynch School of Engineering Safety and Risk Management, University of Alberta

Session 2: Autonomous Mining (10:30 a.m. – Noon)

Suncor's Autonomous Experience
Anne Marie Toutant, Suncor Energy

Space Age Mining at Home
Greg Baiden, CEO, Penguin ASI

Continuous Surface Mining to Zero Waste
Trevor Kelly, Canadian Mining Innovation Council, and Mal Carroll, Syncrude

Session 3: Future Considerations (1:30 p.m. – 3 p.m.)

Costing Haul Road Construction or Rebuilds – Where is the Value?
Roger Thompson, Curtin University

All-electric Drive Truck
Daniel Robertson, Siemens

Improving Mine Haul Roads by Using Advanced Instruments to Measure Haul Road Parameters
Alok Baranwal, technologist, RM Resource & Mining, Tata Steel

Session 4: Safety & Health (8:30 a.m. – 10 a.m.)

Advances in Wearable Safety Products
Dan Bongers, SmartCap

Managing Fatal Risks in Mine Equipment Operations
Douglas Jones, Freeport-McMoRan

Actionable Intelligence to Improve Safety
Carey West, Loadscan

Session 5: Strategies for Pit Management (10:30 a.m. – Noon)

Meeting Expectations for Profitable Production
Ross Gibbons, Thiess

Turning Challenging Mining Conditions Into Success
Tawnya Thornton, JDS Mining

Strategies to Improve Productivity
Jared Katerenchuk, KMC Mining

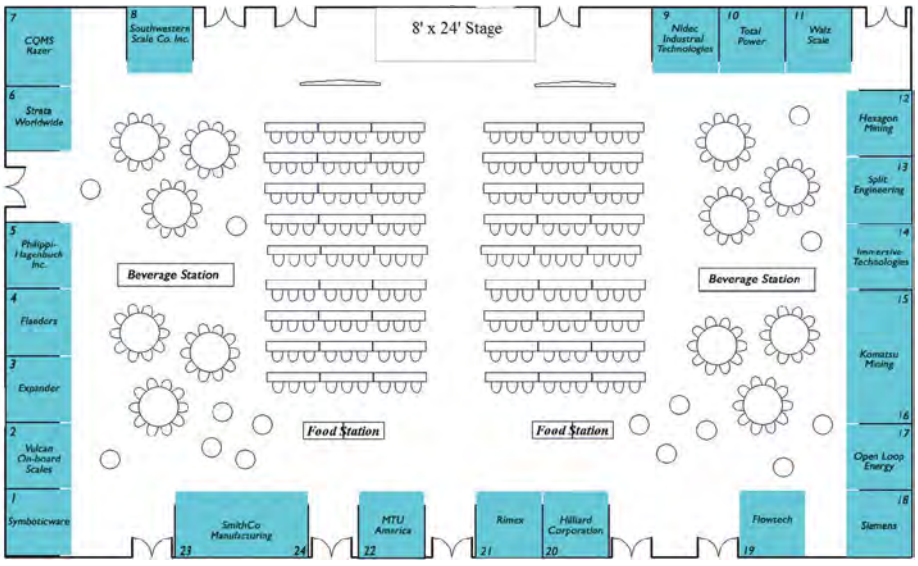
Session 6: Training & Development (1:30 p.m. – 3 p.m.)

Mine Operations Supervisor Development Program
Rick Green, Freeport-McMoRan

Reducing Variance Through Simulation-based Training Technologies and Processes
Adam Norris, Immersive Technologies

The Take Charge Training Concept
Gordy Williams, EDI

Workshop: Positioning Mines to Capitalize on Available Technologies (8:30 a.m. – Noon)
Dr. Tim Joseph, JPI Mine Equipment & Engineering Consultants



3D images) for every load. With an LVS in play, loaders and truck drivers have actionable intel, which they use to improve safety, eliminate overloading, reduce tire wear, optimize truck loading, eliminate wasteful haul-back, and increase fill factors. Some Loadscan users have upskilled their workforce and increased their trucking factors by approximately 15%.

Session 5: Strategies for Pit Management

Meeting Expectations for Profitable Production

Ross Gibbons, Thiess

What is the definition of profitable production? How does this relate to business sustainability and why is this important? How is this influenced by pit management? What impacts profitability and/or production? What part does innovation and technology play? This presentation will explore the relationship between operating costs, capital costs and revenue.

Turning Challenging Mining Conditions Into Success

Tawnya Thornton, JDS Mining

Building a mine is no easy feat; it's even harder in a remote location. JDS has assisted in the development and performance of mines around the world, in a variety of challenging environments. This presentation will discuss some of its greatest operational obstacles, and demonstrate that from Brazil to Baffin Island, a lot of the big problems in open-pit mining are exactly the same.

Strategies to Improve Productivity

Jared Katerenchuk, KMC Mining

KMC is one of Canada's largest contract miners with significant assets, knowledge and understanding in the oil sands sector. Dealing with ever-changing mining conditions, KMC has developed several strategies over the years to improve productivity in the pits.

Session 6: Training & Development

Mine Operations Supervisor Development Program

Rick Green, Freeport-McMoRan

The Mine Operations Supervisor Development Program is a systematic approach to develop essential skills, knowledge and abilities. The program is based on a simple business model composed of four components: physical assets, processes, people and leadership. Technical competency and business knowledge are key factors in each area of the business model. The program ensures a common foundation for Freeport's mine operations across North America. Concepts are based on best practices, continuous improvement and accepted technical theory.

Reducing Variance Through Simulation-based Training Technologies and Processes

Adam Norris, Immersive Technologies

A series of case studies will examine real-world results at mining operations in North America and around the world that improved haulage productivity and machine availability through a focused continuous improvement approach using simulation as the key driver. Presentation will feature specific examples of actual projects, including methodology and results achieved. There will also be insights into new technologies available to the industry including the gamification of training.

The Take Charge Training Concept

Gordy Williams, EDI

The difference between a "proactive" supervisor and a "status quo" supervisor can amount to millions of dollars in the mining business. The Take Charge approach is a dramatic departure from traditional supervisory training efforts. It focuses on results rather than classroom activities. After each compact skills unit is presented to a management team, they are required to apply the learned skills and tools "back on the job." They are held individually and collectively accountable to do this. Specially developed tools and measures are used to indicate the degree of success each supervisor achieves. These measures apply to both hard and soft skills.

Workshop: Positioning Mines to Capitalize on Available Technologies

Dr. Tim Joseph, JPI Mine Equipment & Engineering Consultants

Tim Joseph will lead a certificated industry short course that will permit attendees to explore how they can easily use accessible existing on-board equipment data to evaluate equipment performance. The JPI Beyond the Stopwatch workshop will highlight, through presentation, discussion and exercises, haulage and loading issues and the impact that running surfaces and load balance extend to equipment performance. This half-day workshop session will provide insights, tools and techniques using existing on-board haulage and loader data systems to benchmark and predict adverse operational conditions. Attendees will find low-hanging fruit that can be put into operational practice immediately realizing increased availability and productivity through better understanding of asset capability in unique mining operations.

H&L 2019 Sponsors and Exhibitors

CQMS Razer is a global engineering, software and manufacturing company that delivers productivity technology to large surface mining operations around the world. Its range of products includes cast lips, ground engaging tools (GET), load haul optimization software systems, dragline buckets and rigging.

Expander System pivot pin technology provides a permanent solution to lug wear. The system can be installed directly into the lugs of a new machine or be used as a spare part for repairs, eliminating the need for expensive welding and line boring.

FLANDERS is a global leader in motors, drives, electronics and control systems for heavy industrial machines. The company develops some of the most advanced controls and software for heavy machines in the connected era of Big Data, and continues to provide its trusted hands-on repair of motors and electrical systems.

FlowTech Fueling has become known for its commitment to providing complete fueling solutions with quality products and outstanding service. Whether a company is interested in mobile fuel depots, non-pressure fueling systems or comprehensive fuel/lube filtration, FlowTech can help them achieve improved safety and multidimensional savings while greatly reducing environmental impacts.

Hexagon's Mining division combines surveying, design, fleet management, production optimization, and collision avoidance in a life-of-mine solution that connects people and processes. According to Hexagon, its customers are safer, more productive, and can make sense of their data. They are shaping smart change by helping to connect all parts of a mine with technologies that make sense of data in real time.

Immersive Technologies is an equipment simulator supplier with a consistent and proven track record of delivering significant and measurable in-pit cost reductions, productivity gains and safety improvements. It has reshaped the way mining companies recruit, train and assess equipment operators.

Komatsu is a partner to the mining industry that maximizes value for customers through innovative solutions with original equipment and services. Through its full line of products supported by advanced internet of things (IoT) technologies and global service network, the company helps customers safely and sustainably optimize their operations. Komatsu's Autonomous Haulage System (AHS) leads the industry in tons hauled and years in commercial use, it said.

MTU America Inc., a Rolls-Royce Power Systems company, develops and supports engines ranging from 101 bhp to 4,023 bhp (75 kW to 3,000 kW) for both underground and open-pit mining.

Open Loop Energy provides hydraulic, manufacturing and support services to the mining business. It stands apart from other hydraulic companies with innovations that provide solutions to the customers problems. Product specialties include suspension systems, accumulators, digital-controlled water distribution systems for water trucks, authorized warranty repair center for Parker Hannifin, and HydroSnub electric-shovel dipper-door snubber services.

For 50 years, **Philippi-Hagenbuch** has engineered and manufactured some of the best enhancements for off-highway trucks found in the world. From its innovative HiVol Bodies to Water Tanks and Lowboy Trailers, PHIL is known for exceeding its clients' expectations while maximizing the efficiencies within their off-highway truck fleet.

RIMEX Supply Ltd. is recognized as the premier manufacturer and innovator of wheels and rims for the world's most-challenging industrial applications. By focusing on the requirements of its customers, RIMEX builds custom solutions and specialized products ranging from advanced wheels and rims available to the TyreSense TPMS and peripheral technology system

that sets new standards for tire monitoring and asset management.

With innovative, integrated technologies for electrification, automation and digitization across the entire life cycle, **Siemens** helps customers increase productivity and improve the reliability, safety, and efficiency of products, processes and plants. Siemens mobile mining combines innovative, custom system solutions for electric rope shovels, haul trucks and draglines with worldwide aftersales support.

SmithCo offers Mine Series 60-ton to 100-ton side-dump trailers and they can be pulled in train for additional payloads. Truck and trailer is an ideal haulage solution for distance hauling, according to SmithCo. Smaller haul roads open the possibilities of accessing those satellite mine sites that have been cost prohibitive before, SmithCo said.

Southwestern Scale is an industry leading provider of weighing systems, solutions and services for mining operations, including haulage and loading environments. These solutions and services include truck scales, weight study services, static and in-motion scales for haul trucks and rail cars, cathode production scales, belt scales, weight-based hopper and batching solutions, and preventive maintenance services.

Strata Worldwide's HazardAvert proximity-detection and collision-avoidance system is designed specifically to overcome the most-prevalent accidents experienced in surface operations. The system promotes safer work practices through increased safety awareness and modified worker behavior. It helps prevent vehicle-to-vehicle and vehicle-to-pedestrian accidents and collisions, which improves overall mine productivity, Strata said.

Symbioticware provides an industrial industry of things (IoT) hardware and software platform to help customers unlock, collect and analyze valuable data from their industrial mobile and fixed assets to help improve business outcomes based on optimizing productivity.

With more than 22 years in business, **Total Power** is a specialist in fuel additives and fuel management/accounting systems for open-pit and underground mining operations. They optimize fuel burn, emission reduction and fuel data analysis, Total Power said.

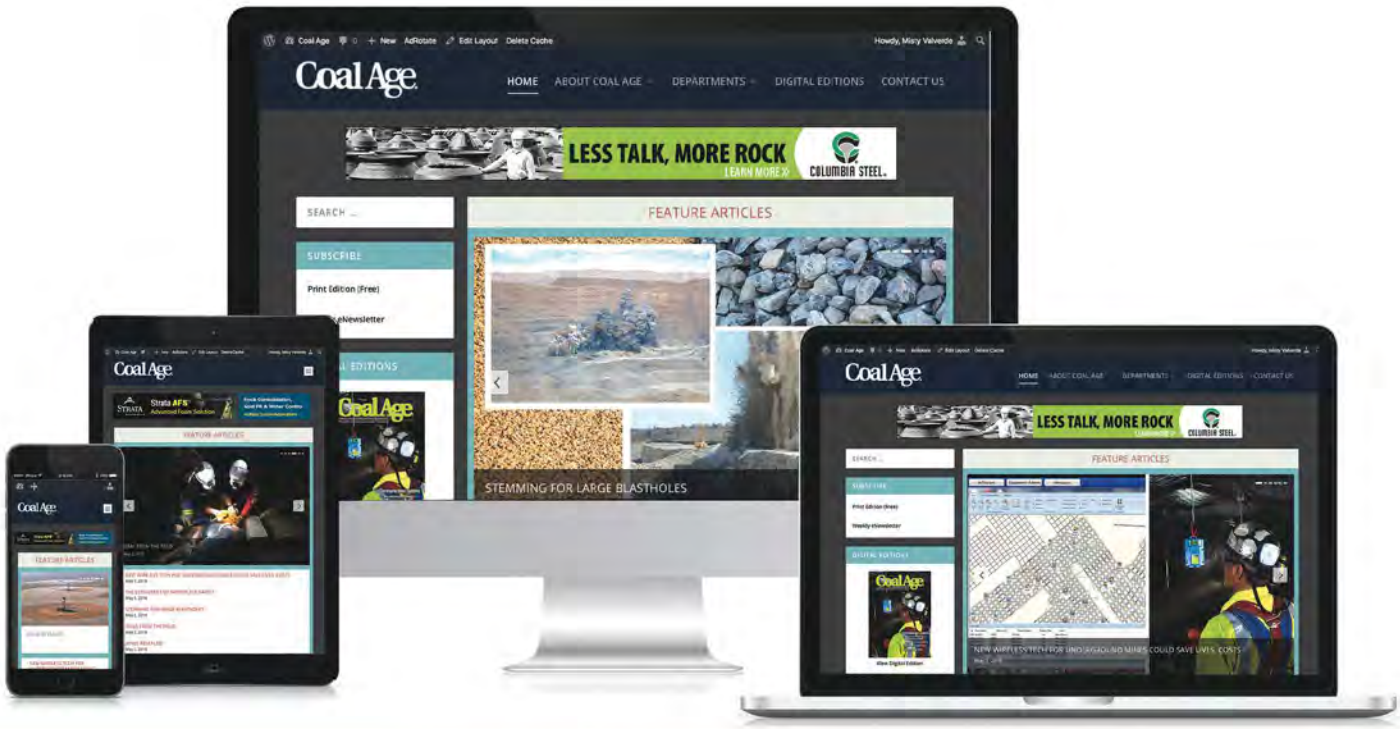
TowHaul is a leading manufacturer of off-road lowboys and haul-truck recovery systems for the mining industry. Equipment mobility is crucial in the fast-paced mining environment and TowHaul's innovative solutions can help a customer decrease their costs and increase their mobility, according to the company.

Vulcan On-Board Scales has weighing solutions for haulage vehicles. Customers can weigh their payload at the pickup point while also tracking truck-frame fatigue. It offers model-specific onboard weighing solutions for high-capacity dump and articulated dump trucks carrying greater than 20 tons. The scales include a meter in the cab of the truck and warning options to let the loader know when the maximum capacity has been reached.

The **Walz Scale** Scanner is a single-source supplier for volumetric measurement systems. Its extensive management systems provide operations with advanced tools for managing vehicle, belt and stockpile volumes. Volumetric load scanners offer an effective solution for tangible weighing systems.

Coal Age

HOME ABOUT COAL AGE DEPARTMENTS DIGITAL EDITIONS CONTACT US



coalage.com

Everything you love from the print edition in an easy-to-navigate format, and access to...

Subscriptions
Newsletters
Digital Issues
Social Media
Marketing
Calendar of Events

CONTACT US
Coal Age
11655 Central Parkway 306
Jacksonville, FL 32224 USA
+1 904 721 2925
subscriptions@coalage.com

E&MJ ENGINEERING AND MINING JOURNAL
EQUIPO MINERO
MININGMEDIA INTERNATIONAL

Proper Tension Improves Belt Cleaner Performance

Given the number of conveyor-related accidents that occur during routine maintenance and cleanup, every bulk material handler has a vested interest in technologies to help reduce hazards and prevent injuries. Seemingly mundane tasks such as adjusting belt cleaners and removing spillage often require employees to work in close proximity to moving conveyors, where even incidental contact can result in serious injury in a split second. Further, spillage can contribute to the risk of fire by interfering with pulleys and idlers and by providing potential fuel. Even worse, in confined spaces, airborne particles can create the right ingredients for an explosion.

The buildup of fugitive material can occur with surprising speed. As the table below illustrates, spillage in an amount equal to just one sugar packet (about 4 grams) per hour will result in an accumulation of about 700 g (1.5 lb) at the end of a week. If the rate of escape is 4 g/min, the accumulation will be more than 45 kg (nearly 100 lb) per week, or more than 2 tons per year. If the spillage amounts to just one shovelful per hour (not an uncommon occurrence in some operations), personnel can expect to have to deal with more than 225 kg (nearly 500 lb) of fugitive material every day.

Although there are a number of belt cleaning technologies available to conveyor operators, most designs in use today are blade-type units of some kind, using a urethane or metal-tipped scraper to remove material from the belt's surface. These devices typically require an energy source — such as a spring, a compressed air reservoir or a twisted elastomeric element — to hold the cleaning edge against the belt. Because the blade directly contacts the belt, it is subject to abrasive wear and must be regularly adjusted and periodically replaced to maintain effective cleaning performance.

The ability to maintain the proper force required to keep the blade edge against the belt is a key factor in the performance of any cleaning system. Blade-to-belt pressure must be controlled to achieve optimal cleaning with a minimal rate of blade wear. There is a popular misconception that the harder the cleaner is pressing against the belt, the better it will clean. But research has shown that there is an optimum range of blade pressure, which will most effectively remove carryback material. Increasing tension beyond this range raises blade-to-belt friction, thus shortening blade life, increasing belt wear and increasing power consumption — without improving cleaning performance.

Operating a belt cleaner below the optimum pressure range also delivers less effective cleaning and can actually accelerate blade wear. A belt cleaner lightly touching the belt may appear to be in working order from a distance, whereas in reality, excessive amounts of carryback are being forced between the blade and the belt at high velocity. This passage of material between the belt and the blade creates channels of uneven wear on the face of the cleaner. As material continues to pass between the blade and the belt, these channels increase in size, rapidly wearing the blade to a jagged edge.

As the center of the blade wears unevenly, the outer edges create a 'smiley face' or 'mooning.'

A common source of blade wear that often goes unnoticed — even with a properly installed and adjusted cleaner — is running the belt empty for long periods of time. Small particles embedded in the empty belt's surface can create an effect like sand paper, increasing the wear rate of both the blade and the belt.

Another potential source of wear is when the cleaner blade is wider than the material flow, causing the outside portion of the cleaning blade to hold the center section of the blade away from the belt. As a result, carryback can flow between the belt and the worn area of the blade, accelerating wear on this center section. Eventually, the process creates a curved-wear pattern sometimes referred to as a "smiley face" or "mooning."

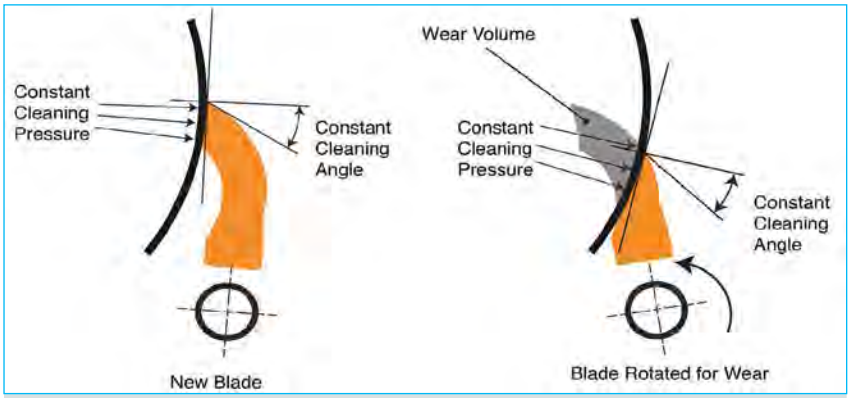
As urethane cleaner blades wear, the surface area of the blade touching the belt increases. This causes a reduction in blade-to-belt pressure and a corresponding decline in cleaner efficiency. Therefore, most mechanically tensioned systems require periodic adjustment (re-tensioning) to deliver the consistent pressure needed for effective carryback removal.

To overcome the problem of the blade angle changing as the blade wears, a radial-adjusted belt cleaner can be designed with a specially engineered curved blade, known as "CARP" for Constant Angle Ra-

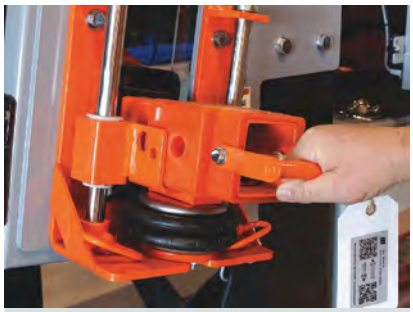
Accumulation of Fugitive Material Over Time

Fugitive Material Released	Accumulation				
	Hour (60 minutes)	Day (24 hours)	Week (7 days)	Month (30 days)	Year (360 days)
"packet of sugar" (4 g) per hour	4 g (0.1 oz)	96 g (3.4 oz)	672 g (1.5 lb_m)	2,9 kg (6.3 lb_m)	34.6 kg (75.6 lb_m)
"packet of sugar" (4 g) per minute	240 g (8.5 oz)	6,2 kg (13.8 lb_m)	43,7 kg (96,3 lb_m)	187,2 kg (412,7 lb_m)	2,2 t (2,5 st)
"shovel full" 9 kg (20 lb_m) per hour	9 kg (20 lb_m)	216 kg (480 lb_m)	1,5 t (1.7 st)	6,5 t (7.2 st)	77,8 t (86.4 st)
"bucket full" 20 kg (44 lb_m) per hour	20 kg (44 lb_m)	480 kg (1056 lb_m)	3,4 t (3.7 st)	134,4 t (15.8 st)	172.8 t (190 st)
"shovel full" 9 kg (20 lb_m) per minute	540 kg (1200 lb_m)	13 t (14.4 st)	90,7 t (100.8 st)	388,8 t (432 st)	4665,6 t (5184 st)

Material loss from conveyors can add up quickly.



Minimizing the changes in contact angle and surface area as the blade wears helps to maintain the blade's effectiveness.



Ease of service should be a key element in any belt cleaner tensioning system.

dial Pressure. With this innovative design, the changes in contact angle and surface area are minimized as the blade wears, helping to maintain its effectiveness throughout the cleaner's service life.

New air-powered tensioning systems are automated for precise monitoring and tensioning throughout all stages of blade life, reducing the labor typically required to maintain optimum blade pressure and extending the service life of both the belt and the cleaner. Equipped with sensors to confirm that the belt is loaded and running, the devices automatically back the blade away during stoppages or when the conveyor is running empty, minimizing unnecessary wear to both the belt and cleaner. The result is consistently correct blade tension, with reduced power demand on startup, all managed without operator intervention. For locations lacking convenient power access, one self-contained design uses the moving conveyor to generate its own electricity, which powers a small air compressor to maintain optimum blade pressure at all times.

Even the best-designed and most efficient of mechanical belt cleaning systems require periodic maintenance and/or adjustment, or performance will deteriorate over time. Proper tensioning of belt-cleaning systems minimizes wear on the belt and cleaner blades, helping to prevent damage and ensure efficient cleaning action. Belt cleaners must be engineered for durability and simple maintenance, and conveyors should be designed to enable easy service, including required clearances for access. Service chores that are straightforward and "worker friendly" are more likely to be performed on a consistent basis.

The use of factory-trained and certified specialty contractors can also help ensure that belt cleaner maintenance is done properly, and on an appropriate schedule. Further, experienced service technicians often notice other developing systems or component problems that can be avoided if they are addressed before a catastrophic failure occurs, helping conveyor operators avoid potential equipment damaging and expensive unplanned downtime. By setting the cleaning goal necessary for each individual operation and purchasing a system adequate for those conditions as laid out in CEMA standards, it's possible to achieve carryback control and yet obtain long life from belt cleaners. The bottom line is that properly installed and adjusted belt cleaners help minimize carryback and spillage, reducing risk and overall operating costs.

This article was written and submitted by Martin Engineering Co. Additional information can be obtained at www.martin-eng.com.

The World's Largest Trade Fair Continues to Grow

BY STEVE FISCOR, EDITOR

Tens of thousands of visitors gather to see Liebherr's ultra-class haul truck at bauma 2016.

Every three years, Messe München organizes the bauma trade fair, which takes place at the fairgrounds outside Munich, April 8-14. Billed as the world's leading sector event for construction machinery, building material machines, mining machines and construction equipment, the exhibition space totals 640,000 m^2, making it the largest trade show on earth. In 2016, bauma broke previous records, attracting a total of 3,425 exhibitors from 58 countries, and 583,736 visitors from 219 countries.

This bauma will be the 32nd edition and the organizers are thinking they may set another record. For 2019, Messe München expects to have 3,500 exhibitors from 60 countries and it expects to attract more than 600,000 from more than 200 countries. The size of the exhibit (640,000 m^2) is already 9,000 m^2 more than 2016. To accommodate the additional space, two new halls were constructed, so bauma now occupies 18 halls with more than 200,000 m^2 of indoor exhibition space.

Unlike other large fairs for construction equipment, bauma has dedicated a portion of its program to mining. Mining represents roughly 20% of the exhibition. The mining sector has its own hall: C2. According to Messe München, a total of 578 exhibitors indicated they are involved with the mining, extraction and processing of raw materials. Visitors reviewing exhibitor information will notice the familiar mining symbol and the phrase "Mining Inside."

For this edition of bauma, Canada is the partner country. It's the seventh largest market for mining and construction equipment, according to Messe München. Canada and the European Union recently signed the Comprehensive Economic and Trade Agreement (CETA), which eliminated 98% of the tariffs between the two regions.

"To accommodate the two new halls, we restructured the fairgrounds to make the routes easier and provide an optimized structure for the venue," Dittrich said. "More than adding space, we also have to remain fit for the future by incorporating modern digital processes and systems sustainably in our fairs and in all parts of our business." This year, bauma will focus on this growing aspect of the business with programs geared toward digitalization and virtual reality.

For the mining industry this year, Messe München has seized on sustainability as an important theme. "This focus extends well beyond the areas of energy consumption and the use of resources," Dittrich said. "All industries are currently searching for alternative, low-priced and environmentally friendly raw materials and energy sources."

Manufacturers like ABB, FLSmidth, Komatsu, Liebherr, Paus, Siemens, Weir Minerals and many others will present their highlights and innovations. "By selecting sustainability, bauma 2019 is focusing on a real issue of the future," said Mareile Kästner, exhibition director of bauma. "There is no other such venue where all key players in the industry can discuss the issue of sustainability so thoroughly. This will make bauma the ideal place to conduct successful business."

Liebherr to Showcase Latest Developments

With its overarching message, "Together. Now & Tomorrow," Liebherr will give bauma attendees a chance to learn more about its products, innovations and trends.

Construction on Liebherr's stand began a full half-year before the trade fair opens. With more than 14,000 m^2 of space, Liebherr's open-air terrain (809-813) will once again provide space for more than 60 exhibits. Among the many products on display will be new innovations and developments with tower cranes, mobile and crawler cranes, earthmoving, material handling, deep foundation, concrete technologies and mining.

Liebherr will also present its latest components in hall A4 (stand 326) on a showroom floor of nearly 450 m^2. Here, the focus will be on condition monitoring and system solutions.

In hall B5 (stand 439), guests can learn more about the latest innovations

from Liebherr's extensive attachment tools program.

For the new XPower large wheel loader, trade visitors can also look forward to a total package with many smart assistance systems. Features also include the new rear-bystander detection and a built-in, sensor-powered tire-monitoring system. With these and other assistance systems, Liebherr offers total solutions to optimize safety and comfort during everyday wheel-loader operation. All these systems are developed by the Liebherr Group so they can be fully integrated into the control systems of the machinery.

In the mining area, visitors will have a chance to experience the power of ultra-class mining trucks and excavators. A single dashboard makes fleet management easier than ever.

Wirtgen Presents Smart Synergies

The Wirtgen Group is a global trendsetter when it comes to innovative road construction machinery — a fact highlighted by the company's approximately 120 exhibits and 13,000 m² of exhibition space at bauma 2019. This year, the group's slogan for the trade show is "Smart Synergies and Innovations."

While the mining industry is most familiar with Wirtgen and its surface miners, the Wirtgen Group also encompasses several specialized product brands, including Vögele, Hamm, Kleemann and Benninghoven. Together, they form the basis for synergies that allow customers to leverage additional savings potential — in other words, Smart Synergies.

The Wirtgen Group's concentrated strength will be on full display in Munich — together with John Deere at a shared booth for the very first time. Thanks to the two companies' complementary product ranges, the lineup covers an enormous range of customer solutions. Visitors will not only be able to experience this for themselves up close at the exhibits, but also from a height of 5 meters during a tour across the Skywalk, which connects each of the Wirtgen Group product brands' technology centers and John Deere to each other.

Wirtgen will unveil the 220 SM/220 SMi surface miner, a new machine designed especially for use in small- and medium-sized mining operations. With a cutting width of 2.2 m and a cutting depth of up to 300 mm, the 220 SM/220 SMi can extract raw materials up to a uniaxial compressive strength of 50 MPa.

Metso to Launch Groundbreaking Innovations

Metso will introduce a number of new, state-of-the-art solutions for the aggregate, construction, and mining industries at bauma 2019. The launches include technologies and services that will improve productivity and drive down costs.

Along with the new crushing and screening solutions, Metso will unveil a groundbreaking innovation for off-highway trucks, enabling mines and quarries to haul more with less. This major product launch will expand Metso's offering into completely new territory and help customers reach a higher payload while lowering their operating costs.

Metso will also showcase a broad range of equipment, wear and spare parts as well as services designed to help make operations more efficient and assets work harder. The solutions that will be featured include the Metso MX cone crusher, the company's line of optimized slurry pumps, the Poly-Cer wear lining and its financial services.

Attendees can consult an up-to-date overview of exhibitors online in the bauma Exhibitor Directory. More information about the trade fair is available at www.bauma.de.

Adding halls C5 and C6, bauma now has 18 halls in addition to an incredible amount of outdoor space.

Bringing Down the Highwall

Bringing down a 60°, 180-ft highwall is just part of the daily workload for a Hitachi EX2500-6 at Peabody Energy's Rawhide mine, a thermal coal surface mine located 10 miles north of Gillette, Wyoming. "The Hitachi EX2500-6 excavator is used to bring down the highwall in the pit," said Eric Martin, general manager of Rawhide mine.

The EX2500-6 is just one of several Hitachi mining excavators in the company's fleet, which also includes shovels operating at its North Antelope Rochelle mine (NARM), the largest coal mine in the world, and at its Caballo mine.

Peabody's Rawhide mine, Caballo mine and NARM are all located in the Powder River Basin (PRB), the largest producing coal region in Wyoming. These PRB operations have earned more than 25 honors for safety and environmental excellence since 2006. Among those honors, the Rawhide mine earned the Small Surface Operation Safety Award from the Wyoming Mining Association and the Wyoming State Inspector of Mines for the best safety performance in 2013.

"Safety is ingrained in our company culture as our leading core value," Martin said. "Employees at Rawhide mine are like family; we look out for each other."

The EX2500-6 is helping the operation mine two seams of coal at Rawhide mine — the Smith seam and the Roland seam — which range up to 120 ft in thickness. An on-site processing plant crushes and sizes the coal, which is then loaded on rail cars for distribution. In 2017, the mine sold 10.3 million tons of coal and provided $160 million worth of direct and indirect economic benefits.

Peabody partnered with local Hitachi dealer Arnold Machinery to acquire the EX2500-6 for the Rawhide mine.

"We have a long partnership with Arnold Machinery," Martin said.

"Operators at the mine appreciate that the 2500 is smooth and the cab is quiet, which is important when working 12-hour shifts," he added.

Mining isn't the only activity taking place at the Rawhide mine. Peabody views land restoration as an essential part of the mining process and manages land reclamation with pride and sustainability.

In 2017, the company restored 5,145 acres of coal-mined lands globally. These efforts are visually evident at the Rawhide mine with reclaimed land supporting abundant wildlife and vegetation.

"It's important to be good stewards of the land," Martin said. "We work simultaneously to reclaim coal-mined land as quickly as possible to continue a sustainable cycle."

This article first appeared in Hitachi's BREAKOUT *magazine, Winter 2018 issue.*

SynTerra Buys ECSI

Officials from SynTerra Corp. and ECSI LLC announced they have combined their operations. The two companies officially became one science and engineering consulting firm operating as SynTerra on Monday, January 28.

Characterizing the transaction as a unification of client-focused firms, officials of the combined company emphasize the operations are "still the same." They say the expanded company is ideally suited to serve clients throughout the eastern United States. SynTerra now has offices in Greenville, South Carolina; Lexington, Kentucky; Pikeville, Kentucky; Charlotte, North Carolina; and Birmingham, Alabama. The Lexington, Kentucky, office of Bowser-Morner Inc. also became part of SynTerra in the transaction.

"Having more locations, personnel, and service offerings means we can offer our clients broader capabilities and greater responsiveness," SynTerra President Mark Taylor said. "This is such a natural fit. From day one, we approached this as

an opportunity to strengthen our firms to better meet the business objectives of our clients. We've been doing a lot of planning together, and we have been functioning as a team for months — now it's official."

Steve Gardner, president and CEO of ECSI, expressed similar sentiment. "From my first meeting with Mark, I had a good feeling about the fit between SynTerra and ECSI," Gardner said. "Our experience, culture, and vision for the future were in sync. With ECSI recently acquiring the geotechnical capabilities of the Bowser-Morner Lexington office, our combined groups can now offer a complete engineering and science-based package. Everyone at ECSI is excited about the opportunities this partnership brings."

SynTerra covers a full range of scientific disciplines in conjunction with process, civil, mining and geotechnical engineering. SynTerra provides services to the electric utility, forest products, mining and minerals processing, manufacturing, site development, chemicals, and government market sectors.

www.synterracorp.com

Push Block Dislodges Haul Trucks Without Damage

Philippi-Hagenbuch (PHIL), a leader in off-highway truck customization, recently introduced the Push Block for articulated and rigid-frame trucks. PHIL engineered the Push Block to integrate with the rear chassis on off-highway trucks ranging from 20 tons to 400 tons. The optimal positioning of the Push Block allows operators a safe and engineered "push point" to dislodge trucks from areas with poor ground conditions without damaging the truck body or pushing equipment.

"Poor underfoot conditions can cause trucks to become stuck," said Josh Swank, PHIL's vice president of sales. "Prior to the development of the Push Block, support equipment, such as a dozer, pushed directly on the truck body to move it to dryer ground where it could regain traction. This type of pushing on the truck can damage the tires, hinge and even the body since there's no component of a truck designed to take this type of pin-point pressure."

The Push Block provides a stable assembly that transfers rear pushing force directly to the truck's frame, preventing damage. By transferring the pushing and pulling forces through the Push Block to the truck frame, operations prevent damage, downtime and the associated costs without affecting the loading process or payload. Without the Push Block, trucks can experience body damage that impacts material flow or tailgate damage as much as $15,000. An integrated hook also allows the Push Block to be used for pulling a disabled or stuck off-highway truck.

PHIL designed the articulating Push Block for simplicity and durability. The Push Block pivots downward for unobstructed dumping, and is made of high-strength, abrasive-resistant Hardox 450 steel to ensure long-term stability.

The Push Blocks are offered as standalone products or as part of a versatile, customizable package designed to enhance productivity.

www.philsystems.com/PushBlock

Sean McLanahan, CEO of McLanahan, left, and Alistair Forsyth, founder of Anaconda Equipment, formalize the deal. (Photo: McLanahan)

McLanahan Acquires Anaconda Equipment

In 2017, McLanahan Corp. began a partnership with Anaconda Equipment of Northern Ireland to distribute and sell Anaconda's line of mobile track equipment. As the relationship between the two companies progressed, it became clear that their values and business styles were closely aligned. Recently, the two companies announced that Anaconda Equipment will officially join McLanahan's family of companies upon legal closing within the next 30 to 60 days.

"We looked into growing our line of track equipment in several different ways," said Sean McLanahan, CEO of McLanahan. "When it came down to it, we saw in Anaconda a company that was well-established, had great employees and dealers, and had many of the same values and business principles as we do. Adding them to our family of companies seemed like a clear fit."

Founded in 2008 by Alistair Forsyth and Martin Quinn, Anaconda Equipment has spent the last decade developing their extensive range of mobile tracked equipment. The range includes scalping, screening, recycling and conveying equipment, which is sold through a global dealer network. In the past 10 years, they have sold more than 1,200 units into more than 50 countries across six continents.

www.mclanahan.com/news

ADVERTISING INDEX

This index is provided as an additional service. The publisher does not assume liability for errors or omissions.

MSHA's Blind Spot on Powered Haulage Safety

BY BRIAN HENDRIX

Last June, the Mine Safety and Health Administration (MSHA) published a Request for Information titled, "Safety Improvement Technologies for Mobile Equipment at Surface Mines and for Belt Conveyors at Surface and Underground Mines." MSHA asked stakeholders to submit "[b]est practices, training materials, policies and procedures, innovative technologies, and any other information they may have to improve safety in and around mobile equipment, and working near and around belt conveyors."

MSHA said "[m]ining safety could be substantially improved by preventing accidents that involve mobile equipment at surface coal mines and metal and nonmetal mines and belt conveyors at surface and underground mines." In the RFI, MSHA noted that "[s]ince 2007, 61 miners have been killed in accidents involving mobile equipment. MSHA investigated these accidents and determined that contributing factors in many included: (1) no seat belt, seat belt not used or inadequate seat belts; (2) larger vehicles striking smaller vehicles; and (3) equipment operators' difficulty in detecting the edges of highwalls or dump points . . ."

No one loses when MSHA spends time developing, collecting and sharing information about the most effective practices, policies and equipment that have been developed, tested, are using, etc. to improve powered haulage safety. MSHA has posted all of the information it received to an online docket. Time spent reviewing the information there will be time well spent. It is a great repository of timely information and ideas about powered haulage safety. MSHA has also created a page on its website for its Powered Haulage Safety Initiative, and it is also a valuable repository of information.

MSHA's RFI process will be worthy of applause if MSHA focuses on sharing and promoting the best of the information it has obtained. MSHA is surely right that we can improve the safety of powered haulage in mining. However, the evidence MSHA uses to make this claim is suspect.

MSHA's claims are based on MSHA's accident investigations. However, MSHA does not and will not identify human error or behavior as a potential root cause of any accident. When MSHA investigates an accident, it will always assume that the accident was caused solely by management failure(s). Per MSHA's Accident/Illness Investigations Procedures Handbook, "[t]he root cause identifies the reason that the mine operator's rules, policies, procedures or programs failed to ensure that employees took appropriate actions to prevent the indirect causes that led to the hazard or unplanned event."

As a result, MSHA's conclusions about the cause(s) of an accident are often incomplete, erroneous or worse. For example, one of the 61 fatalities MSHA refers to in the RFI involved a 2007 haul truck accident. The haul truck driver did not maintain control of the vehicle, and he was not wearing his seat belt when the accident happened. He had more than 40 years of mining experience, was a model employee and an advocate for seat belt usage. When the accident occurred, he was traveling approximately 15 mph up a 10% grade with a loaded truck on a straight section of the haul road. The truck drifted gradually to the right, went through/over a berm and over a highwall. From the evidence, it did not appear that the driver braked or attempted to steer out of the turn.

MSHA's accident report identified two "causal factors" for the accident. First, "[t]he truck driver did not maintain control of the truck he was operating." Second, "[m]anagement policies and procedures did not ensure that the truck driver wore his seat belt when operating the truck." The haul road — including the berm — was in good condition, and there was nothing wrong with the haul truck. Speed and weather weren't factors. Why did the haul truck driver lose control of the truck? To most of us, that would be a key question that you would want to answer. Not MSHA. MSHA's report doesn't answer that question.

After the accident, MSHA determined the driver wasn't wearing his seat belt at the time of the accident. The mine operator had a seat belt policy, it required miners to wear seat belts, and it trained miners to use them. The fatally injured miner was very experienced, properly trained and he was a seat belt advocate. MSHA's report is silent as to why this miner wasn't wearing his seat belt at the time of the accident.

Of course, there was an explanation, but MSHA refused to include it in its report. Put simply, the miner almost certainly experienced a medical event prior to the accident. The evidence indicated that he lost consciousness before the haul truck traveled over the highwall.

This is just one example out of many. MSHA accident investigation reports are often incomplete, erroneous or worse. MSHA knows or should know this. Yet, MSHA continues to use these accident reports to inform its policies and rules.

The point here is that we can do a lot to improve powered haulage safety. MSHA is right about that. However, we won't get where we want to be if we don't acknowledge and work to address the role miners play. The role of personal responsibility — the choices that miners make — is one of MSHA's most significant blind spots. For example, we need to know why some miners, even some experienced, well-trained miners who know better and fully understand what they are doing, choose not to buckle up. Achieving our goals for powered haulage safety will require all the stakeholders, including MSHA, to acknowledge that that's a very important question that we haven't yet answered.

Brian Hendrix is a partner with Husch Blackwell. He can be reached at brian.hendrix@huschblackwell.com.

JENNMAR

Join us **February 24-27** at the
2019 SME Annual Conference & Expo and
CMA 121st National Western Mining Conference
at **JENNMAR Booth #621**

SMART MINING
Resources for a Connected World
FEBRUARY 24 – 27, 2019 · DENVER, COLORADO
SME 2019 SME ANNUAL CONFERENCE & EXPO
CMA COLORADO MINING ASSOCIATION 121st NATIONAL WESTERN MINING CONFERENCE

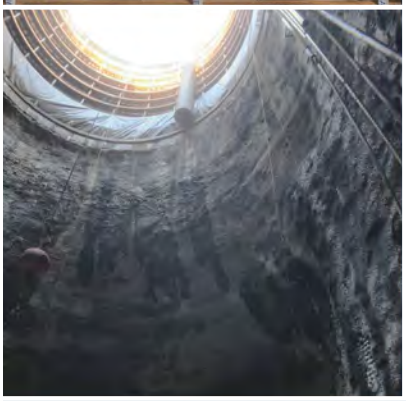
Serving Industries that make Modern Life Possible

So much of our modern world begins underground, in the form of the raw materials that must first be extracted from the earth and it must be done safely. That's where we come in. With our affiliated brands and more than twenty strategically located manufacturing facilities, our products and services allow men and women to safely mine the earth. We support the world that supports you.









GET THE CHAIN THAT GETS IT DONE

American-made dragline chain that sets the standard in rigging performance.

- Engineered with greater contact area for better wear
- Exclusive molding process for integrally cast chain and superior link integrity
- Proprietary H alloys for resillience, toughness and longer wear life
- High strength and abrasion resistance
- Made in the USA

COLUMBIA STEEL®

1-800-547-9471 COLUMBIASTEEL.COM