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The Magazine for Coal Mining and Processing Professionals

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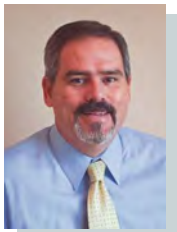
THIS ISSUE

Ken Duncan, shearer operator for CONSOL Energy's Bailey mine, raises the drum on an 1,850-hp Eickhoff 300-SL shearer. Using this shearer, which is the only Eickhoff shearer operating in the U.S., the crew posted its best numbers: 12,400 raw tons per shift.

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CELEBRATING 100 YEARS WITH COAL AGE



BY STEVE FISCOR
/ EDITOR-IN-CHIEF

With this edition, we celebrate 100 years of *Coal Age*. Producing this retrospective was an enormous undertaking and an incredible learning experience. For a century the magazine has served as the voice of the coal industry. The editors always strived to provide timely information in a concise, unbiased manner, and that formula won the loyalty and respect of at least four generations of coal people.

As you will see, the coal industry has a rich history and *Coal Age* was there every step of the way. It begins as a weekly in late 1911. In the 1920s, advertising appears for the first time and in the 1930s, it converts to a monthly magazine. They say a trade journal reflects the industry it covers and, during some periods, the magazine is 300 pages thick, while at other times it becomes worrisome thin. Through thick and thin, *Coal Age* covers the industry and all of those that influence it: the industrial magnates, the railroads, the oil companies, organized labor, politicians, regulators, etc.

So, what have we learned from all of this? The coal business not only depends on the weather, it's a lot like the weather—wait a while and circumstances will change. *Coal Age* offered retrospectives in 1936 (25 years), 1961 (50 years) and 1986 (75 years). Readers can find all three in the archives at: www.CoalAge.com. Each time the editors composed one of those pieces, it seemed the coal industry was about to face a period of weakness—the same place we stand today. Time and again, production builds to a crescendo and then falls back dramatically. Coal is constantly competing with other fuels. Even though it is abundant; it's not always dependable. On more than one occasion, the energy market is King Coal's for the taking and he seems to shoot himself in the foot every time. Politics change with times too. In the 1980s, the coal industry favored Democrats in coal states because they fought against acid rain legislation; today it favors Republicans because they support environmental policy based on science.

There are a few constants throughout the timeline as well. More pages of *Coal Age* are dedicated to John L. Lewis than any other subject. Love him or hate him, he is steadfast and never corrupted. Another reoccurring theme is CONSOL Energy's leadership in safety, the advancement of coal mining technology, and as a labor negotiator. Consolidation Coal Co. was one of a handful of companies that were already present when *Coal Age* was founded. That is the reason we asked to profile the Bailey Complex as the cover story for this edition. It discusses the company's renewed dedication to safety and serves as a benchmark for the advances the underground coal industry has made.

If one were to set all of the publications side by side, the *Coal Age* shelf would need to be at least 60-ft long. Honestly, trying to compress that information into 100 pages would not do the magazine justice. The other three anniversary issues provide timelines with pain-staking detail in some cases. Rather than recreate the wheel, for the first 75 years we let the pages of *Coal Age* highlight the history. The last 25 years, however, have not been chronicled, so readers will notice the retrospective finishes with a different chronological cadence.

Thank you for your continued loyalty and support over the years. Thank you for allowing us to bring the world of coal onto your desk or into your home. Enjoy this edition of *Coal Age*. Hold onto it, it will be a collector's item.

Steve Fiscor, *Coal Age* Editor-In-Chief
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Coal Age

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TIMES ARE TOUGH, BUT ALLIANCE CEO SEES MARKET IMPROVING

Despite challenging coal markets in the United States, the records just keep coming for Alliance Resource Partners. The Oklahoma-based company established high water marks for revenue, coal sales volumes and pricing in the second quarter and Joe Craft, Alliance's longtime president and CEO, predicted brighter times ahead, particularly in the high-sulfur Illinois Basin (IB) where the company's presence is growing.

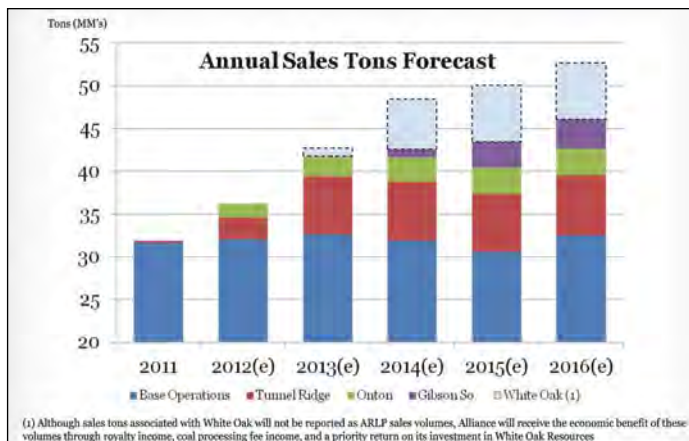
In releasing quarterly results in late July, Craft said Alliance's "operating strength, quality customer relationships and solid contract position allowed us to overcome challenging market conditions and deliver another quarter of excellent results to our unitholders." Alliance posted revenues of \$529.9 million in the three months ended June 30, coal sales volumes of 8.7 million tons and average pricing of \$59.17/ton—all company records.

The only off note for Alliance was a slight 2.8% decrease in quarterly earnings, to \$95.5 million.

Still, the performance drew plaudits from coal analysts during Craft's July 27 phone conference to discuss earnings. They marveled at the way Alliance has managed to churn out solid quarterly profits while planning to boost production at a time when some coal companies are closing or curtailing operations to combat the triple whammy of low natural gas prices, the mild winter of 2011-2012 that left bulging coal stockpiles, and a hostile regulatory environment as evidenced by new federal Environmental Protection Agency rules.

"There's no secret that times have been and are tough in the coal industry," Craft said. "Challenges are many. Coal will continue to be the fuel of choice for most of the electricity produced around the globe. We believe demand for coal has hit bottom and brighter times are ahead. The question is when."

During the second quarter, an increase in output at the Warrior, Tunnel Ridge and Onton No. 9 mines contributed to higher coal production of 8.2 million tons for Alliance, which has mines in Northern Appalachia, Central Appalachia and the IB. Outside coal purchases rose \$10.3 million to \$16.2 million in the second quarter compared to



Production increases to drive future growth.

a year ago, primarily as a result of increased brokerage coal sales volumes and higher cost per ton of coal purchased.

The company blamed depreciation and development costs at the White Oak No. 1 underground mine under construction in Hamilton County, Ill., for the small dip in earnings. Alliance acquired a major equity interest in privately owned White Oak Resources, the mine's original developer, in 2011.

Alliance is hoping 2012 is another year of record earnings for the company. As he looked to 2013, Craft said he expects revenues on a per-ton basis to be "comparable" to this year.

In terms of market demand for IB coal, Craft said the Midwest basin appears poised to profit from steadily declining demand for Central App coal. "But we haven't seen much movement for that yet" in the IB.

The low-sulfur Powder River Basin most likely will be the first coal basin to recover lost sales from some electric utilities switching back to coal from gas, as the price of gas begins to slowly increase. "There are certain utilities today at \$3.50 (mmBtu) that are definitely looking to



BREAKING NEWS

NMA Scores Two Major Victories for the Coal Industry

Judges awarded the National Mining Association's (NMA) legal team two decisive wins in early August. The first case was *WildEarth Guardians v. Ken Salazar and Antelope Coal LLC*. The NMA entered to help defend the federal coal leasing program against environmental groups' challenges to the government's West Antelope II lease sale. The Powder River Basin (PRB) has been the venue for green activists who have repeatedly sought a legal foothold to tie up the federal coal leasing program by alleging environmental harm when the coal is mined and its contributions to global warming when coal is used to generate electricity.

In a decisive ruling for the NMA, the U.S. District Court for the District of Columbia not only denied the environmentalists standing to challenge

coal leases on the basis of climate change, the court also denied their contention that environmental reviews were inadequate. By knocking the pins out from under WildEarth Guardians, the summary judgment may well put to rest the entire line of attack on the PRB coal program.

The second victory stemmed from the EPA's virtual moratorium on new coal mining permits in the Eastern coalfields. In *NMA v. Jackson*, Judge Reggie Walton—in the same U.S. district court—handed the NMA a win on all counts and the EPA its head.

The EPA's use of guidance to impose "conductivity" standards on state agencies and coal companies is unlawful, Judge Walton said. So too is the EPA's encroachment on the authorities of the Office of Surface Mining under the Surface Mining Control and Reclamation Act and its muscling of state agencies under the Clean Water Act.

TOP 10 COAL-PRODUCING STATES



(in Thousand Short Tons)
Week Ending (7/28/12)

	YTD '12	YTD '11	% Change
Wyoming	22,218	241,363	-7.9
West Virginia	74,467	79,626	-6.5
Kentucky	59,060	62,781	-5.9
Pennsylvania	33,201	34,611	-4.1
Texas	22,817	25,792	-11.5
Illinois	22,714	20,782	9.3
Montana	22,493	21,530	4.5
Indiana	21,030	21,251	-1.0
Colorado	16,966	14,554	16.6
Ohio	15,929	15,869	0.4
U.S. Total	581,836	615,947	-5.5

burn Illinois Basin coal," he said. "We are projecting the IB will grow from 10 to 20 million tons over the next 12 to 18 months."

Alliance's venerable Dotiki underground mine in western Kentucky is transitioning from the No. 9 seam coal to the No. 13 seam, "so we've had some productivity losses there," he said. He added, however: "We expect the No. 13 to be productive once we get there." Dotiki is operated by Webster County Coal, an Alliance subsidiary.

Construction also continues on the new Gibson South underground mine in Gibson County, Ind. Meanwhile, the new Tunnel Ridge longwall mine in Ohio County, W.Va., and Washington County, Pa., is ramping up. Tunnel Ridge produced almost 300,000 tons in the second quarter, and is expected to reach 900,000 tons in the third quarter and 1.2 million tons in the fourth quarter. It should hit 6.2 million tons in 2013 and max out at 6.5 million to 6.8 million tons in 2014.

PBS Idles Mining Operations

PBS Coals and its affiliate, RoxCoal, will immediately idle a portion of its deep and surface mines in Somerset County. Production schedules for the remaining mines have been adjusted to match market demand. These changes have resulted in the layoff of approximately 225 employees. The affected employees have been officially briefed on the situation. PBS attributes the necessity for these layoffs to coal market conditions and increased pressure from the Environmental Protection Agency (EPA), which has resulted in increased costs.

"The decision to idle our surface mine operations is a difficult one, but in an effort to manage our inventory and to balance coal production with expected customer demand and shipping schedules, we are faced with making adjustments which unfortunately will impact our workforce," said Lynn Shanks, president and CEO. "Both the foreign and domestic coal markets remain soft due to weak economic growth and activity."

Cloud Peak Energy, Ambre Energy Lock Horns

During mid-July Cloud Peak Energy filed a lawsuit against Ambre Energy Ltd., regarding a dispute over the future of the Decker Coal mine. Located near Sheridan, Wyo., in the northern Powder River Basin, the mine is adjacent to Cloud Peak's Spring Creek mine, a leading west coast exporter.

Australian-based Ambre became a U.S. coal producer when the company acquired the former Kiewit Coal Properties' (KCP) 50% interests in two mines in November of 2011 from Level 3 Communications.

WORLD NEWS



Coal Miners Take to the Streets in Spain

Wearing caplamps, thousands of miners chanting and throwing firecrackers marched through the center of Madrid in the early morning hours of July 11 in protest against government austerity measures, according to the *Telegraph*. Joined by trade unionists in the capital, the miners rallied noisily at the climax of a 44-day protest against a 60% cut in coal subsidies which they say will force mines to close and put many out of work. Prime Minister Mariano Rajoy announced more pain in a new series of taxes and spending cuts.

Zambian Miners Kill Chinese Manager during Pay Protest

Chinese mine manager Wu Shengzai was killed by protesting miners after being hit by a trolley. The trolley was pushed toward him by rioting miners as he ran underground seeking refuge, according to *BBC News Africa*. A second Chinese manager was injured, as were several Zambians, during the riot. The workers were on strike at the mine in protest against delays in implementing a new minimum wage. They were angry their wages were lower than a new minimum of \$220 a month paid to shop workers. The Chinese-owned Collum coal mine is located in Sinazongwe, 325 km south of the Lusaka. Last year, the Zambian government dropped charges against two Chinese managers accused of attempted murder after they fired on miners at the Collum mine during a pay dispute.

Cascading Blackouts Leave Northern India in the Dark

A huge power failure in Delhi caused a cascading blackout, which left much of northern India without electricity. At one point more than 620 million people, more than twice the U.S. population, had no access to electricity. The lights in Delhi and seven states went out around 2:00 a.m. July 31 and power was fully restored mid-day August 2. Chaos reigned in a sweltering Indian summer. The country's inability to properly fund coal mines and power plants has now reared its head.

Six Miners Perish in Mexican Mine Accident

Another fatal coal mining incident has taken the lives of six miners near Muzquiz in the Mexican state of Coahuila and critics are ramping up their call for stronger regulations, the *Los Angeles Times* reported. In late July, an explosion at another nearby mine killed seven workers. The national miners' union claims that 200 miners have died in Coahuila since 2006. The mine's owner, Altos Hornos de Mexico, claimed that modern safety features allowed them to evacuate 285 miners after the collapse.

Cliffs Sells Its Sonoma Interest

Cliffs Natural Resources plans to sell its 45% interest in the Sonoma coal mine and prep plant, located in Queensland, Australia, to QCoal Sonoma Pty Ltd. for A\$141 million in cash. The assets to be sold include Cliffs' interests in the Sonoma mine along with its ownership of the affiliated prep plant. The transaction should close during the fourth quarter of 2012.

Cliffs purchased its 45% economic interest in Sonoma in 2007. The mine's 2011 production and sales volumes totaled 3.5 million

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and 3.1 million metric tons of coal, respectively. The product mix was approximately two-thirds thermal coal and one-third metallurgical coal. The existing mine manager, Sonoma Mine Management, will continue to be responsible for overseeing the operation with no disruptions.

Anglo American Buys Met Coal Interest in Mozambique

Anglo American has agreed to acquire a 58.9% interest in the Revubøe metallurgical coal project in Mozambique from the Talbot Estate for \$555 million in cash. The Revubøe project is a joint venture that includes Nippon Steel (33.3%) and POSCO (7.8%). Revubøe has a reported JORC resource of 1.4 billion metric tons (mt) of surface mineable hard coking and thermal coal. Anglo believes that as much as 6 million to 9 million mtpy could be exported.

"The acquisition of a majority interest in Revubøe is in line with our strategic commitment to grow our global metallurgical coal business to supply our customers from each of the key metallurgical coal supply regions of Australia, Canada and Mozambique," said Cynthia Carroll, CEO, Anglo American. "Revubøe is located in the most attractive area of Mozambique's Moatize coal basin and has a number of infrastructure development options."

The transaction is subject to a number of conditions and is expected to be completed during the third quarter of 2012.

Colombia's Prodeco Declares Force Majeure

Colombian coal producer Prodeco, a subsidiary of Glencore, has declared force majeure on vessels waiting to load at the company's Puerto Prodeco coal export terminal after a week-long strike by private coal railway company Fenoco, according to *Platts*. This comes after Colombian miner Drummond also declared force majeure on vessels berthed at its Puerto Drummond coal port. Workers at Fenoco, which transports thermal coal from Drummond, Prodeco and Colombian Natural Resources to coal ports in northern Colombia, struck July 23 over pay and work conditions. Alongside the Fenoco strike, there is also ongoing industrial action at the Prodeco-owned La Jagua 7 million mtpy thermal coal mine, which began July 19. Prodeco produced 14.6 million mt of coal in 2011, but plans to increase annual output to 21 million mtpy by the end of 2013. Spot prices in Europe—Colombia's largest customer—are currently at a three-month high of \$91/mt.

Transnet to Boost Coal Export

Transnet SOC Ltd., which operates the Richards Bay Coal Terminal, plans to spend ZAR 13.5 billion in the next three years to boost coal export capacity to 81 million metric tons (mt), *The Sunday Times* reported. According to Brian Molefe, CEO of Transnet, the state-owned company will probably export 75 million mt in the 12 months through March 2013, up from 68 million mt in the previous year.

EIS Submitted for Canada's Donkin Project

During mid-July an Environmental Impact Statement (EIS) was submitted to the Canadian Environmental Assessment Agency (CEAA) for the Donkin export coking coal project, located on Cape Breton Island, Nova Scotia. The Donkin project is owned through a 75:25 joint ven-

Continued on pg 8...

Under terms of the agreement, Ambre operates and markets the coal for Decker. Since Ambre Energy took over mine management, it has been working toward increasing production while planning to export coal to Asian markets. According to the lawsuit, that is directly against plans agreed upon by Cloud Peak's subsidiary, Western Minerals, LLC as well as the management team prior to Ambre's buy-in.

According to the suit, Western Minerals wants Ambre Energy's mine management removed, charging that they are abusing their obligations and responsibilities. Cloud Peak's complaint states that Ambre has engaged in various self-dealing transactions designed to give Ambre a disproportionate share of profits on Asian sales.

Furthermore, Cloud Peak alleges that Ambre's export redevelopment proposition is not that the Decker Coal Co. should sell coal from the Decker mine to Asian utilities with an equal return to both 50% owners, but instead that Ambre will sell coal from the Decker mine to Ambre Entities "so the Ambre Entities can retain undisclosed revenues and profits from such coal, while Western Minerals bears 50% of the expense and risk of redevelopment of the mine.

In a further alleged breach of their contract, despite numerous requests, Cloud Peak claims that Ambre Entities has yet to provide Western Minerals with a complete and transparent business proposal for the redevelopment of the mine, including the commercial terms for the Ambre Entities' transactions involving coal from the Decker mine.

Ambre vigorously defends both its actions and its strategy. Ambre Energy initially responded with a public statement that management has done nothing wrong, countercharging that Cloud Peak really wants the Decker mine closed because it owns the adjacent Spring Creek mine and other nearby reserves that Cloud Peak intends to market overseas. Given the recent change in management and direction, Decker now represents something of a competitor to Cloud Peak, particularly as Spring Creek has a long established reputation and position in Asian markets.

In an interview with *Coal Age*, Everett King, president and CEO of Ambre Energy North America, said exporting coal from Decker was always part of the deal. "Our intention in acquiring the KCP properties from Level 3 Communications late last year was to keep Decker competitive domestically but also to have available Decker coal for export to Asian markets through the ports we now have in development," said King.

At the end of July, Ambre and KCP filed a legal counterclaim against Cloud Peak and Western Minerals. The counterclaim seeks to expel Western Minerals from the Decker partnership. Cloud Peak declined to comment on Ambre's assertions, instead referring to the text of the lawsuit.

Rhino Restarts CAPP Mines

After cutting inventories, primarily for metallurgical coal, to more manageable levels, Rhino Resource Partners in July restarted Central Appalachian mines that had been idled for five weeks because of soft markets.

The Lexington, Ky.-based company shuttered the bulk of its Central App mines in June after stockpiles continued to grow through the first five months of the year at the operations. During the idling, Rhino said it was able to trim inventories by about 75,000 tons, and was close to targeted, albeit undisclosed, levels.

Rhino did not identify the individual mines affected by the temporary closures. Its Central App operations, however, include

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ture between Xstrata Coal Donkin Ltd. and Erdene Resource Development Corp. In association with the filing, Xstrata hosted community meetings in both Donkin and Sydney, Nova Scotia. A decision is expected on the EIS by the second quarter of 2013. The Donkin project proposal includes the construction and operation of an underground coal mine with a lifespan in excess of 30 years. Underground operations would include multiple continuous miners producing approximately 3.6 million mtpy raw coal. A coal handling and prep plant capable of processing 2.75 million mtpy of clean coal. It is anticipated that the coal will be transported to international markets via a newly constructed barge-to-ship load-out facility. Xstrata still plans to sell its portion of project, as originally announced in April.

Newcastle Exports Continue to Grow

Asian demand for Australian coal remains strong. New South Wales Ports Minister Duncan Gay said total trade throughput for the 2011-12 financial year amounted to 128.6 million metric tons (mt), or an increase of 12.2 % on 2010-11. "Coal exports reached 121.9 million mt which was 13.6 million mt more than achieved in the 2010-11 financial year," Gay said. "The Asian region market was again the main export destination for coal with Japan, China, South Korea and Taiwan being the major customers."

In related news, the Port of Newcastle opened a new \$3.5 million operations center housing state-of-the-art maritime vessel tracking systems. "The Port of Newcastle is recognized as being the world's largest coal export port," Gay said. "This modern building ensures Newcastle Port Corp. will maintain its operational excellence and be able to handle increasing exports and imports. The three-story Port Center is built on the eastern side of the Pilot Station near the entrance of Newcastle harbor."

Last Saar Coal Mine in Germany Closes

The Bergwerk Saar coal mine in Ensdorf, Germany, was shut down June 29, 2012, *Getty* reported. Operated by RAG AG, Bergwerk Saar is the last mine in the Saar region that has a mining tradition dating back to 1730. Together with the coal mines of the Ruhr region, the Saar mines played a crucial role in the industrialization of western Germany and once employed tens of thousands of miners.

China Coal Majors Struggle Amid Falling Coal Prices

The slowing economy and waning demand for coal have triggered an 11 consecutive-week price drop after a decade of robust development, arousing great concerns among China's coal enterprises, *Xinhua Online* reported. However, industry analysts believe the situation for the world's largest coal consumer won't last long. Stockpiles at the Qinhuangdao Port in Hebei province rose the most in six months on slowing demand. Data from the China Coal Transport and Distribution Association showed that coal with an energy value of 5,500 kilocalories per kilogram slid by 1.96% to \$100/mt after 10 weeks of decline. According to the CCTDA report, in the last two months, the price slumped 23% from the same period in 2011, indicating unusually weak industrial demand. Sales of coal resources in coal-rich regions such as Shanxi, Shaanxi and Inner Mongolia have been seriously affected as a result.



the Tug River complex in eastern Kentucky and West Virginia, and the Deane and Rob Fork complexes in eastern Kentucky.

The company's overall production during the second quarter was not significantly affected by the shutdowns. Rhino produced just over 1 million tons in the three months ended June 30, down slightly from 1.1 million tons in the first quarter of 2012. The company remains on track to produce at least 4 million tons this year.

During the latest quarter, Rhino produced 171,000 tons of steam coal and 99,000 tons of met coal in Central App.

Northern Appalachia, with 477,000 tons of steam coal, was the company's most productive region in the second quarter.

Rhino also produced 220,000 tons at its Castle Valley operation in Utah, where the underground mine in June recorded its first 100,000 ton-plus sales month under Rhino's stewardship.

Meanwhile, the Rhino Eastern joint venture between Rhino and Patriot Coal Co. produced 98,000 tons of met coal in the second quarter. Rhino Eastern is located in Raleigh and Wyoming counties, W.Va.

In a July operational update, Rhino said the impact of Patriot's bankruptcy filing earlier this year on Rhino Eastern remained uncertain. Rhino said it expected the joint venture to continue normal operations.

In a subsequent July filing with the U.S. Securities and Exchange Commission, David Zatezalo, Rhino president and CEO, said the company expected to settle its 2013 met coal contracts late in the third quarter of 2012. Zatezalo said the U.S. coal market is "cyclically depressed, and while our steam coal is well contracted through 2014, our metallurgical coal is contracted annually."

Pennsylvania Coal Groups Form Alliance

Marshaling the resources of two coal advocacy groups, the newly formed Pennsylvania Coal Alliance aims to tell coal's story at a time when the black mineral is under attack on several fronts.

The Alliance is the summer marriage between the venerable Pennsylvania Coal Association and Families Organized to Represent the Coal Economy (FORCE). They joined forces and tapped former Republican State Senator John Pippy to lead the consolidated effort. Pippy, 41, is a veteran legislator in the Keystone state, having served as senator from 2003 until his retirement from politics June 30 and, before that, pulling a seven-year stint in the state House of Representatives.

Pippy is CEO of the Alliance. George Ellis, who served as president of the now-defunct coal association, stayed on as president of the Alliance and serves as the group's principal lobbyist.

Ellis said Pippy's long tenure as a lawmaker, combined with his training as an environmental engineer, makes him "uniquely qualified to lead the Alliance as we begin a new chapter. It has become clear recently that we need a stronger, more unified voice as our industry works toward technical advances to become even cleaner—while remaining the most affordable energy sources for Pennsylvanians."

The Alliance plans to protect and grow the state's coal industry that provides 9,000 direct mining jobs and 41,500 indirect jobs, generating \$7.5 billion in economic benefit annually. Pennsylvania produces more than 60 million tons of coal a year.

The industry applauded an executive order signed in July by Republican Governor Tom Corbett that is designed to expedite permitting decisions by the Pennsylvania Department of Environmental Management. "Permitting in many ways is taking a lot longer than it has in the past," Pippy said in an interview. "Through the executive order, we believe it definitely is a strong, positive step in the right direction. In some cases, it will have an

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immediate impact” on processing permit applications, “and will set a template as we look into the future.”

MSHA’s ‘Examinations’ Rule for Underground Coal Mines Goes into Effect

The Mine Safety and Health Administration’s final rule “Examinations of Work Areas in Underground Coal Mines for Violations of Mandatory Health or Safety Standards,” which was published April 6, 2012, in the Federal Register, became effective August 6. The rule requires mine operators to identify and correct hazardous conditions and violations of nine health and safety standards that pose the greatest risk to miners.

The rule requires that, during pre-shift, supplemental, on-shift and weekly examinations, underground coal mine operators, in addition to examining for hazardous conditions as in the exist-

ing regulations, examine for violations of the nine specific health and safety standards. The rule also requires operators to record the actions taken to correct hazardous conditions, as in the existing regulations, and violations of the nine standards. Additionally, operators must review with mine examiners, on a quarterly basis, citations and orders issued in areas where pre-shift, supplemental, on-shift and weekly examinations are required.

The nine standards address ventilation, methane, roof control, combustible materials, rock dust, equipment guarding and other safeguards. They are consistent with the standards emphasized in MSHA’s ‘Rules to Live By’ initiative and the types of violations cited in MSHA’s accident investigation report on the Upper Big Branch mine explosion as contributing to the cause of that deadly accident.

NRG and GenOn to Merge

NRG Energy and GenOn Energy plan to merge, creating the largest competitive generator in the United States with a diverse fleet of approximately 47,000 megawatts (mw) with asset concentrations in the East, Gulf Coast and West, and a combined enterprise value of \$18 billion.

“This combination ushers in a new era of scale, scope, and market and fuel diversification in the competitive power industry,” said NRG President and CEO David Crane, who will continue his current positions with the combined company. “The greater depth and breadth gained through the combination with GenOn will put NRG in a uniquely strong position to fulfill the needs of American energy consumers in the 21st century.”

“NRG and GenOn are a great fit geographically and operationally, and we look forward to working together to capture efficiencies from the scale associated with the transaction to deliver enhanced value to our investors,” said GenOn Chairman and CEO Edward R. Muller, who will join the NRG board of directors as vice chairman.

The combined company will retain the name NRG Energy. An expanded core generation fleet will enable the combined company to duplicate in multiple core markets (principally in the East). The combined company will be dual headquartered, with financial and commercial headquarters in Princeton, N.J., and operational headquarters in Houston, Texas.

Peabody, Kinder Morgan Sign Gulf Coast Coal Export Agreements

Peabody Energy and Kinder Morgan Energy Partners announced long-term agreements to secure and expand the Gulf Coast export platform for Peabody’s Colorado, Powder River Basin and Illinois Basin coals. Under the multi-terminal agreements, Peabody would gain additional access to export coal at Kinder Morgan’s Deepwater Terminal and Houston Bulk Terminal (HBT) near Houston, and its International Marine Terminal (IMT) in Myrtle Grove, La., through 2021 and 2020, respectively. This would increase Peabody’s Gulf Coast export capacity to approximately 5 million to 7 million tons of coal per year between 2014 and 2020.

Peabody has also secured a rail service agreement with Union Pacific to transport the company’s Colorado coal to Kinder Morgan’s Houston terminals. The agreements allow for throughput flexibility among Kinder Morgan’s Gulf Coast export terminals to serve Peabody’s international customer base. The additional capacity also supports the planned expansion of Kinder Morgan’s Gulf

TUG VALLEY MINING INSTITUTE AWARDS SCHOLARSHIPS

At the June 21, 2012, Tug Valley Mining Institute (TVMI) dinner meeting, four 2012 scholarship recipients were named. The two top \$6,000 scholarship awards went to Arionna Hatfield, Belfry High School and Tyler Williams, Belfry High School. Two \$1,500 scholarship awards went to Whitney Horton, Mingo Central High School and Christin Crum, Regional Christian School.

The guest speaker was West Virginia first lady Joanne Tomblin. She encouraged the scholars to persevere and work hard to achieve their higher educational dreams. Mine Lifeline sponsored the meeting and Jeremy Abraham shared encouraging words for the coal industry regarding the political storm it is currently facing.

Over the last 16 years, TVMI has awarded 94 students \$213,250 in scholarship monies. The TVMI scholarship is open to students from Mingo, Logan, Wayne, Pike and Martin counties. The applications are available in November of each year and may be obtained from Marsha Williams at the First National Bank of Williamson or from the TVMI website, www.tugvalleyymi.org.



Pictured from left to right: Bud Baldwin, president, TVMI; Whitney Horton, Mingo Central High; Tyler Williams, Belfry High; Arionna Hatfield, Belfry High; West Virginia first lady Joanne Tomblin; and Ray Scites, treasurer, TVMI. (Not pictured: Christin Crum, Regional Christian)

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Norris Screen (NS) manufactures high quality screens for stationary and vibrating screen systems and other diverse applications.

Mining Controls (MCI) is a major supplier of electric power equipment and mine lighting and surveillance systems to the underground mining industry.

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Coast coal handling facilities and Peabody's development of the Sage Creek extension of the Twentymile mine.

Kinder Morgan will invest, including previously announced projects, approximately \$400 million to expand its Gulf Coast terminal network. After completion of all of the export expansion projects, Kinder Morgan's Gulf Coast terminal network will have a coal export nameplate capacity of approximately 27 million tons per year.

"Peabody is securing a large-volume, sustainable U.S. export platform to meet growing global seaborne coal demand," said Peabody Energy Chairman and CEO Greg Boyce. "These new throughput agreements further strengthen Peabody's ongoing partnership with Kinder Morgan as we continue to expand our long-term Gulf Coast capacity in line with emerging export opportunities for our competitive and reliable coal products."

"We look forward to expanding our partnership with Peabody into new markets," said Kinder Morgan Terminals President Jeff Armstrong. "Export coal demand continues to grow around the country and Kinder Morgan is well positioned with our network of terminals to serve our customers' needs in multiple locations."

Peabody has extended its existing contract with KMP's HBT and will begin exporting Colorado and PRB coals from the Deepwater facility beginning in 2014. Peabody's Illinois Basin, Colorado and PRB coals will be exported through KMP's expanded IMT in New Orleans from 2014. An existing agreement at the Cora river terminal in Illinois will be extended through 2018 to facilitate exports through IMT as well as domestic sales.

The Gulf Coast export platform is one of a number of ways in which Peabody accesses seaborne coal markets, including its



PEOPLE IN THE NEWS

Arch Coal, Inc. has appointed *Kenneth D. Cochran* senior vice president of operations, and *Gary L. Bennett* has been promoted to vice president of operations support.

Alpha Natural Resources has appointed *John W. Hanekamp* senior vice president of international thermal sales and trading. The company also appointed *L. Patrick Hassey* to the board of directors.



Patrick Hassey



Larry Drummond

Elbert Allen (Larry) Drummond, vice chairman of **Drummond Company, Inc.**, recently passed away. His father, Heman Drummond, had been a coal miner for Debardeleben Coal Co. and decided in 1935 to start his own mine, the beginning of what is now Drummond Co. During breaks in college, Larry worked in various areas of Drummond Coal operations—preparing a site for mining, drilling at a new mine, cleaning coal for loading, and work at other operations. After returning home with a law degree, he joined the company and was involved initially with sales. Over the years he was heavily involved with domestic and international coal sales. He assumed additional responsibilities as vice chairman of the corporation and chairman of its executive committee.



Michael Karmis

Michael Karmis, the Stonie Barker Chair of Mining and Minerals Engineering at **Virginia Tech**, has received the first Gunter Fettweis Award from the international Society of Mining Professors. This award recognizes active SOMP members for accomplishments in education, research, and professional service. Karmis joined the Virginia Tech Department of Mining and Minerals Engineering in 1978. He is a past head of the program. Earlier this year, Alpha Natural Resources named him as one of three directors to administer its new foundation to improve mine health and safety. Currently, Karmis serves as the director of the Virginia Center for Coal and Energy Research. Karmis is also the founder of a consortium of major research universities, called the Appalachian Research Initiative for Environmental Science, to address the environmental impacts of the discovery, development, production and use of energy resources in Appalachia.

The Australian Center for Geomechanics at **The University of Western Australia** has appointed *Dr. Ken Mercer* to a professorial position in environmental and mining geomechanics. He will be responsible for developing and leading the envi-



Ken Mercer

ronmental geomechanics program and will also be involved with slope stability research.



Connie Rogers

Davis Graham & Stubbs LLP partner *Connie Rogers* has been appointed chair and associate *Elizabeth Titus* has been appointed a vice chair of the Public Lands and Resources Committee of the American Bar Association's Section of Environment, Energy, and Resources for 2012-2013.



Elizabeth Titus



Billy Rodrigues

Bridge Shipping Group has appointed *Billy Rodrigues* managing director of the Mozambique and Malawi regions, and its new facility in Beira, Mozambique.



Patrick J. Largier

With the recent closing of FLSmidth's acquisition of the Australian engineering and equipment supply company, Ludowici Ltd., **FLSmidth** has appointed *Patrick J. Largier* senior vice president and head of the Asia-Pacific region for the non-ferrous division. He will also continue as CEO of what is now known as FLSmidth Ludowici.



Patrick Largier



Chad Cantor

Fairmont Supply Co. has promoted *Chad Cantor* to general manager of strategic business development.

Columbus McKinnon Corp. has appointed *Kurt Wozniak* vice president and an officer.



Kurt Wozniak

MWH Global has appointed *Ken Esposito* mining sector leader for North America.

GE Capital, corporate finance, announced the appointments of *Greg Eck* and *Dustin Weinberger* as managing directors supporting the specialty team dedicated to meeting the commercial financing needs of metals and mining companies nationally.

MICROMINE has appointed *Kevin Fitzpatrick* CEO.

River Consulting has appointed *Steven Lorence* senior project manager in its Columbus, Ohio, office and *Christopher Carstens* manager of business development in its New Orleans office.

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Ohio Valley Pleads Guilty to CWA Violations

A Murray Energy subsidiary, the Ohio Valley Coal Co., operator of the Powhatan No. 6 mine, pleaded guilty July 13 to criminal violations of the Clean Water Act (CWA) involving coal-wastewater spills into a southeast Ohio stream—spills that could cost the company more than \$7 million, *The Associated Press* reported.



DATELINE WASHINGTON

IT'S A COAL AGE

BY LUKE POPOVICH



Despite appearances, I wasn't around 100 years ago when *Coal Age* first broke into print. Still it's amazing to think that any publication these days can hang around and even prosper that long by covering a single industry.

For one thing, how many publications have had an industry to cover for 100 years? And even if they did, how many publications have stayed in print—surviving 100 years of business cycles and competitors—to cover it? The only magazine I read that is older than *Coal Age* is reputedly the oldest continuously published magazine in the English language—*The Spectator*. But this proud London publication covers an even older, more enduring topic—political vice and cultural vanity. That's not fair competition.

So this anniversary pays tribute to both an industry as well as the publication that has chronicled its ups and downs. Ups and downs...they've seen a few. Over the decades, both coal and *Coal Age* have been knocked down but never out. "Creative destruction," said by the Austrian economist Joseph Schumpeter to be the defining characteristic of capitalism, has not destroyed the demand for coal or the need for *Coal Age* to cover it.

In today's global economy, a "here-today, gone-tomorrow" product cycle has made Schumpeter's dictum painfully obvious. Ask Lehman Brothers' shareholders if any business is too big to fail. That's why the enduring value of coal and the coal industry's oldest trade magazine is especially remarkable today, when businesses seem to emerge out of nowhere and disappear just as fast. Will social media hang around for 100 years? Right.

It must be a surprise to many today that coal has survived and yet its day is far from done. Although coal faces stiff domestic competition and fierce opposition from green fanatics, it's the darling of foreign consumers. Coal has been the fastest growing energy source in the past decade.

Ask 600 million electricity consumers in India if they want fewer coal-fired power plants. Ask China's energy ministry for the date when it plans to

replace coal with LNG. Question high-cost EU manufacturers, struggling in a global economy, on how their carbon caps are working out. Offshore demand for coal will continue to grow whenever offshore economies resume growth. Last month an economic think tank estimated that U.S. coal exports could add between \$2 and \$6 billion annually to our economy.

Coal could add even more if Washington would stop fighting coal utilization and start fighting coal regulation. There are signs that some in Congress get it. The House of Representatives passed a bill this summer that would lift the regulatory burden from coal and a bi-partisan group of senators have introduced similar legislation in their side of the Capitol. We're also seeing the federal courts swing into action, backing the NMA's arguments in multiple decisions this summer that flatly declared the EPA's coal permit policy unlawful.

But here too, coal has seen this all before—it's a war veteran, not a battlefield casualty. In 1973, Carl Bagge, the president of the NMA's predecessor organization, reminded his members "the coal industry has had to fight for its life" from "a national environmental orgy" and a government determined to "war against the coal industry." Sound familiar?

If coal's challenges haven't changed all that much, its performance certainly has. *Coal Age* has presided over 100 years' worth of improvements in mine safety, emissions reductions, and reclamation and productivity. Better technology, better training and better workers have literally transformed an industry from a low wage, labor-intensive provider of pollution-heavy energy to a high-wage, highly automated producer of lower-emission power.

And over this single generation of progress, how many more generations of people here and the world over have been lifted from the darkness of rural poverty with electricity made possible by coal? Hundreds of millions around the world are still waiting to see the light. In the century to come, coal can give them a brighter future too.

Popovich is a spokesperson for the National Mining Association, the industry's trade group based in Washington, D.C.

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“ Ask 600 million electricity consumers in India if they want fewer coal-fired power plants. ”

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CALENDAR OF EVENTS

September 11-12, 2012 *3rd Coaltrans Colombia*—will be held at the Bogota Plaza Summit Hotel, Bogota, Colombia. Contact: Coaltrans Conferences Ltd. (Email: coaltrans@euromoneyplc.com; Web: www.coaltrans.com/Colombia).

September 12-13, 2012 *Water Management for Mining*—will be held at the Denver Marriott Tech Center in Denver, Colo. Contact: Infocast (Tel: 818-888-4444; Fax: 818-888-4440; Email: mail@infocastevents.com; Web: www.infocastinc.com/mining).

September 20-21, 2012 *Platts 35th Annual Coal Marketing Days Conference*—will be held in Pittsburgh, Pa. Contact: Erica Giardina (Tel: 781-430-2115; Email: erica_giardina@platts.com; Web: www.events.platts.com).

September 24-26, 2012 *MINExpo*—will be held at the Las Vegas Convention Center in Las Vegas, Nev. Contact: Hall-Erickson Inc. (Tel: 866-717-6463; Email: minexpo@heexpo.com; Web: www.minexpo.com).

October 16-18, 2012 *Coal Handling & Storage 2012*—will be held at the Union Station Marriott, St. Louis, Mo. Contact: Tanna Holzer (Tel: 303-283-0640; Email: tholzer@mining-media.com; Web: www.mining-media.com).

November 3-6, 2012 *China Mining 2012 Conference and Exhibition*—will be held at the Tianjin Meijiang Convention Center in Tianjin, China. Contact: Beijing Sino-Confex International Conference and Exhibition (Tel: 86 10 64466855; Fax: 86 10 58857006; Email: info@china-mining.org; Web: www.china-mining.org/en).

November 14-16, 2012 *Western Mining Electrical Association Bi-annual Meeting*—will be held at El Tropicano Hotel in San Antonio, Texas. Contact: WMEA (Web: www.wmea.net).

January 15-17, 2013 *MSHA's Alternative Case Resolution Initiative: presented by Catamount Consulting and Patton Boggs LLP*—will be held in Green Bay, Wis. Contact: Catamount Consulting LLC (Tel: 518-623-2352; Fax: 518-623-3658; Web: www.catamountconsultingllc.com).

February 10-13, 2013 *39th Annual Conference on Explosives & Blasting Technique*—will be held in Fort Worth, Texas. Contact: International Society of Explosives Engineers (Tel: 440-349-4400; Web: www.isee.org).

February 24-27, 2013 *142nd SME Annual Meeting and Exhibit and CMA 115th National Western Mining Conference*—will be held in Denver, Colo. Contact: Society for Mining, Metallurgy & Exploration (Tel: 303-948-4200; Email: meetings@smenet.org; Web: www.smenet.org/meetings).

April 15-21, 2013 *bauma 2013*—will be held in Munich, Germany. Contact: Messe München GmbH (Tel: 49 89 949-11348; Fax: 49 89 949-11349; Email: info@bauma.de; Web: www.bauma.de).

April 16-18, 2013 *Minex Central Asia 2013*—will be held in Astana, Kazakhstan. Contact: Arthur Poliakov (Tel: 44 (0) 207 520 9341; Email: admin@minexforum.com; Web: www.minexasia.com).

April 30-May 2, 2013 *Coal Prep 2013*—will be held in Lexington, Ky. Contact: Penton Business Media (Tel: 800-927-5007; Email: registration@penton.com; Web: www.coal-prepshow.com).

June 11-13, 2013 *Longwall USA Exhibition & Conference*—will be held at the David L. Lawrence Convention Center in Pittsburgh, Pa. Contact: Tanna Holzer (Tel: 303-283-0640; Email: tholzer@mining-media.com; Web: www.mining-media.com).

August 20-23, 2013 *AIMEX 2013 Asia-Pacific's International Mining Exhibition*—will be held at Sydney Showground, Sydney Olympic Park in Sydney, Australia. Contact: Reed Exhibitions Australia (Tel: 61 2 9211 7544; Email: aimex@reedexhibitions.com.au; Web: www.aimex.com.au).

October 1-3, 2013 *Minex Russia 2013*—will be held in Moscow, Russia. Contact: Irina Yukhtina (Tel: 44 (0)207 520 9341; Fax: 44 (0)207 520 9342; Email: ira.y@minexforum.com; Web: www.minexrussia.com).

Ohio Valley's parent company, Murray Energy Corp., acknowledged in a recent statement it had reached an agreement with the U.S. Attorney's Office for the Southern District of Ohio "to resolve potential charges, stemming from two incidents." Murray, based in northeast Ohio's Pepper Pike and in St. Clairsville in southeast Ohio, said Ohio Valley began two years ago to install the "pipe-within-a-pipe system" designed to eliminate the potential for another release.

Murray Energy said its independently operated subsidiary also has installed equipment and controls to monitor the pipeline.

The War on Coal Now Being Fought from the Air

According to documents obtained by *The Associated Press* and reported in numerous news sources, government inspectors have been conducting aerial surveillance of coal operators in central Appalachia, particularly surface miners. The Kentucky Division of Mine Reclamation and Enforcement (KDMRE) has spent more than \$477,000 over the past four years for helicopter flights over coal mining operations.

A review by the *AP* found the agency has been spending on average nearly \$2,000 on each citation issued to mining companies for violations spotted from the air through an initiative started by the federal government's Office of Surface Mining (OSM).

The flyovers came as a surprise to mining industry leaders, including Kentucky Coal Association President Bill Bissett, who not only complained about their "covert" nature but also questioned their effectiveness.

However, the state disagrees. "We feel the helicopter's value as an enforcement tool is a necessary component of our overall enforcement program and we would suffer greatly if we did not use it," said KDMRE spokesman Dick Brown.

Last year, the state agency wrote almost 1,250 citations that resulted in nearly \$10 million in fines. That averages to about \$8,000 in penalties per citation written, though it wasn't clear how many of the 244 citations from flyovers resulted in fines.

"The helicopter was never meant to pay for its use by generating penalties from the violations that are written from its use," Brown said. "That line of reasoning quickly gets into the overall enforcement program paying for itself by generating penalties—a bounty system."

Brown said OSM provided the money for the Division of Mine Reclamation and Enforcement to purchase the helicopter that his agency routinely uses. But the agency reimburses the Department of Aviation for operation expenses.

SunCoke Energy Running above Full Capacity

SunCoke Energy, Inc. reported that second quarter 2012 U.S. coke production is expected to be approximately 1,089,000 tons. This reflects an estimated increase of 167,000 tons versus the same period in 2011 and an estimated 21,000 tons versus first quarter 2012. The estimated year-over-year increase in U.S. coke production in the second quarter was driven by the new Middletown facility and continued strong operations at SunCoke's Haverhill and Granite City facilities. The estimated increase versus first quarter 2012 is due to higher production at the Indiana Harbor and Middletown facilities. SunCoke's coke-making capacity utilization was approximately 103% in second quarter 2012 versus 100% in second quarter 2011 and 101% in first quarter 2012.

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2012 AWARDS

Peabody Energy's North Antelope Rochelle & Cottage Grove Mines Honored with Excellence in Reclamation Awards

Peabody Energy has been honored with two U.S. Department of the Interior 2012 Excellence in Surface Coal Mining Reclamation Awards for protection of raptor populations in Wyoming and restoration of prime farmland in Illinois.

Peabody's flagship North Antelope Rochelle mine in Campbell County, Wyo., was recognized for a multi-faceted approach to sustain populations of eagles, hawks, owls and other birds of prey through creation of high-quality habitat and protection of nesting areas. Nearly three decades of monitoring data confirm that young have fledged each year, and raptor populations successfully have been sustained as mining activities significantly increased.

Peabody's Cottage Grove mine in Saline County, Ill., was honored for soil handling and crop management methods to restore prime farmland, achieving high yields of corn, soy beans, wheat and hay crops that are as good or better than county averages. These results are important given Cottage Grove is located in one of the most productive agriculture regions in the state. Restoration of prime farmland is considered among the highest land uses, yet it is among the most difficult to achieve.

"Peabody has a world-class environmental, engineering and operations team that continues to demonstrate leadership in sustainable mining and restoration practices," said Charles Meintjes, acting president of Peabody-Americas. "I congratulate our team for setting a standard of environmental excellence that consistently delivers the highest and most enduring benefits for communities and stakeholders long term."



Lands restored include ponds and wetlands that provide water and unique habitat. Wildlife habitat restoration also includes creating nesting and roosting areas.

At the North Antelope Rochelle mine, wildlife habitat restoration includes creating nesting and roosting areas and planting more than 1,900 cottonwood and willow trees in seasonal creeks and ephemeral pools. The highly productive reclaimed rangeland provides habitat for rabbits, mice and other small mammals that are important prey for raptors. Nesting platforms also are constructed within restored lands to provide sites to attract new breeding pairs and allow existing pairs to maintain their territory. Monitoring and surveying are extensive and ongoing.

At the Cottage Grove mine, superior productivity of reclaimed farmland has been achieved through proper handling of soils and use of cover crops. The process includes storing topsoil prior to mining, replacing more than twice as much subsoil for the rooting zone using higher quality material than what is required, and employing the latest technology to prepare and aerate the soils.



Efforts to protect raptor populations have helped successfully sustain species such as Ferruginous Hawks as seen in this nest near the mining area.

Cover crops are used to further enhance the replaced soils and are hardy enough to withstand weather extremes and create rapid ground cover. The species have root types that act as nutrient pumps, concentrating nutrients near the surface while others hold nourishment in their tissues. Cover crops also encourage beneficial insects, mammals, birds, and microflora and microfauna to further strengthen the restored ecosystem.

Alpha Natural Resources Celebrates Safety Milestones at Seven Mining Operations

Alpha Natural Resources announced that seven affiliated operations have been recognized for their safety achievements in 2011. The Virginia Coal Mine Safety Board and Department of Mines, Minerals and Energy recognized the following Alpha-affiliated operations for their outstanding safety records:

- Big Laurel Mining Corp.'s Mine No. 2 received top honors for a large underground mine working approximately 174,000 hours without a lost time accident;
- Paramount Coal Co. Virginia, LLC's Deep Mine No. 35 was recognized as a large underground mine working approximately 144,700 hours without a lost time accident;
- Dickenson-Russell Coal Co., LLC's Roaring Fork No. 4 was recognized as a small underground mine working approximately 80,500 hours without a lost time accident;
- Bluff Spur Coal Corp.'s Mine No. 1 was recognized as a large underground mine working approximately 137,000 hours without a lost time accident;
- Paramount Coal Co. Virginia, LLC's Lovers Gap/Butcher Knife Surface Mine was recognized as a small surface mine working nearly 40,600 hours without a lost time accident;
- Paramount Coal Co. Virginia, LLC's 88 Strip was recognized as a large surface mine working more than 153,200 hours without a lost time accident; and
- Paramount Coal Co. Virginia, LLC's Red Onion Surface Mine was recognized as a large surface mine working nearly 126,000 Hours without a lost time accident.

"We are proud of the continued commitment to safety shown at all of our operations. These awards help validate all of the hard work our miners do every day," said Allen Dupree, Alpha's business unit president for Virginia operations. The 2011 Virginia Coal Mine Safety Awards were presented at each of the mine sites during the week of July 16-22.

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CHINA IRON ORE SHIPPING AFFECTS COAL SHIPPING RATES

BY DAVID GAMBREL

Recent additions to the world's supply of large bulkers can be expected to have the effect of driving daily charter rates down for vessels employed in the heavy bulk trade of coal, iron ore and other ores. Due to easy financing and exceptionally high daily rates in 2007-2008, many carriers placed orders for more ships, hoping to take advantage of the high rates. However, it became obvious after the financial crisis reared its ugly head in the third quarter of 2008 that the exorbitant daily rates would not hold. Beyond that, the overcapacity problem of 2011-2012 was not yet obvious to most shippers and many carriers, but it would play an important part in continuing to depress daily charter rates.

Although at much lower prices, shipping markets held up surprisingly until the end of 2010. This was mainly due to a very quick and forceful response by policymakers in general and by China in particular. Oddly, China would become one of the major contributors to the overcapacity problem that carriers now face. Also, one of China's major shippers, Vale, would also become a major contributor to the problem by ordering a very large fleet of 36 Ultra Large Ore Carriers (ULOCs). (See *Coal Age*, July 2012, Transport Tips).

China—Bumping the World Supply of Bulk Carriers

China represents a microcosm of the shipping world, but it is a great big microcosm. The state-owned shipping company, COSCO, owns more than 6% of the world's dry bulk fleet. COSCO had recently invested in a version of mammoth bulkers, but they were only 300,000 tonners. Moreover, they were losing money hand-over-fist in the cruel world of bulk shipping. Gone were the good old days of 2008, when daily rates were running \$160,000-\$180,000. Now they were running a measly \$10,000-\$20,000 per day, and Vale was even refusing to load their new vessels.

Vale, their major supplier of high quality iron ore, produces Brazilian iron ore and loads very large ore carriers in their ports of Sao Luis and Tubarao, Brazil. In the latter part of 2011, COSCO and Vale got into a months-long public squabble over Vale's new Valemax Vessels, which are capable of handling 400,000 mt of ore. These vessels

were a serious threat to COSCO, which now had a brand new fleet of 300,000 tonners that were dedicated to Brazilian iron ore. The Chinese started the sparring by refusing to allow Valemax vessels into their ports. Vale responded by saying they would not load COSCO's new vessels. Each public exchange got uglier, and it spilled over into worldwide shipping of bulk goods.

One might assume this was a marriage headed for the rocks. How would China get the high quality Vale iron ore if they would not allow Vale vessels into their ports? How would Vale sell its superior iron ore to China if it refused to load the Chinese vessels tendered by COSCO, the government-owned shipping company of China? What would happen to the multibillion dollar investments Vale had made in the new iron ore ships if China would not allow them in?

In early May, the China Shipowners Association basically slammed the door on Vale's attempts to solve the shipping problem. Then very quietly later that month Vale began loading COSCO's fleet of 300,000 ton vessels with iron ore at its Sao Luis and Tubarao terminals, and just as quietly COSCO began hauling Brazilian iron ore to Chinese terminals in their fleet of 10 300,000 ton vessels. Such a turnaround in public posturing must be done with such care and deliberation that neither party would lose face. It must be done without fanfare and public announcement, without embarrassing public retractions. The news sources have been quiet; it is only through GPS that we know what happened.

Currently six of COSCO's 10 ULOCs are loaded with Vale's Brazilian iron ore and are travelling toward iron ore terminals in China. The first of these vessels to reach port was the He Ying, which arrived in the Port of Rizhao July 17, 2012. Assuming a travel time of 44 days, the vessel must have been loaded at Vale's Tubarao terminal between the last week in May and the first week of June 2012. The timing is just a few weeks after the last discouraging words heard from China, suggesting the parties began to quickly see the mutual futility of a word war, and decided to make a serious mid-course correction. As further confirmation, *Reuters* reported recently that China's transport ministry in May approved plans

to build berths for iron ore vessels of up to 400,000 mt at its eastern Ningbo-Zoushan port. This causes one to believe Beijing may eventually lift its ban on the 400,000-mt Valemax vessels.

The status of COSCO's ULOC vessels as of July 18, 2012, is shown in Table 1. The typical travel time to China is 45 days, so not much in the table can change in a short period of time. Certain spaces are blank because the data was gathered after the vessel's last transmission, or because the vessel did not give its destination, ETA or other information. Loaded vessels are indicated by gold highlighting.

Affecting Panamax & Capesize Coal Vessel Rates

How does the dedicated COSCO ULOC iron ore fleet affect daily rates for Panamax and Capesize coal vessels? Quite simply, they affect daily coal rates by displacing the smaller vessels in the world's supply of bulkers capable of carrying coal. According to RS Platou, new orders for bulk carriers totaled 370,100,000 tons in the 2007-2011 period, of which 244,900,000 tons were in the 80,000+ tonnage category. COSCO and Vale alone bumped the world's supply of 80,000+ tonnage vessels.

Every new 300,000 ton vessel hauling iron ore frees up two Capesize vessels and five Panamax vessels, increasing the supply of vessels competing for coal business. The Valemax vessels accentuate the problem (36 vessels at 400,000 tons per vessel equals 14,400,000 tons displaced). In other words, the 10 COSCO ULOCs and the 36 Valemaxes alone will displace 17,400,000 tons of world bulker capacity. This is the equivalent of adding 116-120 new Capesize vessels or 290-300 Panamax vessels to a world supply that is already brimming over. Don't forget, lots of other companies ordered vessels in the excitement of 2007-2008, but excitement over new China business was a major contributor.

For the U.S. coal producer interested in building a terminal to serve a growing Chinese market, it might be wise to recall what happened to the LAXT participants. Japanese banks, shipping companies and

trading houses were involved as LAXT participants, but Japanese utilities steadfastly refused to sign a long-term agreement guaranteeing they would take coal through the new terminal. In the final analysis it was not environmental pressure that closed the LAXT terminal, but an inadequate flow of coal to support the terminal financially. Why would anyone think it would be better to rely on a "growing Chinese market?" Why would any Chinese utility or coal buyer sign a long-term coal import supply agreement when they have more than enough coal to supply their needs from their own mines? One of the main reasons coal ships were not unloaded in June was because Chinese ports were full of Chinese coal. Their major coal export terminal, Qinhuangdao, currently has more than 9 million tons in their growing stockpile, and this is only one of several Chinese export terminals. Chinese authorities must decide whether to ship their own coal south to Chinese power stations, or to buy coal imported coal from Indonesia, Australia, and even the U.S.

The international marketer advising his company to "get in the game" while there is still a "growing Chinese market" needs to make sure he is relying on something other than coal traders and magazine articles. He should talk to end users, and he should make sure there is a genuine long term need for his coal at his price. Considering the Chinese penchant for coal arbitrage, one has to ask why the Chinese buyer would commit to buying U.S. coal over Indonesian or Australian coal. Considering the wild swings seen in daily rates for Panamax and Capesize vessels since 2007, a cheap delivered price today may become an expensive delivered price tomorrow, and distance will be a determining factor. The U.S. coal supplier should consider the distance differentials between the natural suppliers (Indonesia and Australia) and U.S. coal terminals before acting.

Dave Gambrel is the president of Logisticon, a coal transportation consultancy. He was director of transportation for Peabody Coal Company for 15 years, and was also in charge of the company's ocean shipping program. He was a member of the U.S. negotiating team during the formative stages of the LAXT terminal, and a member of the DTA management committee. He may be reached at bunkgambrel@earthlink.net.

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MODERN LONGWALL MINING

With Absolute Zero as its primary objective, CONSOL Energy's Bailey Complex embarks on an ambitious continuous improvement plan

BY STEVE FISCOR, EDITOR-IN-CHIEF

The dayshift crew on the longwall (left to right): Ron Manzo, longwall coordinator; Kenny Duncan, shearer operator; Jimmy Young, longwall maintenance coordinator; Jay Goudy, shearer operator; Domic Capitoni, shield operator; Gary Celesto, Joy life cycle manager; and Jason Diamond, safety technician.

Located in southwestern Pennsylvania, CONSOL Energy's Bailey Complex has been a world leader for many years. The complex, which consists of three mines, Bailey, Enlow Fork and BMX, and a massive state-of-the-art prep plant, produces more than 20 million tons of clean coal per year. With a \$662 million investment in the new Bailey Mine Expansion (BMX), they have now set their sights on 25 million tons per year. While those numbers are impressive, the real story behind them is the company's renewed commitment to safety.

Five years ago, CONSOL Energy launched its Absolute Zero campaign that established the company's core values as safety, compliance and continuous improvement. Today, the safety performance of the company's mining opera-

tions stands well above national averages. During the second quarter of 2012, the Enlow Fork mine ran exception-free while producing 2.6 million tons. Several other mines and operations have also had exception-free quarters.

How does this cultural shift in values relate to production and unit costs? CONSOL Energy's President Nick DeIuliis (pronounced Dee-oo-lee-us) explains it best. "The Bailey Complex gets a lot of attention simply because of the sheer magnitude of the operation," DeIuliis said. "It's also a great reflection of where the company stands today as far as its values and priorities." He carefully articulates the company's core values (safety, compliance and continuous improvement) and its priorities, which are production and unit costs.

"Values are constants that stand the test of time," DeIuliis said. "They will not change with market conditions or differ by location. Priorities change. In a soft market, costs might become more important than production, but the two will always be subsequent to our three core values."

CONSOL Energy is the largest underground coal producer in the U.S. and has always been an industry leader, which is well-documented in the 100 Year Anniversary section appearing in this edition of *Coal Age*. The company pioneered many programs over the years as far as safety, mine engineering, research and development (R&D), project management, coal preparation, longwall mining, gate road development, etc.

Those efforts continue today with the same high level of enthusiasm the company has had for nearly 150 years. "During the past five years, the Bailey Complex has implemented a lot of changes and every one of those decisions were based on improving safety for our workers," said Jimmy Brock, COO-Coal, CONSOL Energy. He cites the decision to widen all of the longwall faces, which decreases the number of panels in a district, the number of longwall moves, and the amount of development work. All of this eliminates employee exposure. Brock talks about new overland and slope conveyor systems, which have allowed the miners to seal major portions of Bailey and will allow them to eventually do the same for Enlow Fork. Similarly, these projects reduce exposure to potential hazards.

Today, the company has established an Underground Training Academy at the BMX mine, the first of its kind in the U.S., and a new communications center on the surface at its headquarters in Canonsburg, Pa. At the Bailey mine, experienced miners are working with stakeholders to test proximity detection systems and other technologies that will protect miners in the future.

CONSOL Energy's competitors will say mining coal from the Pittsburgh No. 8 seam, which has plenty of headroom, a competent roof and manageable amounts of gas, is much easier than other parts of the country. They would also say that a complex running four longwalls should be productive. The competition would have a hard time comprehending the management and engineering skills required to execute these projects. What may surprise them is that CONSOL Energy does not compare itself with competitive coal companies. It compares itself relative to where it stands in relation to Absolute Zero.

Operational Overview

The Bailey prep plant accepts coal from the new Bailey Crabapple slope and existing Enlow Fork slope. Soon it will take on a third stream from the BMX slope. For now, BMX is sealed from the Bailey mine and uses the old Bailey slope to bring its coal out. Bailey and Enlow Fork essentially mirror each other. They both operate two longwalls and four supporting gate development sections. The mines also have continuous miner sections developing the

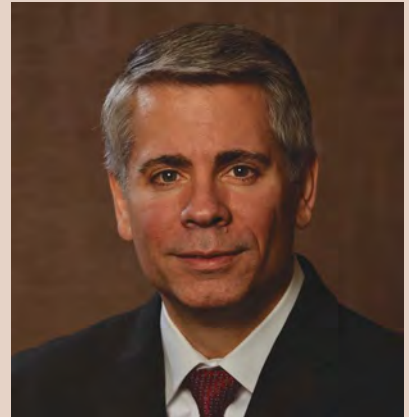
BUILDING A BRIDGE TO THE FUTURE

Waiting to meet Nick DeLuliis in the boardroom on the top floor of the new CONSOL Energy headquarterd just south of Pittsburgh, it quickly becomes apparent that this company is not your father's Consolidation Coal Co. Architecturally aesthetic, the new building emits a modern yet industrial vibe. CONSOL TV, a company-wide high definition network of 200 screens, broadcasts company news and safety messages on LCD panels placed in strategic, high-traffic locations. It does seem like the kind of place where financiers and investors could meet with engineers and executives to chart the future course of the coal and natural gas industries.

Wearing a suit, DeLuliis greets us with a smile. "Coal Age is celebrating 100 years?" he asked. "Welcome to the 100-year club. We're quickly approaching 150 years."

DeLuliis has been the president of CONSOL Energy since February 2011; prior to this role, he was chief operating officer of CONSOL Energy and was instrumental in building CONSOL Energy's gas division. He started his 23-year career with CONSOL Energy in the company's research department as a chemical engineer upon graduation from Penn State. After eight years of working with customers, he had visited countless coal-fired power plants east of the Mississippi River. He then moved to the strategic planning department and at the same time earned an MBA and a law degree from Duquesne University.

According to DeLuliis, three areas—the value system, applied technology development, and a long-term horizon—set CONSOL Energy apart from other coal operators. "Our value system is consistent with our day-to-day decision making process," DeLuliis said. "If you put production ahead of safety, it's a career killer. It's something that we have made taboo by continually talking about our core



Nick DeLuliis, president, CONSOL Energy.

values and backing it up with decision making."

Citing the recent conveyor collapse as an example, DeLuliis explains that the first decision was to stop everything. "We needed to perform a risk assessment before we put anyone in harm's way," DeLuliis said. "The flagship operation for the company is down. If it takes three weeks to bring it back online safely vs. cutting corners to bring it back online in one week, we take the three week route. If any vendors or contractors suggest any other route, a CONSOL Energy team member will steer them in the right direction."

DeLuliis believes the most important value is continuous improvement. "You have to have your values straight as far as safety and compliance certainly, yet we are in a commodity business so production and costs matter," DeLuliis said. "Continuous improvement in my mind is the bridge between those two areas. With a continuous improvement mind set, if we embrace that Absolute Zero culture, then not only are we going to improve safety by adapting new technologies, such as proximity detection, production and unit cost performance will improve too.

"We have been operating under the Absolute Zero program for five years

Continued on pg. 28...



“Today, we don’t do anything if it’s unsafe, we shut it down... Absolute Zero is here today, it will be here tomorrow and it will still be here in 20 years.”

—Jimmy Brock, COO-Coal, CONSOL Energy

mains deeper into the reserves. The longwalls have 54-inch panel belts and all of the production feeds onto 84- and 72-inch main line conveyor networks.

Ventilating such a large underground network is a massive, complicated undertaking. At any one time, there may be as many as 20 fans exhausting air from ventilation or bleeder shafts. These shafts cost \$10 to \$15 million and generate up to 600,000 cfm. “We like to err on the safe side when it comes to ventilation—more is better than not enough,” Brock said. “We design our bleeder system where the air is flowing openly to carry away and render harmless any dust or noxious gas. There is a balance between pressure differentials and the actual amount of air needed to carry away the dust and gas. In addition to looking at the size of the gob, we also look at the efficiency of moving air through the area we have to ventilate.”

Men enter the mines by shaft elevators and most of the materials are transported through the slopes. In a shift, they can move a continuous miner from the surface to wherever it’s going using rail- and diesel-powered locomotives. Miners are already using the new Dry Ridge portal at Bailey, reducing the underground commute, which currently stands at 90 minutes round trip, to 20 minutes. Similarly, the new Pleasant Grove portal was recently completed for the Enlow Fork mine.

The new Bailey overland and slope conveyor system allowed CONSOL Energy to seal a large portion of the mine giving it a temporary advantage over Enlow Fork. Unfortunately, at the end of July, the new raw coal belts suffered a partial collapse. Prior to the problems with the Bailey raw coal feed belts, the complex was on pace to mine 20.7 million clean tons in 2012.

The BMX mine began producing in 2009 and the longwall is scheduled to start-up in late February 2014. “We are currently hiring and training BMX miners,” Brock said. “We

are currently running four continuous miner units at BMX and getting ready to start a fifth. We are on schedule for the February deadline.” The BMX mine will add another 5 million clean tons. At full production in 2015, the Bailey Complex will be producing 25 to 26 million clean tons per year.

The BMX mine is a massive capital investment, even by CONSOL Energy standards. The total cost of \$662 million includes upgrades to the Bailey prep plant, such as the construction of several new raw and clean coal silos, expansion of existing railroad facilities, and installation of additional raw coal material handling systems.

CONSOL Energy is also constructing a new \$207 million slope and overland belt at the Enlow Fork mine. That project began in 2010 and is expected to be completed by the end of 2013. When completed, CONSOL Energy will seal 6 miles of underground belt and take six fans off line. There will be a big savings on electricity. A similar project at the Blacksville mine reduced the footprint of the mine by 24%, eliminating three fans and saving the mine more than \$150,000 per year. “More importantly, with the smaller footprint, it has less risk for our employees, less exposure for violations, and it makes the mine much easier to manage,” Brock said.

Management Philosophy

The mantra among CONSOL Energy managers and miners is: safety, compliance and continuous improvement. “We meet regularly with the miners and ask them to repeat the values,” Brock said. “When they say safety is the No. 1 value, we ask them to explain that. The correct answer is safety is a way of life.”

Working during the summers while in college, Brock cut his teeth as a union miner at the Matthews mine in Tennessee. Upon graduation, he went to work for CONSOL Energy in 1980. His career path took him to the Buchanan mine, Virginia Pocahontas No. 8, Mill Creek, Humphrey,

Dilworth and Robinson Run. In 2008, after the completion of a huge modernization program at Robinson Run, he was promoted to senior vice president of the northern Appalachian mines. In 2010, he was promoted to COO-Coal.

Six years ago, the U.S. coal industry entered a dark period that began with Sago and it continued to suffer one disaster after another. During this period, CONSOL CEO Brett Harvey decided enough is enough and proactively took steps to reduce accidents at the company. “What every coal miner needs to understand is that those events affect all of us,” Brock said. “It’s not just that site or that mining company, it impacts all of us.”

Harvey said safety trumps everything and started the Absolute Zero program. “A lot of us were skeptical,” Brock said. “He put the top 16 executives in a room and said ‘there’s no rank in the room, now let’s figure this out.’ We worked through it. People started to speak up and our company experienced a cultural shift in the way we do business.

“Today, we don’t do anything if it’s unsafe, we shut it down,” Brock said. “Absolute Zero is here today, it will be here tomorrow and it will still be here in 20 years.”

CONSOL Energy’s safety performance is 2.5 times better than the national average. While that is certainly respectable, they are not content because they have not reached zero. In 2007, CONSOL Energy had 7,500 employees and 226 exceptions when the Absolute Zero plan was put into play. An exception is defined as when someone receives medical treatment or they miss work related to an injury. In 2011, the company grew to 9,100 employees, while experiencing 161 exceptions. “The workforce grew and exceptions were reduced,” Brock said. “That doesn’t just happen. Cultural change requires a constant effort every day. To me, it’s the most incredible accomplishment I have seen in my career and it will only get better.”

Developing a Longwall Leader

The Bailey Complex is the flagship operation for CONSOL Energy. The company has made some major capital investments recently to widen the longwall faces, develop the BMX mine, build the Training Academy, and install the overland and slope

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conveyors. All of this is an effort to safely mine more than 820 million clean tons between now and 2045, explained Brock.

Widening the longwall faces to 1,500 ft was a major investment for both the Bailey and Enlow Fork mines. "It improves our lead days because it takes a greater amount of time to mine a wider panel," Brock said. "It enhances miner safety because we do not have to move the longwall as often. In the past, we would have moved that longwall face twice a year, but now we are moving it once a year and twice on the off years. It lessens exposure to the miners because we drive less gate panels." Over the course of seven panels, the decision eliminates one gate and 10 months of development-related mining exposure.

While changing the mine plan seemed simple enough on paper, the biggest change was with the equipment. "Wider faces require more horsepower and all of the motors and the associated equipment just continue to grow," Brock said. "Longwall chain is a prime example. We moved from 42- to 48-mm chain on the armored face conveyor (AFC) and we are now using galvanized AFC chain, which is more durable and lessens risks associated with corrosion." The results from this decision to widen the faces at the Bailey Complex have been so encouraging, almost every CONSOL Energy longwall face has been widened to a certain degree. The shortest of its 11 longwall faces is now 1,100 ft, with the exception of the company's Buchanan mine in Virginia, which is running 700 ft due to geological conditions.

All of the CONSOL Energy longwall faces are high-voltage state-of-the-art units with electronic controls and controlled start technology (CST) drives. "We run bi-di, shearer-initiated systems," Brock said. "When the shearer passes the shields, they are automatically advanced. The miners are exposed to less harm and dust—a safer procedure." The soft starting capabilities of the CSTs place less stress on the system.

CONSOL Energy now pulls a lot of data off the longwalls and managers can monitor the data remotely. Brock can look at the amperage on the shearer and the AFC motors, cutter speed, and the tension on the AFC chain on his laptop from any location that has Internet access. He can literally watch the shields advance on any longwall.

"As technology evolved, we were at the forefront," Brock said. "We have purchased

the very best equipment from a safety and compliance standpoint. Our employees here at Bailey and everywhere else are excited about new technology and they embrace it. The Joy and Caterpillar service reps come to the mine and train the employees, who are eager to learn. The miners also provide feedback to us as far as equipment performance. Probably 90% of the improvements in safety and compliance have been the direct result of employee suggestions from safety to ergonomics to operations."

As technology evolved, we were at the forefront... We have purchased the very best equipment from a safety and compliance standpoint. Our employees here at Bailey and everywhere else are excited about new technology and they embrace it.

The typical longwall panels at the Bailey Complex are 12,000-ft long and 1,500-ft wide. The shearer cuts a 42-inch web (or a 3 1/2-ft cut). The head drive is fully automated and it can push 7 1/2- to 9-ft. "We designed it so the shearer operator can take a double cut in the headgate and push up automatically," Brock said. "As the shearer operator leaves the headgate and cuts toward the tailgate, the crew has about 80 minutes, 40 minutes to the tailgate and 40 minutes back, to advance the headgate." The headgate operator will tram the tailpiece the full distance and then the shearer operator gains another 7 1/2- to 9-ft. This goes on all day long. In the course of a day, an 8- to 10-hour shift, a longwall would typically retreat 22 to 26 ft.

An average longwall move for CONSOL Energy takes nine days. Brock said it takes about a day to move 150 ft of equipment. "We are fortunate enough to have spare sets of shields and a panline at Enlow and some spare shields for Bailey," Brock said. "So, as long as gate development stays on schedule, we will set most of the new longwall in place prior to the other longwall cutting out. Many of our longwall moves are simple walk-across moves. Sometimes, we have to set 100 to 150 shields. If a face

has 240 shields, only setting 100 or 150 shields makes the move easier."

They move the longwall with diesel-powered equipment. "It eliminates trolley wires and the risk of batteries grounding out," Brock said. "We buy the very best diesel engines on the market, running Brookville locomotives with 25-ton Deutz motors manufactured by Chrysler-Daimler. They have more power and the operators love them."

The headgate is the nerve center for the longwall, but a problematic tailgate can bring the best longwall to its knees. "Tailgate support is huge at the Bailey Complex and we do a great job with pumpable cribs," Brock said. "We use them in the bleeders. It's extremely important to keep that area supported because our examiners travel it weekly and it optimizes the flow of ventilation. We also have to maintain a ventilation split on the tailgate.

"Over on the headgate side, which is the tailgate for the next longwall, we set one block of can supports and then we blanket the block with 2 to 3 inches of rock dust," Brock said. "Then, for the next longwall panel, the tailgate is fully supported and 80% rock dusted."

A lot of supplementary support is installed for the headgate on development. Each of the intersections has 16- to 20-ft cable bolts. A cable bolt is installed in the center of the roof strap on every other row in the belt entry. The walk-side rib is meshed, which protects the headgate operator.

Brock believes automation will play a greater role in both the longwalls and the continuous miner sections. "A fully-automated face might be possible, but we would not remove the entire human element," Brock said. "Miners would be on the face monitoring the system and there is a big difference between monitoring and operating controls. We would want to do the same thing with the roof bolting process in the sections."

Keeping Development Ahead of the Longwalls

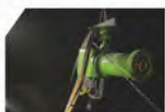
The Bailey mine has eight continuous miner sections. They are developing two gates for each longwall (or four total) with four miners sections cutting the mains. For the mains, they are using the Joy 12 CM full face continuous miner. In the gate development sections, they are using Joy and

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Continued from pg. 23...

now,” DeJuliis said. “It’s gotten us to a new level of performance. Getting people to accept that exceptions are not inevitable within this industry has a big cultural impact. To get to the next level—Absolute Zero across the company—technology is going to be the driver. Continuous improvement, especially the use of new technology and training, will be the bridge needed to push out top two values.”



“Many leaders in CONSOL Energy look at the company today and its expectations as far as safety and compliance, and think about where they were in the past, and they will say there is a night and day difference between then and now,” DeJuliis said. “We hear it a lot, but then one has to wonder what it will look like for the next generation.”

The namesake for the Bailey mine, Conoco Chairman Ralph Bailey said some similar things when he broke ground on the mine in 1984. He was an executive from a prior generation that had the foresight to build the Bailey Complex, DeJuliis explained. “Similar to CONSOL Energy CEO Brett Harvey today, he had a vision for a future generation,” DeJuliis said. “Once they define the goal, they have the ability to enable and facilitate at team to realize that potential. Mr. Bailey’s expectations were consistent with what we are seeing today. As great as the company is performing today, Mr. Harvey has expectations for the future that are substantially different and better than what we are doing today. We will achieve that sooner rather than later with the team and tools we have in place now.”

CONSOL Energy is one of the better-performing, publicly-traded mining companies and DeJuliis also has to convey this

message to Wall Street investors. The company takes a very long-term view and short-term investors tend to question major capital investments. “We could reduce capital expenses and get better cash flow metrics from operating assets. That approach would work for a while, but we didn’t build a 150-year-old company by worrying about the quarter or the week,” DeJuliis said. “We are reaping

rewards today of investments made decades ago.” A 30- to 40-year vision is an exception for a publicly traded company.

There is constant discussion between shareholders as far as long-term accretive, profitable investments vs. the short-term impacts of the investment, DeJuliis explained. “Other shareholders, call them value investors or buy-and-hold investors, are more in tune with those investment decisions,” DeJuliis said. “Whenever a company discusses a major investment decision, it’s challenging to keep investors focused on why the short-term investment drives long-term value. There was a similar learning curve with the value system.”

Investors are beginning to understand the importance of safety. Many coal investors have learned the hard way recently what happens when priorities are placed above values. Savvy coal investors now look for the mining companies with the best safety performance.

“When we meet with shareholders and discuss our core value system and why that correlates to the best performing entities from a financial perspective, they get it,” DeJuliis said. “If you look at any industry where there is a possibility of people getting injured, the best in class in

Continued on pg. 30...

Sandvik continuous miners. The continuous miners are supported by Joy 10SC shuttle cars and Joy 14 BU loaders.

Each continuous miner advances 300 ft in the same entry. The operators cut coal, dump it on the ground and bolt as they advance. Behind the continuous miner, loaders gather the coal and fill the shuttle cars. The continuous miners cut coal independent of shuttle car availability.

Bailey is testing the new Sandvik MB610 continuous miners. “We have spent a lot of time working with Sandvik,” Brock said. “We sent our team to Austria to see the machine and we implemented some design changes. The technology is unbelievable. The machine is doing well. It has a fully-automated cut system. It won’t bolt hands free yet. We are pushing Sandvik on that. It has an LED display that depicts the cutterhead in the cycle as it sumps, shears down and retracts. It also has a remote camera to view the offside of the machine. This is critically important because the 610 is a bigger machine, and it enhances the operator’s vision on the offside of the machine.”

Occasionally the sections encounter soft bottoms or other adverse conditions. If the continuous miner is leaning, the miners would have to use cribbing and jacks to level it and start mining again. CONSOL Energy engineers requested Sandvik install four jacks on the machine, one on each corner. With remote control, the continuous miner operator can now lift any of the corners.

Brock also likes the stab jack. “In soft bottoms, we can advance 4 ft without using the crawler pads,” Brock said. “The cutting cycle is completed. Then the operator trams the machine forward without the stress and vibration. The cycle is repeated. Our goal is to complete that cycle in 6 minutes. Bailey has had runs of more than 300 ft per shift with that machine.”

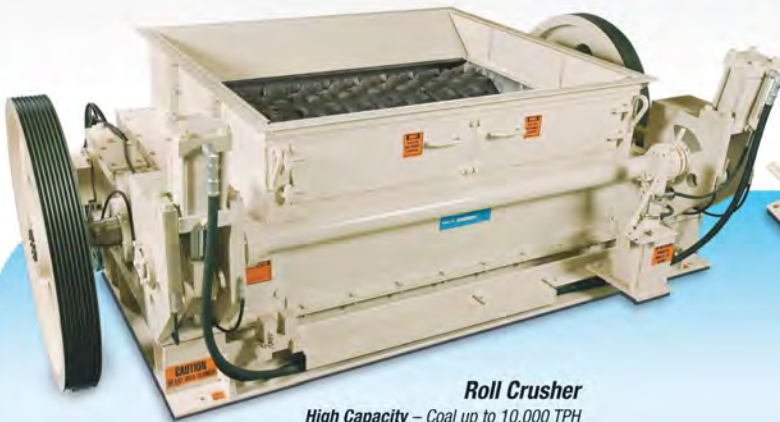
The continuous miner section has a miner operator, a tube man (handling ventilation), two bolter operators, who are satellite bolting, and another miner behind them rib-pinning. “We are not required to by law, but we rib pin everywhere,” Brock said. Within that one 6-minute cycle, two 8- to 12-ft roof bolts are installed on the outside of the roof strap, along with two rib pins installed with a pie pan or a 4-ft T3 channel.

The continuous miner sections use a Fletcher center bolter that tilts to bolt and

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those industries are the safest and most compliant companies. That's true for manufacturing, steel, power plants, chemicals, coal mining, and natural gas exploration and production."

What worries DeIuliis the most is society's disconnect between the reality of what the coal industry brings to the table for society and the politically correct view of the industry. "The degree of the disconnect is amazing," DeIuliis said. "Are we perfect as an industry? Certainly not. Have we made mistakes in the past? We have. Are our best days with safety, compliance and continuous improvement in front of us as an industry? They are."

"To see this industry attacked and maligned to the extent it has is very disturbing on a personal and professional level," DeIuliis said. "Middle America gets it, but the people living on the coasts do not. A lot of people live in New York, Washington and Los Angeles, which are all powered by coal and other fossil fuels, and they have been misled about energy."

"This is a noble industry and what we do matters," DeIuliis said. "If we do not accomplish what we need to get done, regional economies, this country and the global economy will suffer greatly. We provide a standard of living for the developed world that is second to none—the best it's ever been in the history of human existence. For the developing world, we hold the key to getting the 3 billion people who need access to the reliable, inexpensive electricity they need to improve their quality of life."



The new CNX Center in Canonsburg, Pa.

mesh the ribs. They also have the tilt bolters on the continuous miners. Bolters have also been mounted on the loaders. "While the shuttle car is tramping to the feeder breaker, we can install a few center bolts," Brock said. "That's a huge advantage. Some areas, especially when you are cutting a longwall set-up face, can be 22- to 26-ft wide. When it's wide, we can only cut 40 ft and then we have to bolt 40 ft. With the loader, we can continue to put those bolts up. We have five of these units in operation now and we are expecting to get three more later this year."

New Technology Underground

Discussing some of the new recent regulations, Brock explained that safety at CONSOL Energy is not driven by regulations. "We have a moral obligation to our employees," Brock said. "That's how we view safety. It's a process that continues to evolve. Some of the new regulations may be burdensome, and some of them may or may not improve miner's safety. The laws are on the books and we will comply with them. Our culture is not one where we improve safety because of new regulations. We are doing it because it's the right thing to do for our employees."

Nonetheless, all underground coal operators have had to contend with new regulations such as new communication systems mandated by the Miner ACT. "When the requirement for everyone to carry a radio first came out, we wondered how we would deal with this," Brock said. "Well, we managed through it and our mines are better for it today. In addition to safety, it's a great management tool. We can talk to any individual in the mine now using our radios. Not long ago, we would be pulling belts or moving a shearer, miners would attempt to communicate with each other with their cap lamps. Today, the operator has hand-held radio and he's driving a machine with the very best diesel engine. They say pull forward 10 ft and he can pull forward 10 ft."

The Bailey Complex is using a leaky feeder system with handsets and tracking devices on the miners. "It's unbelievable how well this system is working," Brock said. "We know where all of the miners are located all of the time."

Proximity detection technology is currently being tested on most of the equipment at one of the sections at Bailey. "We have it on scoops, shuttle cars and load-

ers," Brock said. "We want to get a system in place as soon as possible to protect our people. Unfortunately, we have discovered some issues and are working with manufacturers to develop the safest system possible for our employees. These systems still need to be approved by MSHA."

Proximity detection is a delicate balance, Brock explained, because "you want to give the operators room to work, but you want to protect them as well. If these systems work the way we expect, we could prevent people from entering the red zone. We would effectively engineer out mistakes made by employees."

The Underground Mine Academy at BMX

The Bailey Complex employs 1,500 miners. According to Brock, finding miners is not difficult, finding experience miners is. CONSOL Energy finds itself training a lot of inexperienced miners. So much so that the company recently completed a \$12 million underground training center at BMX, commonly referred to as the BMX Underground Mine Academy. Located right off the shaft bottom at BMX, it has fully-equipped training rooms with projectors, Internet access and computer availability. Then 600-ft away, it has an actual continuous miner section.

"Right now we are using it to train foreman, but we will eventually begin training inexperienced miners," Brock said. "We will train six to eight miners for a week at a time. We let them operate the equipment, a shuttle car, loaders, center bolters and miners. They use the same mining methods that we use every day. They have to establish ventilation and perform all pre-op checks. It has been a huge success."

CONSOL Energy recognized the need approximately three to four years ago when it began to experience one of the first waves of retiring Baby Boomers. "In 2007, we had 7,500 employees and today we have 9,100. We hire 1,000 to 1,500 employees a year. We are replacing people with 25 to 45 years of experience with people that have zero days of experience."

Brock is confident in CONSOL Energy's ability to attract miners. "We will find miners because a mining job is a good-paying job with great benefits," Brock said. "I call it a single-household job. One parent can work while the other one takes care of the family."



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In The Beginning

1911-1919



Coal Age was launched October 14, 1911, as a weekly publication by the Hill Publishing Co. amid an industry slump with coal prices falling along with demand. Mining coal, beginning after the War of 1812, had become America's first big industry—creating symbiotic relationships with railroads and steel companies and spawning dozens of service companies and vendors. In 1911, coal was the fuel of choice for millions of urban dwellers throughout the crowded eastern seaboard cities—particularly hot burning anthracite with its relative lack of smoke.

Railroads across the nation burned millions more tons in thousands of hungry locomotives, and enterprises like the new U.S. Steel Company and the much more established Colorado Fuel and Iron demanded trainloads of coking coal to forge the steel that built America's infrastructure. Though coal was king in 1911, too many producers were oversupplying railroad, steel and home-heating markets

as the pre-World War I economy was slumping.

The teens were largely hand-loading and shot-firing days, and work in the mines was incredibly dangerous with "accidents" occurring each day and thousands killed every year due to explosions, gas intrusions, floods, cave ins and roof falls. A new industry, each regulation was written largely in blood. As the mines and producers grew in size, so did organized labor. By 1911, the United Mine Workers of America had been struggling for a seat at the table for more than 15 years and organized miners belonging to a variety of unions had been literally fighting coal operators for recognition since the Civil War. As the decade wore on, a series of increasingly bloody strikes led to outright industrial warfare, halted only by the on-set of the unpopular Great War. A brief period of labor peace ensued during the war, but once it was over, demand waned, coal prices fell and operators started trying to cut wages. Labor tried to hold onto its gains and tensions mounted.

The teens were also a period of transition as miners and mining companies both spurred the creation and perfection of a host of new machines and labor saving devices. Both to make the mines safer and to produce more coal with fewer men, steam, diesel and electrically operated loading, cutting and haulage machines were being tested and deployed throughout the industry. By the end of the decade, productivity was soaring and mules were increasingly being sent to pasture.

However, as coal operators battled miners for control of the future of the industry, coal also faced competition from the increasingly powerful oil industry and many progressives hoped and predicted that, in fact, the coal age was coming to an end.

In *Coal Age's* first issue, new Chief Editor Floyd W. Parsons, directly addressed the millions of men then working in the industry and promised them the new publication "will furnish you a schooling that will make it easy to climb

MAIN SOURCES OF WORLD'S FUEL SUPPLY

Country	QUANTITY		VALUE	
	Metric Tons	Increase or Decrease on 1906	Dollars	Increase or Decrease on 1906
United States	448,038,000	+ 40,788,000	554,503,000	+ 22,571,000
Great Britain	268,007,000	+ 2,282,000	517,187,000	- 50,241,000
Germany	217,446,000	+ 2,159,000	413,214,000	- 1,119,000
Austria-Hungary	48,813,000	- 153,000	74,314,000	+ 1,684,000
France	37,840,000	+ 456,000	112,110,000	- 3,197,000
Russia	24,455,000	- 1,448,000	(not stated)	
Belgium	23,518,000	- 40,000	65,775,000	- 8,307,000

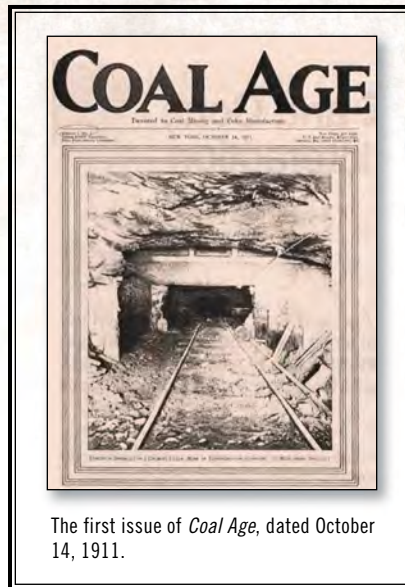
**Coal Age*, January 16, 1912

to better things. Do your part—bear in mind that this journal each week will represent the best efforts of a large corps of experienced engineers; study the matter presented and you will find at the year's end, the time consumed will be well employed."

Parsons and Hill Publishing hoped to reach a wide audience throughout the entire coal industry. "This is not a paper for miners only, nor is it intended solely for men higher up; each individual can skip all that doesn't interest him, and still have plenty to occupy his time and thought... With your cooperation, we will be instrumental in putting the industry on a higher, safer footing... We will be around to see you and talk with you, time and time again; no plant worth visiting will be overlooked, and if you have anything to show, whether far or near, just send us word." Hill merged with McGraw in 1917.

Despite the fact that coal production in the United States had nearly doubled in the decade since 1900 to more than 500 million tons or 40% of world production, coal's future was still being doubted. In a January 6, 1912, editorial Parson's wrote: "We've heard for years that our summers are getting hotter and our winters milder, but the mercury makes a new low record for some particular day each year; most every fortnight someone discovers that electricity will furnish all needed heat as well as power, but he forgets to tell us how he's going to generate electricity without burning coal... still consumption increases, and it's safe to con-

clude our children's children will be using more coal in their homes and factories than we ever dreamed could be mined. The pendulum is still swinging—a new year and likely a new era have dawned."



The first issue of *Coal Age*, dated October 14, 1911.

By 1909, the United States had already become the world's largest coal producer. Churning out more than 418 million tons, our mines were 35% greater in output than Great Britain's 268 million tons and second worldwide. Germany was a distant third at only 217 million tons. Though the U.S. was a production leader, its safety record lagged. The death rate per thousand persons employed was 3.35, over twice that of the U.K. This was certainly due in part to the meteoric rise of the U.S. coal industry

since the end of the Civil War in 1865. By 1900, the U.S. was beginning to produce almost half of the world's total coal consumption. From 1906 to 1911, railroads rapidly opened up new coalfields in Virginia, West Virginia, eastern Kentucky as well as Illinois, Utah and Colorado. In Illinois and the Pittsburgh seam coalfields, mechanization and new technologies allowed deep mining to quickly advance. In just that half decade alone, more than 3.5 million U.S. coal miners increased production by over 40,788,000 tons—a nearly 10% jump. But in just those five years, almost 14,000 coal miners lost their lives and fatality rates were rising.

In the January 18, 1913, issue, internationally-acclaimed statistician for the Prudential Insurance Co. of America, Frederick Hoffman, published some of the first statistical information about mining fatalities. In an era when the newly created Federal Bureau of Mines was struggling to establish a methodology to accurately create and publish these vital figures, Hoffman complained that gathering such information was "a difficult and discouraging task." Having "first commenced the tabulation of coal mine fatalities in 1897 at the request of the late editor of the *Engineering and Mining Journal*, Richard P. Rothwell," Hoffman found that "some of the coal mine inspectors are indifferent to the requests made to them for information, and in other states the law prevents the publici-

(TABLE I)
NUMBER OF PERSONS KILLED IN THE COAL MINES OF NORTH AMERICA, 1901-1910

	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1901-1910
Alabama	41	50	57	81	185	96	154	108	129	238	1,142
Colorado	55	73	40	89	60	88	99	61	99	319	983
Illinois	99	156	157	199	199	155	165	183	213	406	1,832
Indiana	24	24	55	34	47	31	53	45	50	51	414
Iowa	27	55	21	31	24	37	35	38	28	39	335
Kansas	10	30	36	16 (a)	36	30	52	31	35	25	301
Kentucky	21	19	25	19	31	40	32	40	33	84	344
Maryland	12	11	16	12	16	13	5	12	19	17	133
Michigan	6	6	7	7	8	6	7	6	9	6	69
Missouri	15	10	17	11	11	16 (b)	8 (a)	10	21	16	135
Montana	7	12	5	9	8	13	14	21	12	13	114
New Mexico	9	17	17	15	5	9	31	34	18	14	169
Ohio	72	81	124	118	114	126	153	112	115	162	1,177
Oklahoma	44	60	33	30	44	39	32	44	23 (b)	48	395
Penn. anthracite	513	300	518	595	644	557	708	678	567	601	5,681
Penn. bituminous	301	456	402	586	479	477	806	572	506	539	5,074
Tennessee	44	226	26	28	29	33	31	34	31	38	520
Utah	9	8	7	9	7	7	8	8	16	15	94
Washington	27	34	25	31	13	21	37	25	39	43	295
West Virginia	134	120	159	140	194	269	356	625	364	320	2,681
British Columbia	102	139	42	37	12	15	31	18	57	28	481
Nova Scotia	14	19	31	19	20	28	35	39	33	31	269
Total	1,586	1,849	1,820	2,027	2,186	2,106	2,852	2,744	2,417	3,051	22,638

(a) Six months only.
(b) Eight months only.

* *Coal Age*, January 16, 1912

ty of the required facts previous to the publication of the official report.” His published figures show a terrifyingly swift increase in deaths—with the previous five being the bloodiest. But thankfully 1911 was a much safer year than the year before, only 2,555 deaths vs. 3,051 fatalities in 1910.

Though both production and fatality figures would fall throughout the first part of the teens, with the on-set of the Great War and the rapid industrial expansion and production increases needed to supply the Great Powers, casualties in the mines sometimes exceeded those on the European battlefields. The war years of 1917 and 1918 each brought new records of production. 1918 production grew by more than 6% year-on-year to almost 690 million tons. However, while praising miners for their role in the emergency that existed, Parsons warned that “the year that has just passed proved conclusively that in time of crisis, the ability of American miners to produce fuel is greater than the ability for our industries to consume it.” Though production cuts were necessary, Parsons wrote that exports should be the new goal, particularly since “due to the war, Europe is minus the labor of 20,000,000 men killed or disabled. America today is not only the richest nation on earth but the greatest storehouse for raw materials that exists anywhere.”

Regional Surveys, Railroads and New Underground Technologies

Beginning with the first issue, *Coal Age* began detailing the “present” of the industry, delivering a “snap-shot” through its editors’ collective lens, so to speak. The article “Anthracite and Bituminous Mining” in the debut issue examined the long history of former and showed how bituminous was fast ascendant. After detailing anthracite’s long history of production in eastern Pennsylvania, the article compared the methods used in both types of coal, suggesting that “in some cases, the northern anthracite field might copy the methods of the bituminous regions,” wrote author Eli T. Conner, a Philadelphia mining engineer. After detailing the history of the anthracite fields and the mainly Englishmen who developed the early works, he advocated for the adoption of the British longwall mining

system which, for a variety of reasons, had yet to be widely used in the region. He concluded, “anthracite managers would find it beneficial to investigate more carefully methods of mining and transportation that have been found economical in thin bituminous beds of coal. The enormous increase in the amount of coal produced by mining machines in the bituminous fields in recent years showing the steady improvement in apparatus and methods” suggest that to stay competitive, anthracite managers would have to learn from their new competitors to the west.

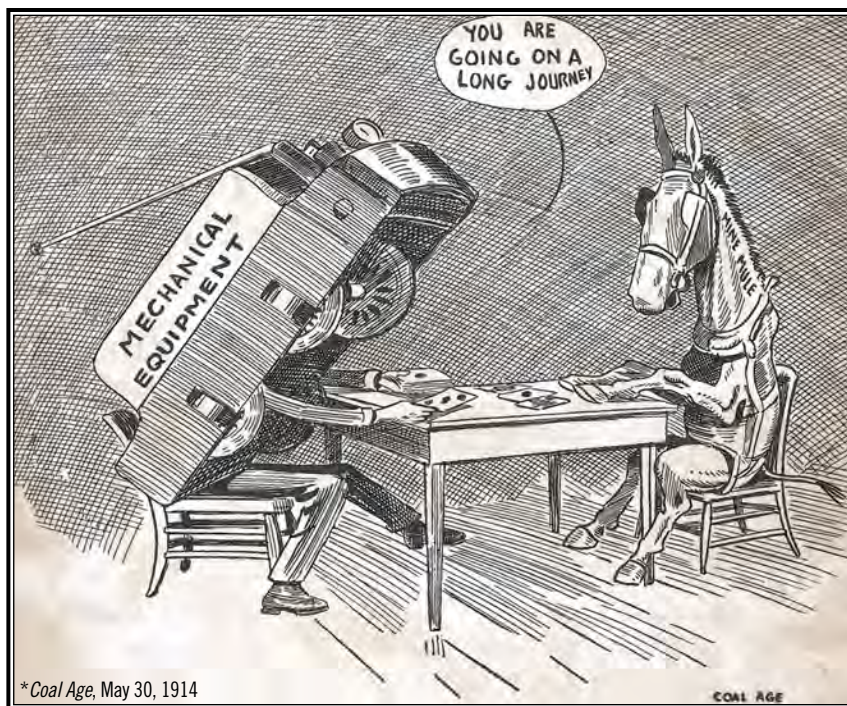
In November 1911, future Editor-in-Chief R. Dawson Hall published a survey of the prodigious northern West Virginia Fairmont coal region where “the Pittsburgh coal is so even in quality and continues so unerringly wherever the surface has sufficed to cover it that where it occurs it is rarely possible to make out separate geologic areas unless we are willing to discuss very large bodies of coal.” Located along a diagonal line stretching northeast to southwest with Fairmont in the center, the coalfields to the west of this fault had, over the previous 40 years, become one of the biggest producers for Pittsburgh’s Consolidation Coal Company, the predecessor of today’s CONSOL Energy. “The Consolidation Coal Company so completely dominates this

region that a description of the methods and developments of that company is virtually a description of the district,” wrote Hall.

In 1910, West Virginia produced more than 60.5 million tons, most of it still produced in the north of the state. Though a highly productive region, mines in the Fairmont area were plagued with high concentrations of explosive gas that had been and would continue to be the source of much tragedy. But as Hall reported, “every precaution is being made to remove the natural-gas menace and I do not know a place where the methods adopted to protect the mines against leakage from wells have been more carefully considered.”

A well-capitalized and innovative operation, Consolidated mines were already electrified and supplied with their own power plants. To ensure that proper ventilation would continue at all times, Consolidated had also installed large electric fans at its portals and had “a portable fan loaded on a truck ready to be hauled to any of its mines should one of its fans becomes disabled. There is no lack of intelligent foresight being used to prepare for the possibilities of a disaster,” reported Hall.

Consolidated and others had also only recently begun to develop the rich fields of eastern Kentucky. “One of the largest, if not the largest bituminous coal company in the



*Coal Age, May 30, 1914

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world," Consolidated had built the town of Jenkins in Letcher County to help support the mines in the area. The drift mines in the area accessed the 7- to 13-ft Elkhorn Seam. Jenkins was built to be a large and permanent town. In addition to homes, churches, schools and other buildings, Consolidated constructed a "large auditorium seating 500 people for entertainments of all kinds. Moving-picture shows are run regularly during the week. Two bowling alleys and four pool tables are in constant use, and there is also a newsstand, soda fountain, barber shop and showerbaths."

In 1913, *Coal Age* described the growing Harlan County coalfields. First accessed by rail in 1907 by a predecessor of the Louisville

& Nashville (presently CSX), at the time the Harlan seam, the lowest that was commercially workable and most regularly occurring was primarily sought after. But other operators including those of the Wisconsin Steel Co. in Benham were going after the Kellioka, Wallins Creek and Looney seams too. Hall wrote that Wisconsin Steels' mines were "by far the most important in the county" and would be for many decades to come. Another large company town, Benham, was in the process of getting its own YMCA and large hotel. But near town, "all the coal is converted into coke for which purpose they have built 300 ovens of the beehive type, a breaker equipped with two crushers and flight conveyors driven by

motors. All of the coke made in the county at present goes to the steel plants to the Wisconsin Steel Co. at South Chicago." Equipped with "an excellent reputation," the district's coal found ready markets over the L&N to the north and west, and the Southern Railway to the east and south.

Likewise, when the well-engineered Virginian Railway was constructed west from Sewell's Point—just across from Norfolk—through the Blue Ridge mountains more than 400 miles through a 40 mile gap between two already constructed competing railroads, the Virginian line was able to access some of the richest coalfields of southern West Virginia. Now just a section of today's Norfolk Southern, the Virginian opened up vast fields of 14,800 to 15,300 Btu/lb coal "which heat value is not excelled by any variety of anthracite or bituminous coal in any country."

Constructed to ultra-modern standards by owner and railroad builder Henry H.

viding more comprehensive and effective safeguards for the miners as only the beginning of a broad general movement in that direction.

In the matter of conservation, he is inclined to shoulder the greatest responsibility on the consumer. He regards the meager percentage of efficiency obtained from burning the coal as the gravest menace to the principles of true conservation. While conceding that the mining companies are also wasting enormous tonnages, he believes that no concern can properly conserve its coal and remain solvent, without a broad comprehensive governmental regulation of the systems of mining. Even so he is of the opinion that the operators have materially benefited the conservation cause by educating the consumer up to using the finer grades of coal, which have in the past been



ruthlessly scattered along the highways to improve the roadbed.

In some respects the subject of our sketch differs from the usual type of self-made man who tends rigidly to business up to the last gasp and dies with his boots on. Thus we find that he insists on an annual pilgrimage abroad, is an ardent fisherman, an enthusiastic equestrian and as boastful of his presidency of the Hinsdale Golf Club as he is indifferent to like offices he holds in some of Chicago's powerful financial institutions. He is a member of many popular clubs. On the whole, Frank Peabody is a genial, hospitable personage who has a boundless liking for his fellowman and an innate courtesy so entirely unaffected that one is immediately impressed with its sincerity.

He credits his conspicuous success to an infinite capacity for hard work and a faculty of letting the other fellow do the worrying. The most casual observer, however, catches a gleam of other things behind the kindly brown eyes. An alert, questioning, appraising—in fact a "show me" look that makes you feel glad your business with him is legitimate business. It hints of a coldly impersonal and unbiased mind that has, perhaps, intuitively or subconsciously, proved his great mascot.

✽

May 3, 1913

COAL AGE

691

WHO'S WHO—IN COAL MINING

It has been aptly said that some men can do business well. Others can do business very well. A few can do business superbly well. And there be found—at long intervals—an occasional one who can do business so completely well that he has distanced the bunch and stands alone in his chosen field. To this latter select class Francis Stuyvesant Peabody seems to belong.

Mr. Peabody was born at Chicago in 1859. His ancestors on one side of the family were Dutch, the other branch English, although the Peabody family has now passed the two-century mark in this country. And it is only fair to say in passing that he comes by the "Stuyvesant" legitimately, his mother belonging to one of the old Knickerbocker families.

After knocking about from "pillar to post" in various of the country's then meager educational institutes, he succeeded in capturing a sheepskin at the Sheffield Scientific School of Yale, in 1881. Thus equipped, he went through the customary painful disillusionment of the cub-graduate, waiting for the world to offer him a position, and finally "getting a job" as railroad messenger. Two years in various capacities as bank messenger and traveling salesman convinced young Peabody of the fallacy of getting rich on a salary; so in the year of 1883 we find him embarking in the coal trade, his sole assets being a team of white mules, an indifferent wagon and a well cultivated taste for cigarettes. But that he has now distanced the bunch and stands alone, even his most bitter rivals cheerfully concede.

To understand the man it is necessary to study the environment and conditions under which he waged his successful battle with life. It is a well known fact that most of the leaders in the coal industry today came up from the operating end, but Mr. Peabody is an exception in this respect, having made his *début* in trade circles. His broad knowledge of the producing end of the game has been acquired entirely in the hard school of practical experience; that he was an apt student one has only to compare the photo of his maiden effort, the "Old slope" mine (shown on next page) with any of the present-day efficient and high-powered Peabody operations.

The merciless competition which has characterized the past history of the coal business in Illinois does not seem to present a very inviting prospect. But when Frank

Peabody became a power in that field he performed a service for the industry that it can never repay. He brought together contending interests and abolished intrigue and secret methods of doing business that threatened ruin to the contending principals and effectually discredited the industry in financial circles.

Previous to this time price-wars of the most reckless sort were precipitated

upon the slightest pretext, or no pretext at all, while the trade was surfeited with irresponsible adventurers and business integrity was rapidly diminishing into an unknown quantity. Obviously a legitimate enterprise could not exist in the face of such conditions, and it remained for Mr. Peabody to set up new standards and inculcate new principles into the trade. He attacked the job with his usual indomitable enthusiasm and gradually inaugurated a new era in the Chicago coal trade—rejuvenated it and gave it a new vigor and a new strength. One of the tangible evidences of his labors was the formation of an association which collected some two hundred thousand dollars in bad debts from scheming consumers and unscrupulous small dealers.

Frank Peabody is a radical optimist of the most pronounced type. We endeavored to impress him with the grave possibilities of labor's latent brute power of passivity. We called his attention to the alarming prognostications of our most eminent authorities on economics regarding the concentration of enormous wealth that is being effected by the modern interlocking directorates. In fact we bombarded him with a perfect broadside of the subtle innuendoes of the present-day alarmists, but without avail. In every case, he stoutly affirmed these were but temporary problems that would automatically solve themselves in due time and prove stepping-stones to higher and better things.

The coal industry itself knows the man as a consistent altruist and a conservation enthusiast. On his periodical visits to the mines he is more apt to inquire how Bill Jones was killed up in the Tenth North air course last month than why the cost of haulage on the Main West increased three cents. The humanitarian aspects of the mine-workers commands his first interest and he was among the first to adopt the modern slogan of "safety first." He regards the recent legislation in Illinois, pro-



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Rogers, the Virginian accessed a virgin field of more than 20 billion tons of New River Coal, “without doubt the best steam coals in the world.” Coal from this region of southern West Virginia quickly became the fuel of choice for the U.S. Navy, one of the reasons why Norfolk and Newport News became a military center. But in 1912, when Parson’s traveled to the region, though the area was bursting with opportunity, he warned that consolidation was necessary. “The hope of the coal industry in southern West Virginia lies in the elimination of a shameless, inexcusable and merciless competition that has existed for many years,” reported Parsons.

Railroads marked the dawn of coal mining in Utah too, wrote A.C. Watts in a 1913 piece treating the prodigious mines of Carbon County which, the year before had produced more than 2.75 million short tons, half a million more than 1911. One of these mines, the Castle Gate operation, on the mainline of the Rio Grand Western was not only a large producer, but was where in 1889 “the dangers of coal dust were fully recognized and the sprinkling by hose, the turning of exhaust steam into the mine, the use of electricity in the coal mines of the state and the practice of shooting from the outside of the mine with electricity, after all the men were out, were introduced,” wrote Watts. Only one of the various grades of bituminous coal produced in the region was good for coking, that from the Sunnyside Mines.

Almost every mine in the region was using electricity for hoisting, haulage and lighting. “Reciprocating engines, direct connected to the generators, have been the usual installations up to the last year when turbo-generators appeared in the field. Direct current, of voltage varying from 250-500 is used in the mines, while alternating current of from 2,200 to 4,000 volts is used for transmission lines outside the mines...Room-and-pillar mining is generally practiced. Rooms vary from 18 to 30 ft wide according to mining conditions. Where mining machines are used in low coal, the rooms are 30 ft wide and have two tracks one each side. Pillars between are from 30 to 50 ft thick.”

Like many of the new coal mining communities, “native born” Americans comprised a distinct minority. “Of a total of

4,063 men employed at the mines Americans comprise 35 percent, Greeks 30, Italians 16, Austrians 11, Japanese 3 and Negroes, French, Scandinavians, Swedes and Germans make up the balance or 5 percent,” reported Watts.

☞New Mines in Illinois

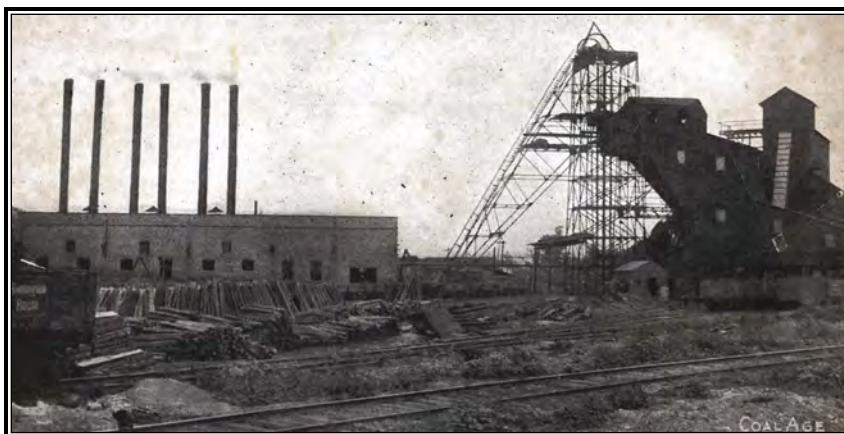
Though new underground mines were being opened up nationwide, the largest capital investments were being made in the Midwestern fields, particularly to extract the large deposits of bituminous coal then being found in the Illinois coalfields. Estimated at between 136.9 and 240 billions tons, in an April 1913 article, author A Bement pegged the state’s reserves at just over 200 billion, qualifying that “Knowledge concerning Illinois coalfields has been derived, not so much from geological investigation, as from engineering experience.” Having extracted more than 800 million tons since the Civil War, in 1911, Illinois produced over 50 million tons from an estimated 16 seams. As technology evolved, the heart of the state’s operations were shifting to the south, particularly to the new deep mines in Williamson and Franklin counties, “the best known, the best advertised and the most spectacular field in Illinois.”

Producing almost 6 million tons in 1910, Williamson County had been producing coal commercially since the 1870s. So reliable were the area’s coal mines that the new Peabody Coal Company decided to invest in several; building its own, Peabody 3, near Marion. According to a 1912 story by Peabody mining engineer M. F. Peltier, Peabody 3 was shipping a 13,000 Btu low sulfur product to Chicago’s new electrical

power plants. “Over 33 percent of the entire tonnage was cut by” the new machines that were rapidly being introduced in Williamson County, reported Peltier. “The mining conditions in general are quite favorable for both picks and machines. In the pick mines, the coal in the rooms is all blasted from the solid with black powder. In the machine mines the undercutting is done in the bottom of the coal, both in rooms and entries. The electric chain breast machine seems to be preferred, although there are a great many punching machines used, which are operated by compressed air.”

Neighboring Franklin County, however, was the site of several mines that over the next decade would become that nation’s largest producers. Mining only began in Franklin County in 1904 when Joseph Leiter acquired 8,000 acres and began constructing the town of Zeigler and the Zeigler Coal Co., that by 1913 was being operated by the Bell & Zoller Mining Co. Though Bunsen Coal Co., a subsidiary of U.S. Steel was the largest property holder at the time, by August 1918, when *Coal Age* staff writer George W. Harris published two features on the region, the Ziegler No. 1 mine was in fierce competition with new Orient mine of the Chicago, Wilmington and Franklin Coal Co.

“If all the 324 commercial shipping mines of Illinois would produce as much coal in a year as the Orient mine did last year, this country would be provided with one-half of the whole amount of bituminous fuel needed to supply 1918 requirements.” Standing on the hill in the center of the company town of Orient, Harris wrote, there “are 14 mines within a radius of about



Zeigler District Colliery Co., Christopher, Ill. Rescreen in rearground on right. **Coal Age*, May 10, 1913

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7 miles which are producing 50,000 tons of coal daily...On November 12, 1917, the Orient mine made its record run (which is also the record for this field) of 5,508 tons of coal dumped in eight hours—this on a single-cage hoist. On the day this writer was at the plant, 4,900 tons were hoisted in eight hours; this coal was loaded by 441 miners, or an average of about 11 tons per loader," world-class numbers at the time.

Harris wrote that the most notable change in mining practices in Illinois was "the adoption of the panel system by the more progressive operators." At Orient, "the rooms are turned on 40-ft centers—18 ft pillar and 22-ft room; they are worked to a depth of 250 ft each panel has 16 rooms on each side of the double stub entry. A pillar of coal 20 ft wide is left between the ends of the finished rooms and the main entries are protected by pillars 150 ft in width. The 16-room panels are separated by 50 ft of solid coal." Orient's coal was cut "by 35 Sullivan shortwall mining machines. The Sullivan Machinery Co. of Chicago, Ill., states that the use of mining machines in the United States has advanced from 545 machines in 1891, when 6,211,732 tons (or 6.66 percent of the entire output) was won by machines to 16,198 machines in use in 1911 (the latest year reported), in which 283,691,493 short tons (or 56 percent of the total production) were mechanically mined." Note that by 1918, at the time Harris was writing, that number was

much higher as mechanization would become dominant by 1920.

☞Surface Mining: Electric Shovels vs. Draglines

While the new Ziegler No. 2 mine yard was being built using a Marion steam shovel and a Bucyrus dragline, surface mines in Kansas and around the nation were experimenting with steam and electric machines made by both producers to uncover, hoist and load coal from shallow deposits.

In the January 4, 1913, issue, *Coal Age* reported on stripping operations in the coalfields of southeast Kansas being performed by the world's largest steam shovels yet in operation. "There are now working in the district about 20 shovels, having an average dipper capacity of about 3½ cu yd. The most spectacular work is being done on the land of the Central Coal & Coke Co., where there are two firms near together under contact. One of these is now erecting the third of three Bucyrus shovels and the other has just completed the second of two Marion shovels. Shipped out in nine cars, it took three weeks time to erect the Marion shovels, but it was worth it. Welding a 5 cu yd dipper capacity and a 90 ft boom, these two machines were larger than their Bucyrus competitors that only had 3½ cu yd buckets and 75 ft booms."

Neither of the booms on the Marion shovels turned independently, "but the upper frame carrying the machinery rests on 45 12-in. rollers. The Bucyrus shovels are

mounted in a similar manner and this fact makes it unnecessary to turn the shovel at the end of the cut. Author C.M. Young reported that one Marion machine "has excavated a pit 92 ft wide and 24 ft deep, piling the excavated earth on the top of the bank at one side. This gives an idea of the magnitude of the machine." Though smaller, the Bucyrus "3½ yd shovel, removing 20 ft of overburden, will uncover about 6,000 tons per month of coal 3 ft thick." That was state-of-the-art in 1912.

Six years later in the February 16, 1918, issue, L. W. Nickel, serving in the U.S. Navy at the time, filed a report on the electric control of a dragline excavator. After reviewing a recently installed machine at the Locust Mountain Coal Co. in the anthracite fields near Shenandoah, Pa., Nickel concluded that the dragline possesses "certain obvious advantages over the steam shovel...electrical driving permits operation with fewer men and insures against delays arising from cold weather." The excavator in question was stripping a coal bed of 14 to 30 ft in depth. "With the dragline in position, it is possible to take a cut 150 ft in width. Spoil banks are always dropped on the surface which does not contain coal; that is the excavator is always placed directly over the vein and is followed by a steam or electric shovel. The dragline method of stripping has been found to be much cleaner than any other, as no rock or dirt is spilled on the coal when once it is cleaned."

Also, an electric machine required smaller crews in comparison to a steam shovel: "no fireman, coal passer or pipe man is needed...The only labor required for the operation of this machine is the dragline operator, an oiler and a few men in the pit." The dragline Nickel witnessed in operation had "a turntable 24 ft in diameter, a 150-hp hoist motor and a 75-hp swing motor. The turntable consists of 40 open hearth steel rollers revolving between two 90-lb rail circles, 24 ft in diameter, one attached to the bottom of the revolving frame and one to the top of the base." The machine was able to strip 256,710 cu yds at an average cost of 4.23c per cu yd, Nickel wrote.

Toward the end of the decade in May 1919, S.B. Creamer of Cambridge, Ohio, reported on the steam and electric shovels then in operation at an unnamed Ohio



Photograph of the world's largest steam shovel on a stripping operation in Kansas. **Coal Age*, January 4, 1913

mine. "These shovels are massive machines of the revolving type, weighing approximately 350 tons with 80 to 90-ft booms; they dig a cut 100 to 125 ft wide and place dirt 145 to 165 ft from the digging face...Each type has its advantages, but much depends upon local conditions in determining the power to be used. The steam machine has had a preference. However, the electric type is gaining in favor."

Though the electric machine required fewer men to operate than the steam shovel, the new and somewhat fragile electric machine could only be operated at one speed and had a more limited power range. "It is impossible to speed it up as in operating the steam machine. When there is an overload, as there often is in pulling heavy stones, an increase in power above the capacity of the machine cannot be provided for at the electric control as is often done at the steam throttle. The manufacturers arrange for a fuse to burn out instead...The great advantage with the steam coal-loading machine, as with the "stripper" is its great flexibility."

☞ The Electric Lamp, Safety, Mine Rescue and the Canary-Mouse Debate

In the December 9, 1911, issue *Coal Age* weighed in on the long running debate about whether a mouse or a canary would serve better for measuring the safe resistance of a man to carbon monoxide poisoning in mine rescue and recovery work after an explosion or a fire. According to the article, "the mouse still has its advocates but its marked tendency to sulk in the corner of the cage in which it is carried makes it difficult to tell whether its inaction is due to atmospheric causes or fear. The canary, on the other hand, is a restless bird...it is never still, unless sick."

With a resistance to carbon monoxide at only 1/20 part of a normal man, a mouse couldn't possibly be of any real help. Thus, concluded the author, "the canary is the best of indicators...Though the canary be regarded as an inadequate standard of resistance, no brief is held for any other bird or mammal." However, *Coal Age* warned that "to continue to advance beyond the point marked by the collapse of the bird is to submit oneself to unknown hazards. But because the indication furnished by the

canary is so inadequate, it will always be customary for bold men to disregard warnings and go ahead braving conditions, of the nature of which they know nothing."

As early as July 1912, *Coal Age* reported on the introduction and progress of the electric lamp in the mines. "The question of a safe, suitable light for the miner to aid him in his underground work has always been a grave, though much neglected problem," the unnamed correspondent wrote. Breakthroughs in battery storage technology leading to the Hirsch Storage battery had led to the widespread use of the new electric lamp. At the time there were "in use in the anthracite field alone nearly 4,000 portable lamps of the Hirsch type." Direct current from the ordinary mine-haulage electric circuit could be used for recharging. "The electric lamp is highly appreciated in dry portions of the mine, where there is danger of fire, such as stables and other underground buildings...From an economic standpoint alone the electric lamp is bound to demand an increased usage. A naked light will cost a miner from 30 to 40 cents per week for oil. This same weekly amount will cover not only the cost of the maintenance of the elec-

tric lamp, but also the interest on the investment," concluded the author.

However, only in 1913 did the U.S. Bureau of Mines grant approval for the use of self-contained portable electric mine lamps. "Since that time, however, the application of these lamps has increased materially, and today they have become a very important factor in providing light for gaseous mines," wrote author H.O. Swoboda, a consulting engineer from Pittsburgh in the July 21, 1917, issue.

As early as November 4, 1911, *Coal Age* published feature stories on mining safety and innovation. In that issue, the magazine published a piece about mine safety demonstration and tests then under way at the "inadequately housed" Bureau of Mines. Located at the time at the Pittsburgh Arsenal, reporters and dignitaries watched various mine rescue and first aid demonstrations followed by speeches and presentations. "Somewhat belated, occurred the address of welcome of the director, Joseph A. Holmes, which was delivered at the rear of the Arsenal." The new Bureau was working to determine how to mitigate explosions, the effects of coal dust, and myriad other problems plaguing the industry.

New technologies were being explored and advanced for mine rescue, in particular for the self-contained breathing apparatus. Only by 1912 had the point been reached where "the apparatus could be considered as of any practical value to the mining industry." Early experiments were mixed with the best developments being conducted in Germany in 1903 by Heinrich Draeger. Working from a device created by the chief of the Berlin Fire Department in 1899, the elder Draeger was able to develop the "first really efficient heavy working rescue apparatus." In 1904, Bernard Draeger, Heinrich's son, conducted underground trials that led to the adoption of the design throughout the industry and "it was used in almost every mine accident and a great many mine fires during the period between 1904 and 1909."

In 1910, the Draeger apparatus was further improved. "A more flexible helmet was provided, insuring a comfortable fit on any shape of head" along with other improve-

Safety First

BY BERTON BRALEY
Written expressly for *Coal Age*

Too long we've dared the firedamp's breath
And chanced the dusty air,
Too long we've sent good men to death
Through lack of thought and care;
Too long our sense of caution slept,
We blindly drove ahead
While children wailed and women wept
In sorrow for their dead.

Master and Man must share the blame
For all those blunders past,
For many a holocaust of flame
And many a deadly blast;
But we have come, at last, to see
How carelessness was cursed,
And from old haste and greed set free
We think of "Safety first!"

For men are worth far more than coal,
And carelessness is waste,
And we have paid a fearful toll
For heedlessness and haste,
Where once we thought that life was cheap,
We know that life is dear,
And more and more we strive to keep
The way to safety clear.

So we have trained our rescue corps
To serve in time of need,
To help and save—but, what is more,
We're learning to take heed,
To face no risk we need not take
Lest death about us burst,
And always, everywhere, to make
Our motto "Safety first!"

ments. "The apparatus was designed with the idea that it might be put into service much quicker than the older model," though some tweaks were added throughout 1911. Through August 1914 and the outbreak of the World War I, more than 8,000 different self-contained breathing apparatus units of differing designs had been installed in the U.S. for mining work. However, little of this technology with being developed in America, and, as Europe slid into war, the Federal Bureau of Mines and others were forced to develop technologies at home. None of these were as affective as the Draeger units that were immediately in high demand following the end of hostilities in late 1918.

☞ Labor: The Road to Industrial Warfare

Nineteen weeks into publication, *Coal Age* attempted to strike a neutral position on the subject of organized labor. In the February 17, 1912, editorial titled "Where Do We Stand?" the editors boldly stated: "Treading on what is supposed to be dangerous ground, we wish to assert right now that we are not opposed to Unionism when labor is organized on a sane basis and conducted for the good of the majority... However, we abhor those leaders who are traitors to the cause of the men, and who grow fat on the sufferings of a misguided and trusting body of fellow-workmen."

That stance was to be tested throughout the decade and particularly into the 1920s as labor actions grew into more violent bouts of industrial warfare. Beginning with the Cabin and Paint Creek strikes in West Virginia in 1912-1913 and in particular the Ludlow Massacre in April 1914, *Coal Age* took readers to the front lines, and presented readers with an accounting of the battles being fought for worker rights and safety. But beginning with the declaration of war in 1918, criticism of both the war and agitating against increased production was deemed illegal. Many union organizers were jailed and *Coal Age's* editorials took on a propagandist bent.

The terrible details of the Ludlow strike and the violence that ensued clearly galvanized the editors and readers throughout the

May 31, 1913 COAL AGE 847

WHO'S WHO—IN COAL MINING

There are few instances in which the careers of ambitious hard-working men of limited means and education stand out as strongly for the uplift of their fellow workers as does that of John Mitchell. The plain unvarnished tale of his forty odd years of life is an inspiration to loyalty and devotion to a noble cause.

John Mitchell was born, of Irish parentage, in Braidwood, Ill., Feb. 4, 1870. He was left an orphan at an early age, and when ten years old went to work on a farm; at thirteen he entered the mines at Braidwood, and from that time until his twenty-sixth year he was employed in the coal mines of Illinois and in those of several of the Western states, which his desire to see something of the world led him to visit. In 1892, Mr. Mitchell returned to Illinois and was married to Miss Catherine O'Rourke, of Spring Valley.

As early as 1885, he had joined a Local Assembly of the Knights of Labor, and from that time on his entire sympathies were enlisted in behalf of organized labor. John Mitchell's education, in so far as it can be measured by actual school attendance, was meager; he read with interest, however, many of the standard works on sociological questions, and by study at night endeavored to overcome the handicap which his lack of opportunities produced. He became president of the Local Assembly of the Knights of Labor; and upon the formation, in 1890, of the organization known as the United Mine Workers of America, he identified himself with that body.

Mr. Mitchell was, successively, secretary-treasurer of the Northern Illinois subdistrict of the United Mine Workers of America; member of the legislative committee of the Illinois miners' organization, member of the state executive board of that organization, and finally was appointed national organizer for the United Mine Workers of America. In 1898, he was elected national vice-president, and that same year, upon the resignation of the president of that organization, he was appointed acting president, being later elected to that position, in 1899. He was unanimously reelected each year until 1908 when, on account of seriously impaired health, he declined to again become a candidate for the office. Mr. Mitchell's first official connection with the American Fed-

eration of Labor was in 1898, when he was elected fourth vice-president; he was unanimously reelected to that position the following year, and in 1900 was elected second vice-president, to which position he has been reelected each year since that time.

When Mr. Mitchell was made president of the United Mine Workers of America, that organization consisted of 43,000 members; and when he retired from the presidency, it had a membership of more than 300,000 mine workers. Aside from its enormous increase in membership, the achievements of the organization regarded by Mr. Mitchell as of the greatest moment are the great advance secured by joint conference with the coal operators, in 1900, when wages of bituminous-mine workers were increased 21 per cent.; the increase of 24 per cent. in the wages of the anthracite-mine workers, secured as a result of the successful strikes of 1900 and 1902; the establishment of the eight-hour workday in central and western Pennsylvania, Ohio, Indiana, Illinois, Michigan, Iowa, Kentucky, Alabama, Missouri, Kansas, Arkansas, Oklahoma and portions of Tennessee and West Virginia.

At present Mr. Mitchell is a member of various nonlabor organizations for the study of social and industrial conditions and for their betterment, namely, the National Child Labor Committee; the American Academy of Political and Social Science; and the American Association for Labor Legislation. He was a member of the New York Commission on Workmen's Compensation, and is the Trustee representing Labor on the Nobel Peace Prize Fund—the Foundation for the Promotion of Industrial Peace, which Theodore Roosevelt gave to be devoted to the promotion of industrial peace.

In the summer of 1908, Mr. Mitchell was strongly urged to become the democratic candidate for governor of Illinois, as well as to be a candidate on the same ticket for vice-president of the United States. Politics has never attracted Mr. Mitchell, however, and he declined, in both of these instances, to become a candidate. He then moved to New York, and became actively identified with the National Civic Federation, as Chairman of the Trade Agreement Department of that organization. Mr. Mitchell terminated his connection with the National



JOHN MITCHELL

Civic Federation in March, 1911, because of an unfounded prejudice of the United Mine Workers organization in respect to the work undertaken by the National Civic Federation; thereby proving his great loyalty to the rank and file of the order with which he was still identified. Mr. Mitchell has maintained his membership in the United Mine Workers of America, and has never lost his keen interest in the mining industry, in its affairs, and the men engaged in it, whether as miners, operators or otherwise. For the past two years, Mr. Mitchell has been on the lecture platform; he has spoken in practically all the large cities of the country, and in a large number of the smaller cities, and has addressed many Chautauqua assemblies.

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spring of 1914. The magazine ran a "Colorado Strike" section for several issues along with first hand accounts, legal documents and dozens of images—many taken at the front. "The disturbance in Colorado has been permitted to grow until, no longer a strike, it has assumed the proportions of a war. Probably 87 persons have been killed and at least nine plants have been burned. The state militia is without pay and consequently campaigning is hampered. Both northern and southern Colorado is affected." Even after U.S. troops entered the field, mass violence continued throughout the state as enraged miners fought operators near Boulder, Denver and Trinidad to the south.

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With the entire nation's eyes on Ludlow and mine owner John D. Rockefeller coming under fierce criticism, the coal operators lined up against organized labor, socialism, the Industrial Workers of the World (I.W.W., aka the Wobblies), and mob rule. Both sides eventually looked to the federal govern-

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Coal Age 100th Anniversary Special Issue

AUGUST 2012

COAL MEN & WORLD WAR I

Though World War I began in Europe in 1914, the U.S. was able to stay out of the war until 1918. However, once in, the entire economy was transformed to ensure a steady supply of vital wartime goods moved from mines to mills and factories. America quickly transformed itself into the “arsenal of Democracy.” An unpopular war from the beginning, to ensure proper fighting spirit, a propaganda campaign spread throughout publishing. Throughout the war, all of McGraw-Hill’s publications carried advertisements, poems, cartoons and additional inserted editorials hoping to whip up the war spirit—and later help sell war bonds.

Coal mining was vital to the war effort and many miners volunteered to fight “Over There.” As the war continued, new mining machinery was pressed into service to produce an unimaginable 700-million-ton target. Just a few weeks after America had “grimly settled down to the task of making war” in an April 28, 1917, editorial, Parsons stated, “We must install every labor-saving device that can be put into operation, especially conveyors and loaders. Every effort must be productive; every motion must count. The period of this war must show such progress in invention that it will be known as the mechanical age.”

He also said that in this time of national crisis, there was no room for profiteering that would inevitably lead to greater governmental regulation or outright takeover. “Any coal company that now attempts to profit unduly is an enemy to the industry of which it is a part. The government does not ask that coal be sold at cost. It offers a fair profit to

Contributed 508 Tons in One Month to Beat the Hun



An Ohio Miner of American Birth loads 508 Tons of Entry Coal in Month of May

In 22 Working Days of 8 Hours. Coal only 3 feet 8 inches high and Entry 15 feet wide.

Ed Blagg, a loader in No. 1 mine of the Buckeye Coal and Railway Co., San Toy, Ohio, averaged 23 tons per day during the whole month of May, working every day he had a chance. This is about 3 tons for every working hour or one ton every 20 minutes.

Blagg is of draft age, and he is ready any time to be called; meanwhile he intends to help in the war by mining all the coal he can. He is 27 years old, married and has

one child. He is of American ancestry, being born and raised near Ironton, Ohio. He has contributed liberally to the Red Cross and Y. M. C. A. and bought \$100 of War Savings Stamps.

Joe Swagda is his nearest rival. He loaded 462 tons in May and has subscribed liberally to all war activities. The miners of San Toy have already bought \$21,000 worth of War Savings Stamps.

*Coal Age, July 6, 1918

COMPANY A, 27TH U.S. ENGINEERS



*Coal Age, December 8, 1917

the producer,” it just asks that advantage not be taken. By January 1918, the nation was gripped with a huge coal shortage and blame was being passed around. Parsons defended the industry and blamed the problems squarely on the railroads that were profiting shorting cars to the mines and heavily profiting as a result. In late 1918, the government took over the railroads and ran them throughout the rest of the war and into early 1920.

In an angry editorial, one of Parson’s last, on May 22, 1919, he excoriated the railroads for usurping the best interests of the coal miners and abusing their powers. “The railroads are largely responsible for the conditions that existed. Coalfields were opened chiefly to get freight tonnage for the roads. These carriers also fixed the price and dictated the point where the coal should be sold, so as to reap the benefit of a long haul and a high freight rate. Is it any wonder that mining was an unprofitable industry when in reality it was a sort of subsidiary business carried on to fatten the treasuries of great transportation systems?...The government, acting as the representative of the people, will see that no further reckless wastes are permitted.”

Parsons worried about the future impact of oil exports from Mexico that “has replaced 1 million tons of coal in New England since the war ended. This same competitor threatens the whole coal business of the Atlantic seaboard. [Natural] gas is the perfect fuel, but it cannot be transported long distances. Oil, therefore, at present is our supreme fuel.” Stating that all heat and power must be wrung out of each ton of coal, Parsons said, “The time has come when colliery owners must lock arms with science if they intend to march to victory.”



Striker's tent colony at Ludlow, Colorado. **Coal Age*, May 9, 1914

ment to act as mediator. With Congress holding hearings and new, violent labor actions spreading, on May 9, *Coal Age* weighed in on the U.S. government's position. Commenting that the Wilson government seemingly was siding with the strikers' demands to keep all mines closed until the inquiry was complete, "All of which means that the United States government is asked to close down the mine still the men have

every demand satisfied. The nation is not to permit any man to work unless the men who have engaged in lawless rebellion are willing. We can easily see why the militia, though directed by a pliant governor, failed to satisfy the strikers."

In a long two-page editorial titled "The Colorado Strike and the Press" (May 23, 1914), *Coal Age* excoriated the popular press for switching sides with every new

detail of the incidents at Ludlow and battles that ensued. "The venality of the public press has rarely been more clearly exhibited than in its treatment of the Colorado strike. We do not refer to its editorial utterances because it is had for a paper which is not published for the capitalist to side openly with him, for while he and his sympathizer purchase single copies of the newspapers, his enemies and contemners,

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being many, purchase perhaps 20. The press is content to follow its readers and refuses to lead." Eventually the editors find a middle path, taking to task the state militia leaders for provocative and unprofessional behavior, as well as illegally killing one of the striking miners while also questioning how much of the behavior of the strikers, many of whom were immigrants, was simply part of an inferior culture. "So prone are we today to expect of soldiers a high standard of humanity, whereas we demand little or nothing from the immigrants who come to us from southern Europe, that even we, in preparing this editorial, have given undue prominence to the weaknesses of the former parties and passed over, as to be anticipated, the violence and savagery of the latter."

After dozens of pages, *Coal Age's* coverage of the strike faded with the violence. However, while the next chapters played out in the courtroom, the United Mine Workers scored significant victories and the Wilson administration, to prevent further outbreaks of labor warfare throughout the

entire industrial economy, hewed to their own middle ground by increasing federal regulatory authority over coal mining. But an emboldened UMWA eventually secured an eight-hour day and, during the Great War, better pay and more government regulations. The fragile peace barely held through the rest of the decade.

Beginning in the teens and ending in the late-1920s, *Coal Age* ran an irregular "Who's Who" section featuring prominent figures in the industry. Though many of these figures have faded into history, few made their mark on the industry more than Francis Stuyvesant Peabody. Though a relative newcomer, by the end of the decade, not only was he president of one of the most important domestic coal companies but he was appointed chairman of the influential government "Fuel Board" during the Great War. Tasked with ensuring that enough fuel was available to stoke wartime industries, the board was later drawn into a dispute over the origins of a crushing nationwide coal shortage after the war—though much of the public—still familiar with Ludlow and

countless mine disasters—blamed the evil coal operators, *Coal Age* came down against the railroads that were deliberately shorting the mines of enough coal cars to adequately supply the nation. The end result: more government regulation. When the magazine profiled Peabody in 1913, it wrote, "The coal industry knows the man as a consistent altruist and a conservative enthusiast," an early proponent of the safety first campaign, "the humanitarian aspects of the mine workers commands his first interest."

Less than a month following Peabody's biography, *Coal Age* gave equal ink to one of his greatest rivals, John Mitchell, longtime head of the United Mine Workers of America. Chronicling his working-class upbringing, the magazine credited several of his accomplishments as head of the Union including increasing roles from 43,000 members to more than 300,000 mine workers when he retired. It also credited him with helping end several early strikes, win pay increases for the men, and secured the eight-hour work day in most coal producing states in the east and Midwest.

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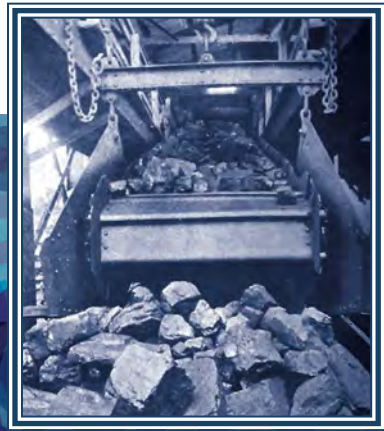
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The Age of Mechanization

1920-1929



Throughout the late teens and into the early 1920s, modern “progressive” mines were rapidly experimenting with various forms of mechanization. Loaders, cutters, conveyors and other new machines were being tested nationwide under all conditions. Machines were seen as ways to reduce both the costs and difficulties of labor, particularly as more miners were organizing and demanding higher wages. Machines also changed the way mining was done, creating new opportunities and helping increase production.

In 1920, production of bituminous coal was more than 556,500,000 net tons, an increase of over 98 million tons or 21% above 1919. That year’s total had been the second highest yet just behind 1918’s total of 579 million bituminous tons. Anthracite coal, once predominant, accounted for only 89 million tons that year. In total, more than 677 million tons were mined in 1918—a figure that would not be exceeded until 1944. 1920’s total of 657 million tons was equaled again in 1923 and 1926. Though coal production fell to a low of 476 million in 1922, average production through the decade was roughly 588 million tons a year. 1926 proved a highpoint however, as the economy began to wane ahead of the Great Depression. In general, however, coal production would not equal the 1920s levels until the height of World War II in 1944.

As coal production increased in 1920, the editors noted in a summary piece from January 1921 that “all producing fields did not share equally in the gain...we find that the Middle West—Illinois, Indiana and western Kentucky—made the largest gain, 38 percent. The increase in quantity was 36,400,000 tons, exceeded only by that in the middle and northern Appalachian territory...comprising the coalfields of Pennsylvania, Ohio, West Virginia, Virginia, Maryland, Michigan and eastern Kentucky, produced in 1920, 332,148,000 net tons of bituminous coal, a gain over the

previous year of 43,837,000 tons, or 15 percent...Illinois, according to the preliminary figures of the Geological Survey, in 1920 reached the goal for which she has been striving for years, namely to replace West Virginia as the second largest coal producing state. West Virginia’s output increased only about 10 million net tons over 1919, while Illinois gained nearly 25 million tons.”

The Illinois Basin, that year, produced at roughly the same levels as the previous high water mark of 1918 while the rest of the nation’s production fell. However, once again the most limiting factor in coal production was not demand or labor but availability of railroad cars. “From the first week of January until the middle of December, car shortage was the principal factor in limiting production...that is, each week of this period the demand for coal was in excess of the ability of the railroads to carry it from the mines.” So much then for the government’s ability to run the railroads better than the railroads themselves. However, the low production mark of 1922 was largely due to massive nationwide railroad strikes as well as mine strikes in the east and Midwest.

As coal production increased in 1920 by more than 16%, fatalities declined by over 7% year-over-year. The fatality rate in 1920 was 3.39 per million tons compared to 4.28 per million tons in 1919. One of the main reasons for that reduction was the rapid increase of mechanization throughout the nation’s largest mines. In the March 6, 1920, issue, *Coal Age* published the first feature on the new Joy loading machine, “one of the devices developed during the war for the purpose of stimulating coal production. This has only recently been perfected and is now offered to the industry. The inventor, J.F. Joy, is the head of the Joy Machine Co., with main office in the Union Arcade Building, Pittsburgh, Pa. Development of the machine was fostered by the Pittsburgh Coal Co., and

FATALITIES IN COAL MINES IN UNITED STATES, ELEVEN MONTHS ENDED NOV. 30, 1919 AND 1920

UNDERGROUND		Killed
		1919 1920
Fall of roof (coal, rock, etc.):		
At working face.....	607	504
In room or chamber.....	107	108
On road, entry, or gangway.....	152	167
On slope.....	11	10
Fall of face or pillar coal:		
At working face.....	116	104
On road, entry, or gangway.....	22	27
Mine cars and locomotives:		
Switching and spragging.....	10	7
Coupling cars.....	17	11
Falling from trips.....	17	28
Run over by car or motor.....	139	137
Caught between car and rib.....	100	89
Caught between car and roof while riding.....	22	15
Runaway car or trip.....	37	33
Miscellaneous.....	26	33
Gas explosions and burning gas:		
Due to open light.....	63	59
Due to defective safety lamps.....	22	7
Due to electric arc.....	19	10
Due to shot.....	6	11
Due to explosions of powder.....	2	11
Miscellaneous.....	28	18
Coal-dust explosions (including gas and dust combined):		
Due to open light.....	22	3
Due to defective safety lamps.....	.....	.....
Due to electric arc.....	13	17
Due to shot.....	19	10
Due to explosions of powder.....	.....	.....
Miscellaneous.....	.....	1
Explosives:		
Transportation.....	96	5
Charging.....	13	6
Suffocation.....	3	4
Drilling into old holes.....	.....	3
Striking in loose rock or coal.....	.....	.....
Thawing.....	.....	.....
Caps, detonators, etc.....	3	4
Unguarded shots.....	2	2
Returned too soon.....	5	8
Premature shot.....	49	47
Sparks from match, lamp or candle.....	2	2
Deafest blast.....	2	9
Shot breaking through rib or pillar.....	6	1
Miscellaneous.....	10	14
Suffocation from mine gases.....	11	16
Electricity:		
Direct contact with trolley wire.....	37	26
Bar or tool striking trolley wire.....	2	3
Contact with mining machine.....	4	9
Contact with machine feed wire.....	12	3
Contact with hoisting motor.....	2	3
Miscellaneous.....	8	16
Animals.....	2	5
Mining machines (other than 8c).....	25	36
Mine fires (burned, suffocated, etc.).....	22	21
Other causes:		
Fall of person.....	4	2
Machinery (other than 10).....	3	2
Rush of coal or gob.....	13	7
Falling timber.....	20	7
Suffocation in chutes.....	2	5
Hand tools, axes, bars, etc.....	.....	.....
Nails, splinters, etc.....	1	.....
Miscellaneous.....	18	10
IN SHAFT		
Falling down shafts or slopes.....	20	23
Objects falling down shafts or slopes.....	6	8
Cage, skip or bucket.....	8	7
Runaway.....	1	.....
Riding with rock or coal.....	1	2
Hiding with timber or tools.....	2	4
Struck by.....	4	4
Miscellaneous.....	5	2
Other causes:		
Overwinding.....	.....	.....
Breaking of cables.....	.....	.....
Miscellaneous.....	2	4
SURFACE		
Mine cars and mine locomotives.....	64	47
Electricity.....	10	17
Machinery.....	20	20
Boiler explosions or bursting steam pipes.....	5	4
Railway cars and locomotives.....	19	20
Other causes:		
Explosives.....	1	12
Fall of person.....	15	12
Falling objects (derrick, booms, etc.).....	7	7
Suffocation in chute, bin or culm.....	3	5
Falls or slides of rock or coal.....	1	5
Steam shovels.....	10	.....
Hand tools.....	1	.....
Miscellaneous.....	12	20
Grand total.....	2,146	1,983

(c) Six additional fatalities by mine fire occurred Nov. 1 to 8, 1920. Reports from Kentucky are incomplete.

*Coal Age, January 20, 1921

most of the tests necessary in perfecting the mechanical principles involved in the construction were made at the Somers No. 2 mine of this company. This operation, which is used principally as an experimental one, is located at Belle Vernon, about 42 miles south of Pittsburgh."

"It is the dream of every operator to increase production, decrease labor, and at the same time be able to reduce overhead expenses," wrote the editors in their feature on the new Joy machine. Mechanical devices were largely making that possible. "In mines where a friable roof is encountered, machine loading permits of a more rapid advance of room and entries, with a consequent earlier drawing of pillars." In the tests, the Joy machine was used in standard room-and-pillar operation with entries 9 ft wide on 50 ft centers. The coal was first "undercut to a depth of about 7 ft by means of Sullivan shortwall mining machines and shot down in the usual manner with black powder. The Joy loading machine was then employed to supplant" the usual handloading methods. "The machine, which weighs about 9 tons, is electrically driven and is 29½ ft long, 5 ft wide and 5 ft high. It is moved under its own power at a maximum speed of 8 miles per hour, the speed of travel being at all time under the control of the operator."

As detailed in accompanying illustrations, "two conveyors are embraced in the construction. One of these reaches from the gathering mechanism to a storage hopper that constitutes the body of the machine. A second conveyor is utilized to discharge the coal from the hopper in to the mine car, which is located to the rear of the machine. Both conveyors are flexibly mounted on the supporting track and may be swung to nearly any angle. This feature of construction permits the machine to traverse short-radius curves such as those at room entrances. The gathering mechanism is placed at the forward end of the loading conveyor. Briefly, it consists of a pair of geared fingers that are arranged so as to be positively driven in a fixed orbital path. The initial movement of the fingers is forwards into the coal, after which there is a raking motion across the coal face and then a rearward movement toward the loading conveyor."

"After the machine has been brought into the room where it is desired to load the coal, the loading conveyor is lowered so as to bring the gathering mechanism at the front end into contact with the floor. The

machine is then propelled forward until the gathering mechanism is in close proximity to the loosened coal, after which it is set in motion and machine body moved forward on the track until the fingers in their orbital movement engage the coal and gathering it onto the loading conveyor."

"The principals involved in the construction of the machine are departures from any other attempts that have been made along this line...The new loading machine was first placed in service on December 1, 1917, and has been operated continuously ever since. Several of the machines are now in operation, each of which is capable of maintaining an average daily production of 100 tons. This is really a highly conservative figure for an eight-hour day."

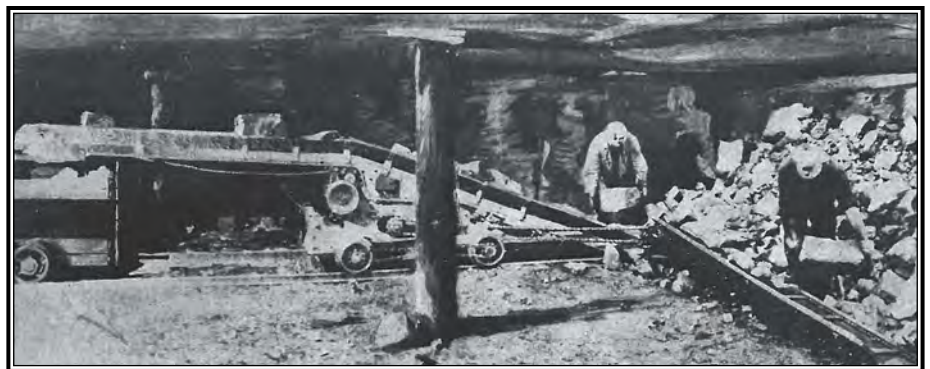
The initial Joy machine required a three-person crew: operator, a helper and a car pusher. "The operators' duty is to supervise the handling of the machine in its various operations and to assist with the cleaning of the coal as it passed up the loading conveyor and into the storage hopper...The duties of the helper are to clean up the coal fragments that may be left by the machine in the corners of the room and to assist in separating the draw slate. He may also place such temporary timbers as may be necessary. The car pusher's duty is to place the empty car under the lip of the discharging conveyor after the loaded car has been removed by the driver." In the initial tests, almost 40-60 tons of rock was loaded for every 100 tons of coal. But "it is quite probable that if the machine had been operating in a bed free from troublesome draw slate the production would have been nearly if not quite doubled."

The new Joy loader was only one of dozens of different machines being developed and pressed into service. To power

them, operators were having to choose between direct and alternating current electrical systems, then also quite new. In a June 24, 1920, piece, author Charles B. Officer from Chicago, Ill., detailed the history of AC motors being applied to continuous coal cutters. According to Officer, the first of these were deployed during the fall of 1912. "At the at time, a Sullivan continuous-cutting chain machine fitted with an induction motor was put into operation by the Star Mining Co. at Rugby, Colo." Shortly afterward a second, nearly identical machine was employed by the Gordon Fuel Co. at Walsenburg, Colo. "These machines differed from the standard "CE-7" equipment in that an induction motor with suitable starting apparatus replaced the direct-current motor with its starting mechanism. The induction motor and the direct-current machine it replaced were of the same rated horsepower." From the beginning, it was "evident that the application of alternating electric current to coal-cutting equipment was, and would be, successful and economical."

At the time of the article's publication, the largest single installation employing AC current underground was at the mines of the Nokomis Coal Co. at Nokomis, Ill. "Here 32 Sullivan "Ironclad" machines are being operated with 220-volt 3-phase 60-cycle current. The Nokomis Coal Co. was the first in the state of Illinois to use continuous coal cutters equipped with alternating-current motors. It began the operation of these machines in 1913. Since that date the proportion of coal mined in Illinois with alternating current equipment has increased till now about one-fifth of the coal produced by machines is cut by such equipment."

Easier to operate and less expensive to purchase, due to needing less copper, AC



Jeffrey pit-car loader—one of the simplest and most effective loading devices thus far developed is the pit-car loader, which is nothing more than a portable inclined conveyor into which coal is loaded by hand and elevated to the mine car. In wide places portability is most helpful. **Coal Age*, January 21, 1926

machines also required less electricity to run. Another consideration favoring AC was greater safety attained in operation. "Should anybody come into contact with the feed line or any part of a live direct-current circuit, he would be subject to a shock from a current of this potential."

Mechanization was addressed again in an August 17, 1922, article titled "Can Mechanical Replace Human Energy in Underground Loading?"—a summary of a series of papers, in particular one read by J.F. Joy, that were presented at a meeting of the

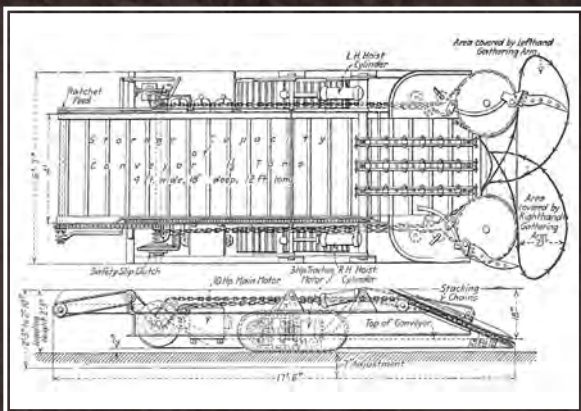
Engineers' Society of Western Pennsylvania. At the meeting, Joy broke down the costs involved in loading coal in terms of power required. "The annual production in the United States, which totals more than 500,000,000 tons is loaded at the face by approximately 400,000 miner workers out of the 750,000 employed...this operation absorbs the greater part of the labor employed in the mining of coal. It is said that a man at work will through an eight-hour shift develop 1/10 of a horsepower, so that for 400,000 miners the power equivalent is

40,000 hp. Converting this value to kilowatt-hours and allowing 200 working days per year, the work equivalent resolves itself into 47,744 kW/hr. With a daily wage of \$5 it will be seen that the loading process costs the coal industry \$400,000,000 per year or \$10,000 a year for each horsepower. Similarly the work costs almost \$10 per kw/hr or four to five hundred times the cost of electrical energy."

Joy and other engineers had, by 1922, been long focused on replacing human power with mechanical. Part of the problem up until then was that the mines were designed and built with only human power in mind. "To make conditions more suitable to the handling of a particular type of machine the cry has been raised to supplant the room and pillar system by one of the many wall systems." Room-and-pillar, according to Joy was the method used by 98% of the industry at the time, so the question was also one of adopting the new machines to that format. Unfortunately, the early machines also broke down frequently and were often available less than 50% of the time.

By 1924, however, many of these early problems were being worked out and over 20 different kinds of loading machines were in use nationwide. By then, according to J.F. Joy, more than 200 of his company's machines were then in operation nationwide. The second largest machine producer, Myers-Whaley Co. had about 40 machines then in operation as well. "Asked as to the savings affected by the operation of his machines, Mr. Joy said that the only knowledge he had was from an operator in West Virginia who claimed that he could load with his Joy loader at about 30c. per ton less than by handloading...based on the 1920 wage scale."

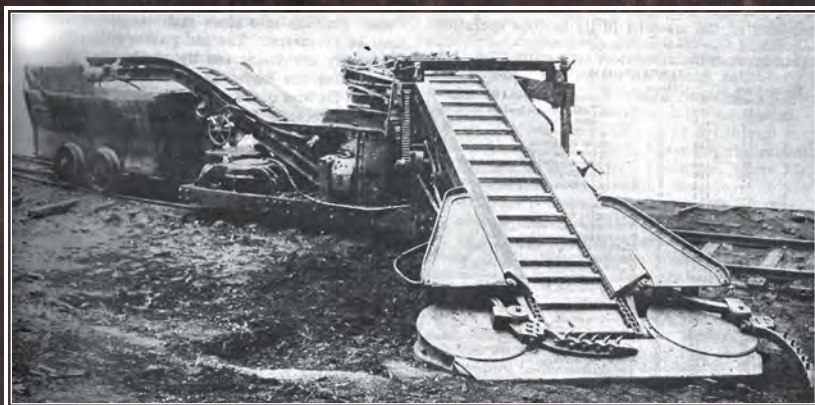
While eastern producers were learning how best to use and develop the new loading machines, at the Union Pacific Railroad underground Hanna No. 4 mine, operators were trying to mechanically mine a huge 32 ft seam. Though blessed with good roof conditions, a lack of available timber presented serious challenges. The company turned to large Thew shovels working in conjunction with Joy loaders. They "earned their keep" during the first six months of the year, said Eugene McAuliffe, president of the company in an October 30, 1924, article. Compared to handloading, the Thews saved nearly 28c a ton and the Joys saved 11 ct ton. "Together the saving averaged 25.2c a ton; but it was Mr. McAuliffe's opinion that nei-



The (Joy) Low Model Machine

The paths of the fingers are here plainly shown. In this low model the second conveyor serves for a temporary storage place of the hopper used on the higher machine. This will carry when filled with a sufficient amount of coal to appreciably shorten the time necessary to fill a car upon the track behind the machine.

** Coal Age, May 6, 1920*





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ther type of machine could have done it alone...The system at Hanna is for the Joy machines to take out the lower 8 ft of the 32-ft seam in rooms 32 ft wide and sometimes 800 to 1,000 ft long. The Thews then load out the next 18 ft above, the aim being to leave 6 ft of top coal to hold the soft sandstone roof."

Introduced just before the war, McAuliffe reported the process took some refinement until it became more profitable than handloading. At first the men were indifferent and out-right hostile to the new Thews and later the Joy machines, but at the time "production and costs are reasonably good...With better results from the Thew shovels, the officials of the company soon realized that it was necessary to find some means by which rooms would be developed faster than mere human power could drive them, for otherwise the Thew shovels would soon exhaust the working places available. So in November 1923, the company purchased two Type 4BU Joy loaders." When used in tandem, the Thews averaged 140 tons per day per loader and the Joys were averaging 104 tons per day—a definitive increase over manpower alone.

In a survey piece from January 1926, the editors reviewed the 500 mechanical loaders in operation nationwide. "Most of these loaded more than 75 tons per shift. By assuming this as an average for 200 days" machine loading was still only 1.5% of total bituminous production, roughly 8 million tons. "Joy machines in operation during 1925, numbering 175, have produced nearly 4 ½ million tons." Some producers were able to mine up to 1,200 tons per day with the Joys, depending on conditions. Jeffrey short-wall loaders, McKinlay entry drivers, Goodman scrapers and Myers-Whaley products made up the bulk of the other machines then in use. Both the Joy and the Myers-Whaley machines received upgrades toward years end. "Thus it is apparent that not only have mining men increased their knowledge of how to fit loaders into methods of mining but several manufacturers have been able to alter to their own opportunities and have equipped the industry with more effective loading machines for 1926. Machine loading is steadily advancing."

"In the continuous quest of lower production costs, American operators in large numbers are trying conveyors" wrote Associate Editor Frank H Kneeland, in a February 25, 1926, article. "One of the simplest oscillating or jiggling conveyors so far tried is known as the Eickhoff...It is present-

ly in daily operation in several states including Virginia, Pennsylvania and Wyoming. This conveyor is built in sections of varying widths and lengths to suit local conditions." Operation of the conveyor was easily applicable to room and pillar operations. "As the room advances section after section of chute is added until full room depth has been attained." The Eickhoff transports coal "by a combination of differential oscillation and a vertical movement. The sectional pan carries upon its bottom a vertically curved track made of angle iron within which the supporting rollers travel. On the floor or mounted on blocking depending upon the desired height similar but reversed tracks are placed. The rollers that operate between these two trackways or raceways are wheels about 8 in. in diameter with ¾ faces. These are fastened together and held to gage by a 1-in. shaft or axle extending between them. Each pair of wheels therefore constitutes a single rigid roller of light weight that allows the conveyor or trough to move back and forth with only a small amount of friction and effort."

In a June 3, 1926, article operators discussed the financial and manpower savings they were enjoying because of the new machines. Following the delivery of a paper entitled "Mechanical Loading in Rooms and Entries" by I.N. Bayless, superintendent of the Union Colliery Co., in Dowell, Ill., the author was questioned about how many men were "saved" by the machines. Bayless responded that the machines "have eliminated 204 men with no change in the daily output of the mine. In answer to another question, Mr. Bayless said that all except the machine cutters are paid a flat day wage."

Knowing that breakdowns would occur, Bayless suggested that operators always keep spare machines on hand. However, "these loaders have increased the daily output per man on the payroll from 5.5 to 8.5 tons. The record output per man employed at his mine for one day is 11 tons," he reported.

Perhaps the symbolic height of the new machine age came when Captain Charles Lindbergh made his record setting New York to Paris, France, flight May 20-21, 1927. In an editorial published five days later, Engineering Editor Dawson Hall exclaimed that Lindbergh's feat proved "the machine age has arrived. It remains now for the operator to develop through careful management the necessary coordination of his man forces with machines of production....The coal industry in the midst of this drama of coordination of men and machine salutes the great Lindbergh and his almost human machine."

Just a few issues later, in the August edition of the new monthly *Coal Age*, H.O. Rogers of the U.S. Bureau of Mines hailed the tipping point of mechanization with a long feature "Exit the Mule," documenting the shift from animal to mechanical power, particularly for underground haulage. "Of the 7,361 deep mines in operation during 1924, there were 3,585, producing 88 percent of the output, that reported the use of locomotives of some type underground. The mines not using locomotives, although numbering 3,776, produced only 12 percent of the output." According to the survey, although there were more than 36,000 animals still being used underground (8,843 in Pa.; 5,906 in W.Va.; and 4,378 in Ill.), 14,723 locomotives were being employed nationwide. Included in the animal survey were "a few dogs used in small mines working thin coal."

Though mechanical transformation was on the rise, "the extent to which animals can be dispensed with and the entire work of haulage be performed with locomotives, depends upon physical conditions...In many mines, working thin coal, gathering locomotives have been introduced simply because mules could not be used in the room and entries without excessive lifting of bottom or brushing of top. Elimination of mules further depends



Spillertown Sam Dead; Aged 32 Years

Spillertown Sam was in the coal business over twenty-six years. He died on Dec. 24, 1922, at the Peabody company's No. 3 mine, Marion, Ill., at the ripe old age of 32 years. Spillertown Sam enjoyed a life of ease for the past six years on a Peabody Coal Co. pension. The company provided him with a ten-acre field, well wooded to shelter him in the summer time, and a comfortable barn with an attendant to take care of him. While in active service this mule averaged twenty miles per day, year in and year out, underground, hauling coal and never met with an accident serious enough to incapacitate him for work.

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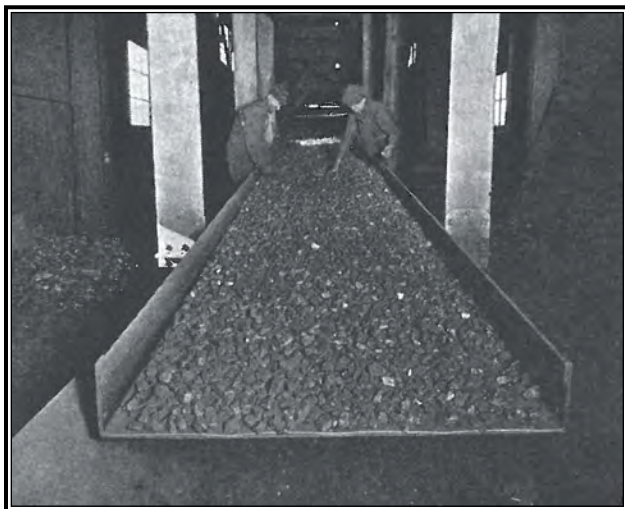


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Cleaning coal at the Orient mine.* *Coal Age*, August 31, 1922

TABLE I.—COMPARISON OF ORIENT AND ZEIGLER RECORDS

	Orient	Zeigler
Maximum output per day.....	8,218 tons	7,537 tons
Average output per day in March, 1922.....	6,001 tons	6,078 tons
Monthly production (March, 1922).....	162,015 tons	164,109 tons
Lowest tonnage per day.....	5,241 tons	4,103 tons*
Days run.....	27	27
Depth of shaft, collar to bottom.....	520 ft.	417 ft.
Average thickness of coal.....	9 to 10 ft.	11 ft.
Hoisting time on day of maximum production.....	468 min.	463
Lost time on day of maximum production.....	12 min.	17
Total time on day of maximum production.....	480 min.	480 min.
Number of dumps on day of maximum production.....	1,640	1,968 at bottom
Dumps per minute.....	3.5	2.1
Capacity of mine cars.....	5 tons	4 tons
Size of skip.....	.....	8 tons
Production in coal year—April, 1921 to April, 1922.....	1,374,985 tons	1,349,610 tons
Average tons per hoist.....	5,0091 tons	8.1 tons
Average time per hoist.....	17.12 sec. †	29.75 sec.
Lower landing to dump.....	600 ft.	517 ft.
Two engineers worked in relays of.....	30 min.	one man
Working relations.....	Union mine	Union mine
Mine opened.....	1912-13	1904
Mine worked by.....	open lights	open lights
Method of operation.....	room-and-pillar ‡	room-and-pillar
Size of main shaft.....	11½ x 8 ft.	8 x 12 ft.

* Last day of run. † Allowing 5 seconds for engine, 5 seconds for acceleration and for retardation the maximum rope speed figures 5,070 ft. per minute, or 57.61 miles per hour. ‡ Fifty per cent of coal removed in first mining. Hope to recover 25 per cent on retreat.

* *Coal Age*, August 31, 1922

on local practice with respect to hand tramming or pushing of cars, which is also related to thickness of seam.” Mirroring a nationwide trend, the author concludes that “the mule is disappearing from the mines just as the horse is vanishing from the country’s highways. His place is being taken chiefly by the much faster and more efficient electric locomotive.”

Nowhere was the spirit of mechanization greater than in the coalfields of southern Illinois’ Franklin County where, in the

race with its neighboring rival, Orient No. 1, twice broke the world’s record for daily output only to lose it finally to the other mine. But in those 27 days, Zeigler set the world’s high mark for monthly production, hoisting 164,109 tons. Mr. Leiter’s fanciful 1904 dream of some time getting 5,000 tons of coal a day out of the mine was nothing compared to the cold facts of the mine’s performance that month. It exceeded 5,000 tons every day but one and once touched 7,537 tons.”

airshaft and its material shaft...The 8-ton skips in the main shaft are loaded at the bottom of the big hopper, where an operator about 40 ft below the level of the dumping tracks, opens and closes with compressed air the sliding doors in the mouth of the hopper...during that feverish month of March when the great mine was exerting itself and when good luck was with it every day, the daily hoist ran from 4,100 to 7,537 tons, with an average of 6,078 tons.”

“By raising 8,218 tons of coal in a single shaft on March 25, 1922, the Orient mine of the Chicago, Wilmington & Franklin Coal Co. established a one-day single-balanced-hoist record that so far has never been beaten.”

spring of 1922, the two largest bituminous mines in the state duked it out hoist for hoist for title of most productive mine in the world. After a decade of highly publicized struggles and failures, Chicago’s Bell & Zoller Co., had rebuilt and retooled much of the Zeigler No. 1 mine while incorporating its original audacity. Constructed with greatness in mind by Chicago financier Joseph Leiter early in the new century, the “top works he built astonished the coal industry. No shaft at that time was producing more than 1,500 tons a day and many a good engineer figured that was about the limit. The Zeigler mine equipment was good for 5,000 tons a day!” reported E.W. Davidson, western editor in the May 25, 1922, issue. This capacity would come in handy when “the mine, in a tremendous 27-day production

Though much of the original equipment including the hoisting skip installed between 1904-1906 “did its bit” during the race, the mine had been upgraded by installing a rotary car dump at the bottom in 1917—perhaps the nation’s first underground—and had upgraded to a high capacity steam-turbine driven 750-kw 2,300 volt alternator providing power throughout the mine. It also had four shafts instead of the usual two. “Its main shaft, built to accommodate a pair of 8-ton skip hoists, is separated by a partition from the man shaft, in which a double-deck cage operates.” But the shafts were too small to accommodate an ordinary mine car. “So the fourth shaft—a passageway for material alone—was sunk in 1920 about 100 yards from the main shaft. Thus the mine has its skipway, its man hoist, its

Coal Age continued to tell the tale in the August 31 issue that year from the victor’s side. “By raising 8,218 tons of coal in a single shaft on March 25, 1922, the Orient mine of the Chicago, Wilmington & Franklin Coal Co. established a one-day single-balanced-hoist record that so far has never been beaten.”

Admitting there were single breakers in the anthracite region “that not only handled but actually prepared more coal than the Orient and Zeigler shafts lifted and the surface plants prepared,” the editors distinguished the bituminous and anthracite fields as inherently different places to operate. And, unlike anthracite breakers, “the tonnage of each of the Illinois shafts all came to one landing and was hoisted up one shaft by one hoist. There was a concentration not only in regard to time but in regard to facilities of operation.”

However, unlike those anthracite operations, “Zeigler produced on its best day about 8.1 tons per man and during the whole month averaged 6.78 tons. The average output per loader per day for the whole month was 11.7 tons and per machine man 95.9 tons...these records are exceptionally good.” Besides glory, also propelling the men at each mine was an impending strike to commence “on or after April 1 [that] made every man paid by the ton anxious to do his utmost so as to obtain the largest possible cash reserve for the long period of idleness which was in view.”

However both mines were about to be overshadowed by the New Orient (Orient No. 2) mine that would go into full production in 1925 and quickly become the world’s most productive bituminous mine. Under construction since May 1921, *Coal Age* first featured the mine in the March 12, 1925, issue, would update readers about its massive new hoist for the April 9 edition and then devote nearly an entire magazine to the New Orient in the September 9, 1926, issue, stating that “for the present, New Orient is the last word in an industry in which constant improvement calls continuously for betterment.” In 1925, its first year in operation, the mine increased average daily output from 6,211 tons in January to a whopping 9,757 tons per day. On December 15, New Orient’s 1,377 men shattered the world record and hoisted 12,825 tons to the surface. Designed to produce 3.6 million tons per year, CW&F management predicted the mine would be capable of producing 4.5 to 5.4 million tons per year if the market for Illinois coal was steady enough.

Underground, each of New Orient’s main entry groups had four headings “constituting a pair of pairs”—22 loading machines were used and the mine’s aircourse was rock dusted, a practice new at the time. The loading machines are “chiefly used in heading driving. To date, more than 125,000



Men who produced New Orient’s big tonnage. **Coal Age*, September 9, 1926

linear ft of entry have been driven mechanically. During the earlier stages of underground development, by an agreement with the United Mine Workers, the loading machines were operated three shifts per day. Consequently, the rate of development by machine loading methods was 50 percent greater than by hand loading.” At the time of the author’s visit, “six loading machines were put to work in a concentration plan for working rooms. These machines were then loading an average of 125 tons per shift each.”

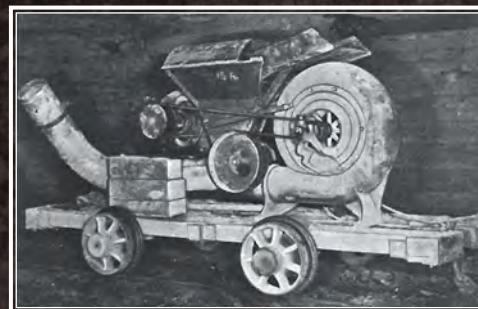
Revolutionary Rock Dusting: *Coal Age* Helps Spread the New Safety Tool

In 1926, rock dusting was new to the U.S. coal industry and was being rapidly adopted by the most progressive operations. “New Orient of course, is thoroughly rock-dusted. By the careful maintaining of rock dust where needed, the danger of coal dust in this mine has been eliminated as proved by an unfortunate explosion last winter which was checked by rock dust within a short distance of its origin. Not only are all haulways coated with rock dust, but the stretches of aircourse from crosscut to

crosscut are also being thus treated before track is torn up. The first application of dust is of 3 ½ lb. per linear ft. The quantity and the time for the application of additional dust are determined by the analyses of samples which are taken systematically.” Though the explosion in discussion killed five men, “New Orient management is convinced that rock dust saved it from an explosion of great magnitude.” In addition to dusting, to prevent an explosion from spreading from panel to panel “a large rock-dust shelf is erected on each side of the stopping in the chain-pillar crosscut between.”

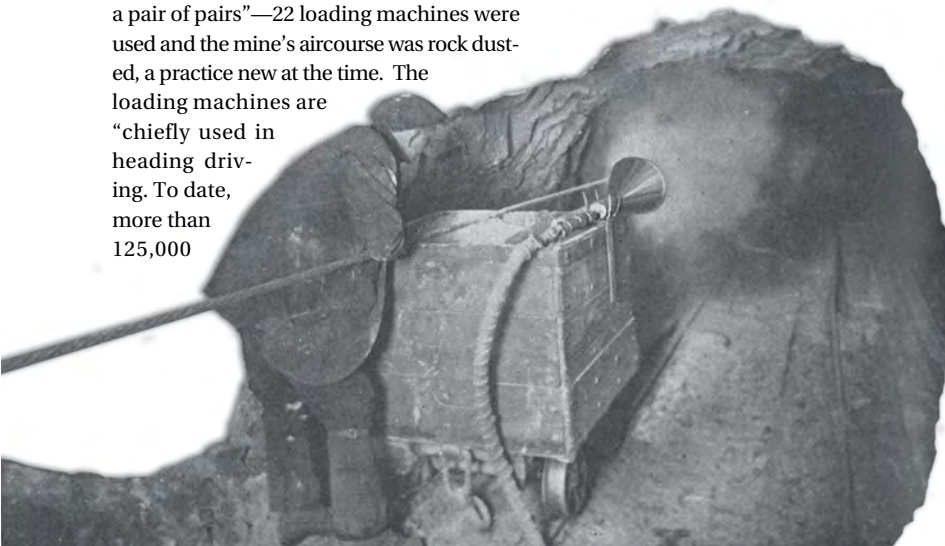
Rock dusting was a subject the magazine had been treating since May 1924, when, just weeks after the horrific

Rock Dusting Introduced to Help Prevent Mine Explosions



This small-like machine is rock-dusting roof, ribs and floor of the headings in an Old Ben mine. The new machine based on the same principle will have a double discharge and will completely dust the heading in one trip. The machine illustrated is operated by two men, treats a heading completely in two operations at the rate of 2,000 to 3,000 lin.ft. per hour distributing 2 to 3 lb per linear foot and making the ash content of the mine dust about 65 percent.

**Coal Age*, May 8, 1924



Castlegate mine blast in Utah that killed 171 men, *Coal Age* published feature on the British practice of "Stone Dusting." Leeds University professor J. A. S. Ritson claimed that stone dusting was largely responsible for a British fatality rate 1/3 as large as the U.S. "Soon after the erection in 1908 of an experiment station at Altofts, England...two facts were thoroughly demonstrated. They were: That coal dust might form an explosive mixture with air and that fine stone dust acts as a barrier to the spread or propagation of a coal-dust explosion." In the six page feature, Ritson presents scientific evidence of his thesis and offers solutions as well examples of methods to spread the rock dust.

In the same issue, *Coal Age* reported that shale dusting was spreading rapidly in Illinois. As part of an interview with J.E. Jones, safety engineer at Old Ben Coal Corp., who has "more experience in rock dusting than any man in this country," the magazine reported that the new technology's adoption was largely due to a tour by members of the British Mines Department had made through the region. Spurred on by the deaths of more than 400 men from explosions beginning January 1, virtually all of the large mines in southern Illinois were adopting the new technology. Old Ben at the time had started applying "shale dust in its mines in four ways: in concentrated barriers containing one and a half to three tons of dust, in V-shaped troughs, piled on platforms elevated a few feet from the floor and spread on roof and ribs. It is roof-and-rib dusting which is now being introduced into many of the large mines of southern Illinois."

To spread the shale dust, a new device, the traveling blower, was developed. To pulverize the dust to a fineness of 250-mesh was also difficult, as was figuring out the

best mixture of dust to suppress explosions. Each day they got it wrong, the chemists and technicians who were working at these mines feared could bring news of another preventable disaster. By May of that year, Mr. Jones was able to boast that between all the mines of Franklin County, the protection against explosion had been extended to a point where 4,350 of the 12,855 underground men...are protected with shale dust and 1,925 with enclosed lights."

Franklin County's gassy coalfields were quickly expanding. And as it did, so did the amount of fatalities. From 1904-1921 deaths there were "nearly double that of the state for the same period. The difference in the rate was largely due to the fatalities which were the result of mine explosions. The number fatalities in Franklin county mines from all causes during this eighteen-year period was 533, of which 203 were caused by gas and coal-dust explosions...In Franklin County...the chief improvement has been a better understanding of the dangers of gas and a consequent greater respect for it. Formerly, naked lights were often used by fire bosses during their examination, and it was considered a great joke to frighten someone by igniting a pocket of gas."

In a June 19, 1924, article by J.E. Jones he detailed how Old Ben, using rock dust, had extinguished seven mine explosions since 1917. "From the experience gained a rough appraisal can be made of the relative effectiveness of the various types of rock dust protection, of the means by which the protection may be afforded most readily and of the frequency with which dust applications must be made." In the article, Jones proffered his formula for best rock dust mixtures, his experiments and observations and his drawings for machines to distribute it throughout the mine. The information spread and rock dusting became widely adopted throughout the industry.

By May 20, 1926, the U.S. Bureau of Mines had completed a long series of tests and they could state in a piece penned by J.W. Paul and C.A Herbert that "It has been shown in repeated tests in the Experimental

Mine of the Bureau that rock dust when properly used is 100 percent efficient." Titled "Rock-Dusting Promptly Checks Coal Dust Explosions," the authors re-tell incident by incident times when coal dust prevented the further propagation of an explosion and saved the lives of miners in dusted areas. "Great risk is taken when only part of a mine is treated with rock dust, such as the haulage roads, leaving the aircourses and trackless entries without this protection. A practice such as this invites disaster." However, "rock dust, properly applied and maintained is a panacea for coal-dust explosions, and when its use has become a daily routine at all bituminous coal mines, the wholesale loss of life in mines will be at an end."

Preparation: How to Make Coal Float

With the June 2, 1921, issue, *Coal Age* published the first feature article on the coal flotation process of preparation then prevalent in England. Written by E.G. Hill of Pittsburgh, the piece describes how, using this process, fine coal attaches itself to oil and bubbles, thus floating away with the froth. Though gravitational methods were used in separating coal from its impurities, "it is now proposed to use oil to collect coal and to make a froth to which coal" and coal fines would adhere. Hill recites how the process was accidentally determined while chemists were working to separate other types of materials selectively. He also goes on to discuss the use of pyrite, which tends to float as readily as coal.

Though the use of heavy media was a new concept as applied to coal, Hill confidently believed that "there can be little doubt that the time will come when it will be applied to the reclaiming of fine coal from waste products and to the preparation of low-ash coal from high-ash coal. The process should appeal to metallurgical coke producers, especially if sulphur be also reduced. The sulphur elimination probably will be a fairly hard problem, but when one considers that in ore concentration pyrite has been made to sink in a pulp while other minerals were floated, its solution would appear possible." Hill closed by stating that experiments on some Pennsylvania coals were then under way at the School of Mines, University of Pittsburgh. "Upon completion of these tests we hope to be able to give more detailed information as to regains, action of materials, etc."

While heavy media separation would eventually gain widespread acceptance,

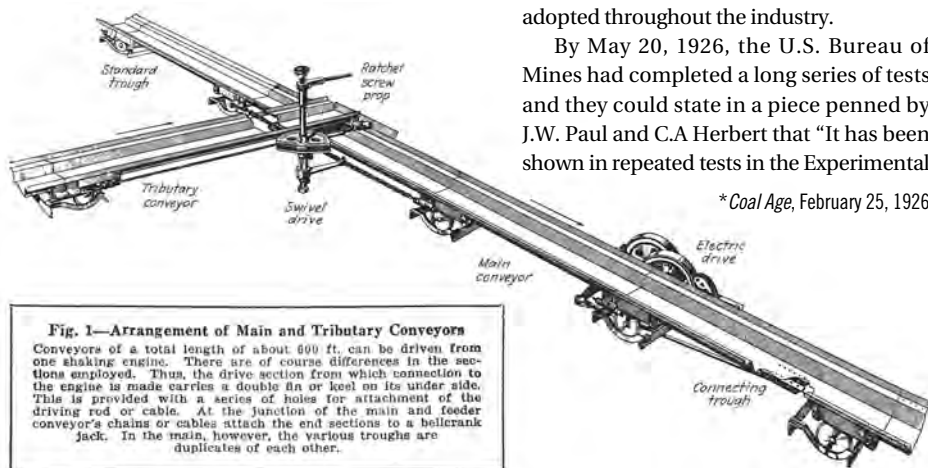
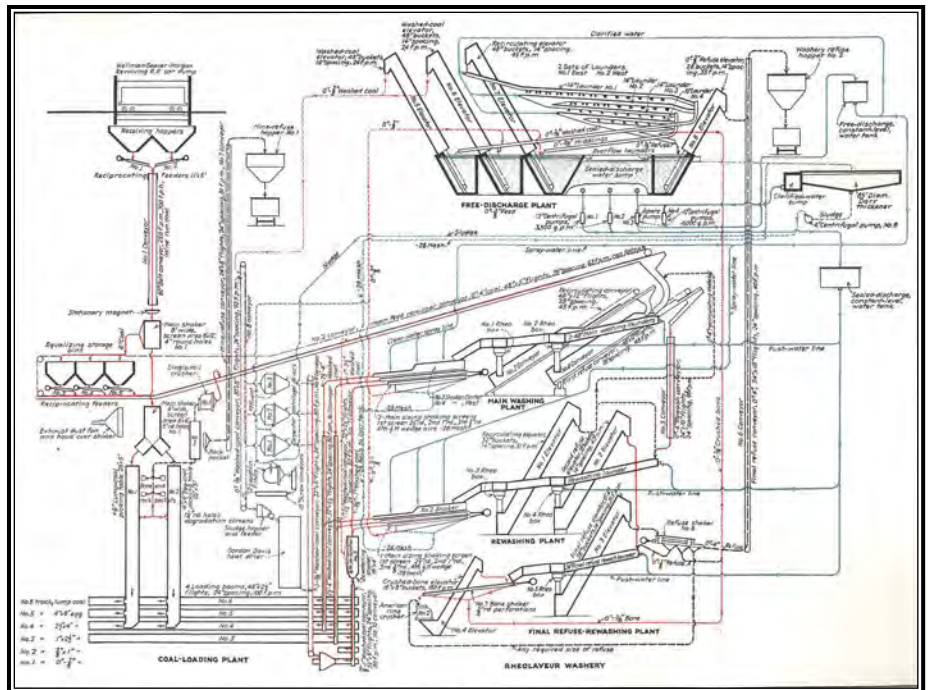


Fig. 1—Arrangement of Main and Tributary Conveyors
Conveyors of a total length of about 600 ft. can be driven from one shaking engine. There are of course differences in the sections employed. Thus, the drive section from which connection to the engine is made carries a double fin or keel on its under side. This is provided with a series of holes for attachment of the driving rod or cable. At the junction of the main and feeder conveyor's chains or cables attach the end sections to a bellcrank jack. In the main, however, the various troughs are duplicates of each other.

even by the end of the decade, in 1929 when *Coal Age* presented an in-depth look at the preparation plants of the Pittsburgh Coal Co., modernization still meant applying mechanization to preparation and cleaning. J.B. Morrow, manager of preparation for the company, described the methods then being used at four mechanical prep plants. Three use the "Rheolaveur wet process for cleaning coal and one [uses the] Arms dry tables [process]. The combined annual capacity of these four plants is 9,250,000 tons."

For the article, Morrow focused on the Champion No. 1 plant's original design and how it had been modernized. The factors governing the design was "1) The desirability of receiving mine-run coals of varying qualities and varying percentage of sizes and separating them into a plus 4-in. product suitable for hand-picking and a minus 4-in product which could be prepared mechanically...2) The desirability of being able to mix the products after cleaning in the same relative proportions as that in which they were received from the mine...3) The desirability of shipping a constant-ash product regardless of the variation in ash in the feed product



Flow sheet for Champion No. 1 prep plant, Pittsburgh Coal Co. **Coal Age*, March 1929

from the individual mines...4) The desirability of erecting a type of plant in which low

operating costs would be the principal consideration...5) The desirability of departing

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from the conventional idea that a coal preparation plant must be a dark and dingy establishment. It was believed that the extra expense necessary to remove dust and obviate spillage would be more than compensated by the added efficiency of the operatives and the reduced cost of maintenance."

After the plus 4-in coal was separated by the slate pickers and magnets swept the product looking for "tramp iron," all the coal was delivered and cleaned by "two primary Rheolaveur launders operating in parallel, each of which is equipped with two Rheo boxes. The first set of Rheo boxes over which the coal passes, after primary classification, removes practically all of the refuse, some of the middling products and some of the fine coal. These materials are dropped into the sealed boot of the No. 1 conveyor and after de-watering are delivered to the re-treating launder." Accompanying the article was a special color pull-out schematic of the Champion No. 1 plant further describing the preparation process.

Surface Mining in the 1920s: Kansas, Montana and Illinois are Leaders

In 1898, at the Clemons Coal Co., Pittsburg, Kan., overburden was removed by horse and plow. Eventually 20 ft became the stripping limit. In an August 1923 article and photo essay, *Coal Age* illustrated the progress made since. In the photos "gigantic steam and electric shovels as big as any used anywhere move 50 ft of overburden handling 4,000 to 6,000 cu yd a day with a 6-yd dippers working on an 80-ft boom. Today strip-pit loaders almost dispense with hand shovels and "elbow grease...[since] mechanism has eliminated from stripping much of its hard, hot work."

In a series of articles published in mid-1924, Grant Holmes of Danville, Ill., an

early pioneer of surface mining, detailed how the "art" of stripping was born in northern Illinois as early as 1866 and would be perfected over the next 60 years. "Since 1875, Holmes, of Danville, has had his hand and mind on coal stripping. Half a century of it successfully as mechanic, boss, operator, advisor to and rescuer of failing strip companies, and finally as an investor and director in many stripping companies in Illinois, Indiana, Kentucky, Ohio and Pennsylvania have given him a background in stripping such as few men have. Probably no one is as well qualified as he to tell the story of coal stripping from its beginnings," stated the editors.

Through two articles, Holmes traces the evolution from stripping from horse team and scrapers on the Illinois plains to the Kansas-Missouri border around 1877. The articles show how the Missionfield mine, near Danville, owned for many years by the Consolidated Coal Co. of St. Louis, was a proving ground for various types of surface mining technology. Starting with an Otis steam shovel in 1885, a crew of experienced dredgemen brought in a steam dredge built by the Marion Steam Shovel Co. In 1890, the Butler Bros. were hired to use a new dragline excavator on the property. Eventually three draglines, with bucket capacities ranging from $\frac{3}{4}$ to 1 cu yd were brought in. By the end of the 19th century, Consolidated was enjoying an output of more than 1,000 tons of coal a day.

Holmes recounted how some of the first machines brought in were so powerful they ended up shaking themselves apart. Eventually, as the draglines got bigger and become more stabilized, they were able to produce more effectively. "Two years of persuasion finally moved the Marion Steam Shovel Co. to begin the construction of a revolving shovel built according to the dimensions and ideas of Holmes. The $3\frac{1}{2}$ yd dipper 40-ft handle, 65-ft boom and 150 ton weight made this machine the largest in the world at the at time. In the spring of 1911, the big shovel, known as Model 250, began work in Missionfield." The shovel saw years of service and news of its success spread worldwide, leading to the construction of similar revolving steam shovels by Bucyrus and other companies.

The ultra-modern new Colstrip mine in Montana was the subject of several 1925 articles. The nation's first completely electrified open-pit operation, "the coal bed, about 180 acres in extent and 25 ft deep, is owned by the Northwestern Improvement Co. and is being worked by Foley Bros., general contractors of St. Paul, Minn. The coal is subbituminous with a heat content of about 11,000 Btu. The output of the mine will be used for the locomotives of the Northern Pacific Railroad in Montana...complete electric equipment was purchased for stripping the overburden, mining the coal and hauling it. This equipment consists of an electric shovel with a 155-ft boom and 6-yd bucket, used as a dragline excavator for stripping, equipped with Ward-Leonard control; a coal loading shovel with direct-current drive, and two 60-ton electric storage-battery locomotives, the largest units in the coal fields. The coal loading shovel is a Bucyrus Model No. 175-B weighing 220 tons with a 75-ft boom and a 7-yd dipper."

Since Colstrip's product did not require cleaning and sizing, "the railroad spur is built into the pit so that coal is loaded directly into Northern Pacific cars. Trains of considerable length are handled in and out of the workings." *Coal Age* reported that "the opening of the tract with the big shovels has also centered wide attention on the entire coal field in the Rosébud section of Montana...This operation is designed to produce eventually 5,000 tons of coal per day at a cost not to exceed 65c. per ton."

In another piece in the November 12, 1925, issue, the magazine reported that the new mine was saving the Northern Pacific more than \$700,000 a year in fuel costs. Calling the opening of the mine a "milestone in the economic progress of this industrial age," author V.A. Wolcott said, "the economical results obtained by the use of this coal have encouraged the Northern Pacific to increase as rapidly as possible the number of locomotives using it, and it may be using 1,200,000 tons annually in the near future."

Just to the southeast of the Colstrip mine, in the November 1928 issue R. Dawson Hall reviewed the operations of the Homestake Mining Co.'s Wyodak Coal and Manufacturing Co. surface mine, located about 5 miles east of the town of Gillette. Beneath the 25 ft of cover that contained many bison and beaver teeth and other bones laid a 96 ft seam of subbituminous that Wyodak was able to hydraulically



Largest shovel in the world set up near the tipple. **Coal Age*, May, 1928

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remove. "The monitor which displaces the cover has a 6-ft barrel and a 1 1/4 in. opening. But because of the severity of the climate, the cover can be hydraulic only from April 1 to November. 1. The coal is shot with 40-percent blasting gelatin and drilled with 2-in. electric drills. The coal is lifted by a Marion No. 37 shovel into a hopper by which it is delivered to a 40-in. belt conveyor. The quantity of the material to be stripped is so small as compared with the quantity of coal to be removed that there will be no difficulty in finding a place for it." By the time of *Coal Age's* visit, about 200,000 tons of coal had been mined.

For the December 1929 issue, Hall penned one more surface mining piece treating what at the time was "America's largest shovel and biggest strip mine, the Fidelity operation of the United Electric Coal Co. located near DuQuoin in southern Illinois. Comprising 6,158 acres and constituting a block of some 60 million tons the seam had an average thickness of 6 ft 5 in. "The average depth of the overburden is 45 ft, the heaviest cover being 60 ft and a ratio

of overburden to coal of 7 to 1." The largest stripping unit on property is a 15-yd Marion 5600 shovel with a boom length of 120 ft and an 82 ft long dipper. "As a matter of fact, as usually loaded the bucket carries when heaped, 18- to 20-cu yd of material."

Besides the big 15-yd shovel, Fidelity also operates a 12-yd shovel and a 10-yd dragline. "They will given an opportunity for comparison with the 15-yd shovel, which itself furnishes the necessary experience for the development of future operations... it remains to be seen how much the 15-yd shovel is superior to the almost equally expensive tandem combination of a 12-yd shovel and 10-yd dragline. H.C. Swallow, president, United Electric Coal Co., desirous of leaving the stripping as an object of beauty in the painfully flat country of southern Illinois, has arranged with the State Forestry Department to plant 10 acres of land with trees every year, thus converting the relatively sterile plain into an irregular park-like forest of romantic beauty."

The United Mine Workers, Led by John L. Lewis, Becomes an Institution

Industrial warfare broke out early in the decade, most spectacularly with the Matewan Massacre in May of 1920 when Sheriff Sid Hatfield and a group of striking miners shot it out with a number of Baldwin-Felts mine guards. Eleven men were killed including Matewan Mayor Testerman and Albert and Lee Felts. Hatfield became an instant hero to the miners and the victory helped unionize the southern West Virginia fields for the first time. But the mine owners fought back, smearing "Two-Gun Sid" at every turn. Unable to convict him for murder or corruption, Baldwin-Felts agents assassinated Hatfield on the steps of the McDowell County Courthouse in Welch, W.Va., in August of the following year. Incensed miners organized an armed march on Logan, seen as the seat of power for the mine operators in the region—and so began the Battle of Blair Mountain.

In the September 1, 1921, edition, *Coal Age* reported on the conditions at the front. "A band of West Virginia mine workers, variously estimated between 4,000 and 6,000, many of them with arms, started from Marmet in the morning of August 25 for Mingo County. Marmet is only 12 miles from Charleston on the south shore of the Kanawha River...Mother Jones was a visitor to the Marmet camp and had the men ready to do anything to end martial law and all

laws in Mingo County...The mine workers crossed into Boone County—'enemy country'—on the first day...Two planes owned by the coal operators which followed the movements of the 'army' were fired on near Madison, in Boone County. The deputy sheriffs in the planes did not return fire though the wings of the machine were pierced by bullets. During the night of August 26 and the whole of August 27 the deputies of Sheriff Don Chafin of Logan County fought at intervals with the invaders. He sent out for help, and it was said that McDowell County sent 500 men by automobiles and that 125 special state police, militiamen and deputies left Mingo County at daybreak for the scene. A band of 1,200 men crossed the line at Sharples, seized a special train sent to carry them home and ran it to the Coal River terminal branch near Blair."

Eventually more than 10,000 miners would join the battle and would face down almost 5,000 armed guards, local and county police, and deputies. Bombs were dropped from airplanes as the struggle, already the largest domestic insurrection since the U.S. Civil War, began to resemble World War I battles. After days of trench warfare on Blair Mountain and with large amounts of dead and wounded, federal troops were called out to restore the peace. Army forces heavily pressured "neutral" Union officials to persuade the striking miners to return to their homes, but sporadic fighting was still being reported at deadline. Martial law was eventually declared, almost 1,000 miners were indicted for treason and troops would remain in southern West Virginia for several years to come.

The miner's defeat helped break the union in southern West Virginia and eventually undermined its strength elsewhere. Higher production costs in unionized Pennsylvania and the north led to mine closures and reduced mining rates. Union roles plummeted nationwide as only unionized Illinois miners could compete nationally.

The union's strength in Illinois, particularly in southern Illinois, led to the infamous June 1922 Herrin Massacre in which 23 men, predominantly strike-breakers, were killed in series of brutal, running battles. Though new, UWMA President John L. Lewis and other officials were never personally blamed for the violence, it was clear the Union was somehow involved. *Coal Age* reported, both in the aftermath of the battle and later, that courthouse dispatches revealed a snarling

Table I—Maximum Percentages (Based on 1918 Output) of Productive Capacity in Bituminous Coal Fields Closed by General Strikes in 1919 and 1922

District	Production on 1918 (Net Tons)	Maximum Percentage of District Capacity Closed By Strikes		Theoretical Maximum Annual Tonnage Capacity Closed By Strike—in Net Tons	
		1919	1922	1919	1922
Central Competitive Field					
Illinois.....	89,291,000	100	100	89,291,000	89,291,000
Indiana.....	30,679,000	100	10	30,679,000	3,067,900
Ohio.....	46,653,000	100	97	46,653,000	44,541,000
Western Pennsylvania.....	48,299,000	100	95	48,299,000	45,884,000
Pennsylvania (other than Western Pa.)					
Central.....	61,629,000	83	92	51,362,000	56,699,000
Connellsville.....	35,677,000		81		28,898,000
Northwestern.....	8,051,000	100	67	8,051,000	5,394,000
Logan.....	7,194,000		6	432,000	6,331,000
Somerset.....	17,701,000		65	885,000	11,506,000
Westmoreland (d)					
West Virginia and Maryland					
Cumberland—Piedmont	7,073,000	98	85	6,932,000	6,012,000
Fairmont (b)	20,189,000	90	87	18,094,000	17,400,000
Kanawha.....	13,324,000	88	90	11,722,000	11,992,000
Kenova-Thacker	7,024,000		*		35,000
Logan.....	10,307,000				
New River.....	9,292,000	98	58	9,106,000	5,389,000
Panhandle.....	3,255,000	61	44	1,986,000	1,432,000
Poebontas and Tug River	23,128,000		†		116,000
Winding Gulf.....	5,156,000		15		773,000
Virginia.....	9,041,000		8		723,000
Kentucky					
Harlan.....	3,202,000	60	21	1,925,000	672,000
Harard.....	2,364,000				
Northwestern.....	7,109,000	70	8	4,976,000	568,000
Western.....	10,833,000	58	7	6,283,000	738,000
Southern Appalachian (c)					
Alabama and Georgia.....	19,252,000	48	57	9,241,000	
Michigan.....	1,465,000	100	100	1,465,000	1,465,000
Iowa.....	8,192,000	100	100	8,192,000	8,192,000
Southwestern Interstate Field					
Arkansas.....	2,227,000	100	96	2,227,000	2,138,000
Kansas.....	7,562,000	99	94	7,486,000	7,108,000
Missouri.....	5,668,000	99	93	5,611,000	5,271,000
Oklahoma.....	4,813,000	100	79	4,813,000	3,802,000
Texas.....	2,261,000	50	25	1,131,000	565,000
Colorado.....	12,408,000	55	33	6,824,000	6,576,000
New Mexico.....	4,023,000	15	15	603,000	603,000
Utah.....	5,137,000		45		2,312,000
North Dakota.....	720,000	30	37	216,000	266,000
Montana.....	4,533,000	90	98	4,079,000	4,442,000
Washington.....	4,082,000	100	50	4,082,000	2,041,000
Wyoming.....	9,438,000	95	100	8,966,000	8,436,000
Totals.....	579,281,000	71.6	73.3	414,625,000	425,355,000

(a) Includes Lintrobe, Greensburg and Ligonier districts.
 (b) Includes all of northern West Virginia except Cumberland-Piedmont and Panhandle districts.
 (c) Includes Tennessee and all of southeastern Kentucky except Harlan County.
 * Exclusion of country banks and local stripping operations.
 † Less than one per cent.

*The percentage figures given represent not the percentage of mines closed down, but rather the percentage of miners absent from work and, therefore, show the part of the normal producing power of the district shut off by the strike. For a discussion of how these percentages were arrived at the reader is referred to *Mineral Resources of the United States, 1921, Pt. II, pp. 502-7; ibid, 1922, Pt. II, pp. 513-19.*

**Coal Age*, September 24, 1925

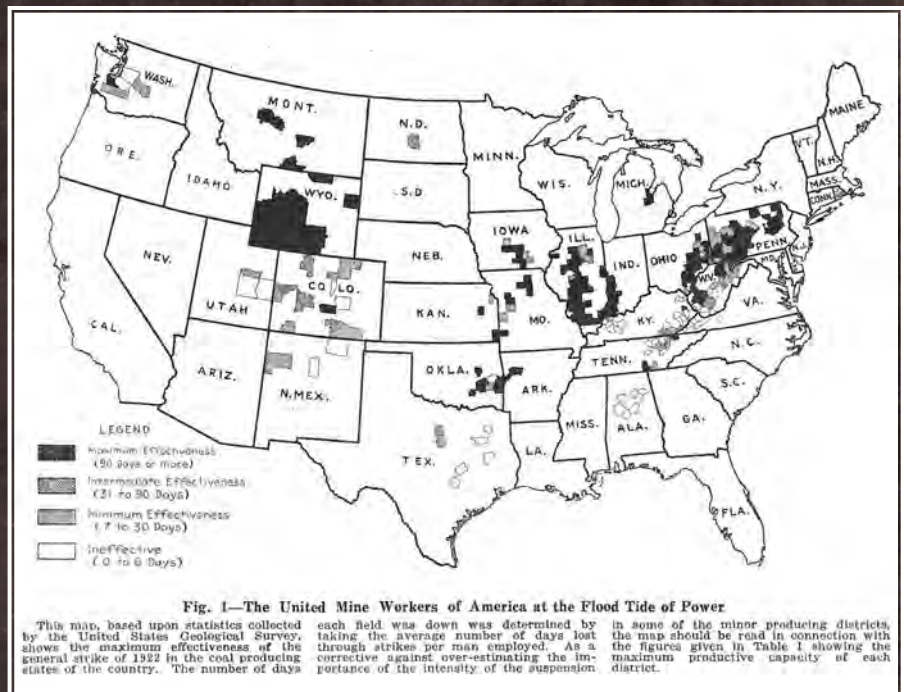
frustration with the lawlessness. More infuriating, over a two-year period, no jury would convict a single miner of wrong doing. Bloody Williamson County would make headline news throughout the decade leading to a nationwide boycott on Union produced coal from southern Illinois.

In the September 24, 1925, issue, special contributor Sydney A. Hale published a piece titled "How Strong is the Miners Union?" that attempted to parse out how powerful the UMWA still was after all the bloodshed. Asking "Has the strength which in 1922 moved President [Warren G. Harding] to confess that 'except for such coal as comes from the districts worked by unorganized miners, the country is at the mercy of the United Mine Workers' been so dissipated that the organization headed by John L. Lewis is no longer the controlling factor in the labor situation in the bituminous fields of the nation? Have the gains so painfully made in the early days of the movement and so effectively consolidated in later years been flung away in an obstinate and unreasoning attempt to maintain a wage basis that is economically out of line with competitive costs?"

Hale summarized the strength of the union after the Great War. "In the general strike of 1919 the power of the United Mine Workers was such that at one time or another during that six weeks' suspension it was able to close down 71.6 percent of the actual productive capacity—measured by 1918 performance—of the bituminous coalfields of the United States. Between the end of that strike and March 31, 1922, union control weakened notably in eastern Kentucky and in the low-volatile regions of West Virginia, where the war had given organization a temporary foothold. Nevertheless when the call went out from Indianapolis for another general strike three years ago, the union was able to marshal enough support to cut off 73.3 percent of the productive capacity."

A truce signed in Cleveland, Ohio, in August 1922 "marked the beginning of the end of the general bituminous strike which had started four and one-half months before. That truce continued the basic rates...fixed by the United States Bituminous Coal Commission in 1920, and averaging 27 percent above the war time scale...Another truce extended these rates until April 1, 1924. By the Jacksonville (Fla.) compact signed a year ago last February these rates are to be continued until April 1, 1927."

This history was vital in understanding that current pay scales were based on



* Coal Age, September 24, 1925

wartime compromises and made during an economy that no longer was in existence. In order for union operations to remain competitive with non-union mines, they had to increase productivity and further mechanize. Under-capitalized mines in union districts worked less days or became idled. However by 1925, union operations in Pennsylvania were still operating an average of 213 days or more. In Illinois "which is, except for small country banks, completely unionized, [production] averaged just eleven days less than [non-union] West Virginia. Franklin County...lagged only six days behind McDowell County W.Va." In essence, only the "better situated producing companies throughout the country were able to show a profit on their year's business." This was done despite spot prices plummeting from \$4.38 per ton in January 1923 to only \$2.18 in December of that year, less than the spot price of coal in 1918, 1920 and each year since. Faced with high costs, operators had no choice but to try to change the terms of the contract or sever ties with union. "No important union district has escaped some manifestation, some evidence of a determination to carry on without the union since it was impossible to carry on with it." Further strikes and skirmishes seemed inevitable in 1925.

Though the Great Depression began in 1929, by then much of the coal industry

had already been slumping for some time. Over production, speculation, high labor costs, crushing competition between union and non-union mines, less railroad traffic, declining industrial requirements and a tidal wave of cheap oil were all cutting into coal's piece of the energy pie. Production plummeted almost 100 million tons from 1926 to 1928 from 657 million tons to 575 million tons, rebounded a bit the following year and fell back sharply to just 536 million tons in 1930—the high water mark for more than a decade to come. Nationwide producers began cutting production. Led by Consolidation Coal Co., operators throughout Appalachia began "concentrating" mining activity at only the most productive mines. In a July 1928 article, executives from around the nation were quoted in favor of further consolidation. "Elimination of sufficient excess capacity to bring production in line with consumption offers the only hope of permanent relief, in the opinion of William J. Clothier, president, Boone County Coal Corp. 'Only those mines will be shut down which are forced to do so because their owners believe they cannot be made profitable. This is the survival of the fittest. The sooner those in the industry realize it and those operations are closed...the better it will be' for the surviving operators, the miners and the public."

THE 1930 GOVERNMENT CONTROLS FOLLOW THE FAILURE OF NORMALCY

1930-1939



During the late afternoon of October 29, 1929, the zip of the jazz era began to slip away into the overarching gloom of the Great Depression. The worst day in a series of stock sell offs that autumn, Black Tuesday's plunge was just one point in a cascading systemic global economic failure. Following the stock market crash, the Hoover administration and the Republican-led Congress pursued various remedies to shore up American industries that ultimately made things worse. The protectionist Smoot-Hawley Tariff Bill of 1930, passed over the opposition of many leading Republicans, raised the prices of most imported good into the U.S. and led to reciprocal tariffs worldwide that effectively shut the door on American exports. That in turn led to even greater stock sell offs and further declines in industrial demand. As the dust settled on the rubble of the global economy, hardest hit were raw material producers and miners. Coal production fell off a cliff from a 1929 high of 608 million tons to 536 million tons in 1930, 441 million tons in 1931, and down to a low in 1932 of only 359 million tons. The lowest tonnage total since 1904, U.S. production would not return to even 1929 figures again until 1942.

Between 1929 and World War II, no industry was hit as hard as the coal sector. Mechanization, already in full swing by 1929 became virtually the only way to cut costs and stay in business as hundreds of mines shut—many for good. Liquidation loomed for many venerable companies, in particular in the older anthracite fields, as eastern manufacturing hemorrhaged jobs on falling demand. There were many days in 1932 and during the Depression when 80%-95% of the miners in dozens of coal towns across the U.S. were out of work—and even then, you were not guaranteed a full week's worth as jobs were often rationed. One of the few growth sectors in the industry were in the bootleg dog-holes that popped up throughout the coalfields as desperate miners and often their families scrounged around for coal to heat their homes, cook their meals or

sell for subsistence. America had never known such despair.

In 1932, the new Roosevelt administration took over the reins of government with a massive mandate for real change. The near immediate passage of the National Recovery Act (NRA) and its sister, the National Industrial Recovery Act (NIRA) were the first of hundreds of new regulatory laws that began to control, stabilize and grow the moribund economy. 1933 brought a tiny glimpse of hope as production slowly began to rise, a trend that continued through the decade to a "high" of only 497 million tons in 1937. But the following year coal output plunged by more than 100 million tons as a third devastating round of contractions hit the economy again in 1938. By the end of 1939, America was getting back on its collective feet, but was still incredibly impaired; coal production was still down to only 446 million tons—barely 60% of 1929 totals.

The early part of the decade until 1933 was a desperate gambol toward survivability. Markets died. Producers had no place and no one to sell coal to, let alone the money to pay employees. Wages were cut, then cut again. Coal communities were desperate. The United Mine Workers was driven by internal division as more radical elements broke off from the John L. Lewis led majority. But as it fractured in the face of endless cost cutting and mechanization, organized labor lost more and more ground. Forced to take any wages they could, coal miners were desperate to get by; and the coal companies themselves were racing each other to the bottom to staunch their own bleeding.

Mechanization, Normalcy & Consol

A return to normalcy was a long way off when Editor Sydney A. Hale, in a July 1930 editorial asked "When will business be normal again?" After nearly a year and with no end in sight, Hale was frustrated with the "pollyannas of last fall who declared that the industrial depression at its worst was only a fleeting visitation." But he also chastised

those who—in their despair—had begun to abandon the exuberance of the 1920s. "Disillusionment over the collapse of 'the new era' which was to overturn all precedent and all economic law seems to have blinded many business men to the opportunities which the present situation offers to sound and progressive management." Lamenting that obviously "Weeping has been easier than working," he wonders what will come in the wake of the stock crash. "Will the return to normalcy revive the fatuous doctrines so recently and so painfully discredited?"

Like a good cheerleader rallying the team when they are down, Hale reminded *Coal Age's* readers that though the nation had been quite prosperous, those dizzying heights had not really been that high for the coal industry. Thus toughened, despite the economic prognostication, "No industry is in a better position to meet these new conditions than coal. On business as a whole, the precipitous pitch from eight soft years of super-prosperity has produced industrial shell-shock. Coal has denied cushioned ease for a decade. Many of the physical readjustments which industry at large now must make, coal already has made under the compulsion of necessity. To coal, for example, the law of diminishing growth is an actuality—not an economist's theory. Leadership in coal, therefore, has an unusual opportunity to build soundly on the return to normalcy."

In the October 1930 article "Tenth Annual Model Mining Number," *Coal Age* singled out the inspiring leadership of the venerable Consolidated Coal Company that had in 1929 initiated massive internal readjustments to stay ahead of the financial onslaught. Showing a survivalist's instinct, Consol had cut production, consolidated mines into more sustainable regional units, and re-invested in achieving high productivity without sacrificing core goals such as safety, innovation and a longer term return on investment. "Such a re-organization, reaching into all departments and affecting every group of workers, has not been easy.

The wide sweep of its production activities spread over four states has made necessary a more complex organization, with possibly finer adjustments and divisions of responsibility, than would be required if the mines of the company were all in one district... Machinery, of course, is playing an increasing part in the program of the company. Standardization of operating practices has been made a tool of efficient management. But in all the ruthless struggles for efficiency, the human equation has been submerged in executive thinking. Consolidated Coal has long been a leader in safety—and the practical benefits of that leadership have been reflected in operating costs.”

Early in the issue, as a way to both trace the growth of the U.S. coal industry and present a rationale for whole-scale readjustment, the editors reviewed the history of Consol and how it grew to become “one of the two largest companies in point of production and the first in reserve acreage.” Incorporated in Maryland in 1864, the “Consolidated Coal Co. confined its activities” to the Georges Creek coal district until 1903 when it merged with several operators working in the Pittsburgh seam in northern West Virginia and Somerset County, Pa. “By these mergers Consolidation, which started the first year of its corporate existence with an output of 37,678 tons, was able to enter the 10,000,000-ton producer class.”

Consol grew again when it entered the newly opened eastern Kentucky coalfields, purchasing 30,000 prime acres in Johnson and Martin counties as well as a new railroad. In 1910, Consol added another 100,000 acres of Elkhorn coal in Knott, Letcher and Pike counties, as well as another railroad that allowed for the opening of 15 mines in

MARYLAND DIVISION	
Mine No.	Location
1	Ocean Mine..... Frostburg, Md.
3	Hoffman Mine..... Eckhart Mines
4	Consolidation No. 4..... Eckhart Mines
9	Consolidation No. 9..... Frostburg
10	Eckhart No. 10..... Eckhart Mines
12	Borden Shaft..... Frostburg
17	Consolidation No. 17..... Frostburg
WEST VIRGINIA DIVISION	
25	Consolidation No. 25..... Clarksburg, W. Va.
26	Consolidation No. 26..... Watson
32	Owings Mine..... Owings
38	Consolidation No. 38..... Fairmont
63	Monongah..... Monongah
86	Carolina..... Carolina
93	Jordan..... Jordan
97	Rivesville..... Rivesville
PENNSYLVANIA DIVISION	
119	Consolidation No. 119... Jenners, Pa.
120	Gray Mine..... Acosta †
123	Consolidation No. 123... Boswell
MILLERS CREEK DIVISION	
153	Consolidation No. 153... Van Lear, Ky.
154	Consolidation No. 154... Van Lear
155	Consolidation No. 155... Van Lear
ELKHORN DIVISION	
204	Consolidation No. 204... Jenkins, Ky.
205	Consolidation No. 205... Jenkins
206	Consolidation No. 206... Dunham
207	Consolidation No. 207... Dunham
212	Consolidation No. 212... McRoberts
214	Consolidation No. 214... McRoberts
POCAHONTAS-NEW RIVER DIVISION	
251	Coalwood Mine..... Coalwood, W. Va.
253	Consolidation No. 253... Six
254	Consolidation No. 254... Caretta
261	Caretta Mine..... Caretta

Consolidation Coal Co.—In 1930, the company was operating 31 mines. * *Coal Age*, October 1930.

the territory. For 12 years the company concentrated on these three districts until 1922 when it merged with the Carter Coal Co., owner of 10 mines and 38,000 acres of coalfields in McDowell County, W.Va.; Tazewell and Buchanan counties, Va.; and Knox County, Ky. “As a result of these purchases, Consolidation Coal Co. in 1924 owned approximately 348,000 acres of coal land, with a potential annual output of 14,000,000 tons and a reserve of more than 2 billion tons of un-mined coal.”

However, Consol’s expansion had not been conducted to create efficiencies, but to ensure output. “The period of greatest expansion took place during those years when railroad-car supply was a critical factor, and it was considered better policy to own a number of small mines—each in position to demand a share of existing transportation facilities—than to concentrate upon fewer and larger-capacity units.” This was precisely the opposite of the strategy then being embarked upon by management. Starting with 108 mines, by 1930 Consol, with less than a third as many mines in operation, was “averaging a greater annual production than during the war years”—at the time, the highpoint of national output and industry health. This was, the editors wrote, because of Consol’s adherence to the most up-to-date mining practices, use of modern production communication, and equipment and advanced strictly enforced safety policies.

Though headquartered—conveniently for *Coal Age’s* editorial team—in New York City, Consol’s 9,300 mine workers and several hundred other mine employees were working in five different divisions: Maryland, West Virginia, Pennsylvania, Millers Creek (Ky.), Elkhorn (Ky.) and Pocahontas-New River. At the time, the Virginia operations were idle.

At the leading edge of technological advance by 1930, throughout coal faces across the company, breast machines had “given way to shortwalls”...and these were “destined to be hard run by arcwalls... wherever the coal is sufficiently thick, the mine is on the room-and-pillar or on the block system, and the miners do not cut their own places...In all, there are 77 arcwalls in active



Joy loader loading on end of pillar, mine 206 * *Coal Age*, October 1930



Brown-Fayer pit-car loader starting pocket in pillar, Cap Mine 32. * *Coal Age*, October 1930

operation. The shortwalls or longwall machines are unassailable wherever the extracted portion of the seam is thin, a long-wall face is available, or where the miners cut their own faces mechanically. Of these latter types of machines the Consolidated Coal Co. has 96, eight being longwall units."

Wherever possible, Consol had invested in mechanization and was using four of the major types of loading and transporting machines, both in high and low coal. These included Joy, Myers-Whaley, Goodman and the Jones Co.'s "Coloders." "Conveyors and scrapers fill an operating need in low coal where mine-car transportation is difficult or costly. Loading machines and pit-car loaders are employed in mines in thicker seams." The company had also installed newly permissible telephones throughout each mine "principally for car dispatching and transacting the business of normal operations,

of safety, and he is consulted on the purchase of merchandise such as goggles, caps, shoes, gloves, overall, etc., before they are put in stock. In fact, there is no branch of the operating department where the engineer of safety is not consulted or where he does not have jurisdiction over equipment and practices." Earlier, when the department had been reorganized, it was tasked with the creation of a set of company-wide rules, later termed "Safety Standards." These were later printed, bound and distributed to all operating officials and bosses who, in turn, trained their crews to follow each standard. Violations, early on at least, could lead to forced appearances before unique "safety courts" where men would be adjudicated for infractions.

But normalcy did not appear in 1930, and it would not return for some time, if ever. The only real hope for the industry was

Rogers, Coal Division, U.S. Bureau of Mines, summed up coal's precarious position. Titled "Drastic Liquidation of Excess Mine Capacity Brightens Prospects for Future," the authors cataloged that "since 1920, a total of 1,665 operators have been forced out of the bituminous coal industry." From a post-war high of 6,277 corporations, by 1929 that number had fallen to 4,612. "The elimination of these unlucky producers bears mute testimony to the ruthlessness of the competitive struggle in recent years, but in ones sense it represents progress. It is a sign of the drastic liquidation of excess productive facilities which the industry has already accomplished." Espousing a Darwinian theme, the whole, they postulated, was stronger because of the demise of the weaker, generally smaller and mid-size producers that had shut down. According to their findings, large

“Granting that mechanization would lead to some job-loss, without further inroads, the entirety of the industry was in jeopardy.”

[but] management also desired to insure, if possible, a reliable means of rapid communication in case of emergencies."

As early as 1908, Consol had put into effect "radical" safety practices, often far ahead of other producers. "Draeger oxygen apparatus for mine rescue work was purchased in Germany, rescue crews were organized and trained, making the company among the pioneers, if not the first, to install such apparatus on a large scale." Chemical fire-fighting skills, gas inspection and rock dusting had become standard practice in the 1920s.

By 1930, Consol had given the Safety Department "jurisdiction from the general plans to the last detail in all ventilation problems; preliminary and final projection control maps, matters of haulage (including signal systems, dispatching, etc.), electrical wiring, new construction and new equipment, all bear the approval of the engineer

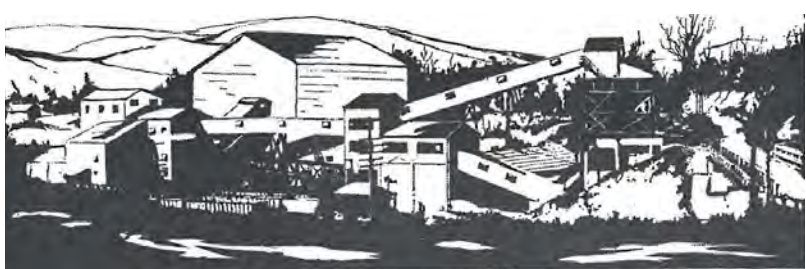
mechanization and finding more ways to cut costs. In the January 1931 editorial, Hale wrote, "the machine is coming to be recognized as the means by which the coal industry is enabled to compete successfully with rival fuels. [But yet]...further mechanization is necessary, however, if the business now led by coal is to be retained and the jobs of the coal miners are to be made secure." Granting that mechanization would lead to some job-loss, without further inroads, the entirety of the industry was in jeopardy. Ominously, Hale signs off that "had the machine not arrived, the story of coal in 1929-1932 would have been far different from what it will be when the record of those years is finally written."

Mechanize or Die: Liquidation Comes from a Failure to Adapt

A review in the February 1931 issue written by F.G. Tryon, R.W. Metcalf and H.O.

mines and mining companies, those producing more than 200,000 tons a year, were less likely to close than smaller producers. And companies that extracted more than 500,000 tons annually were growing in number, mostly through combination. In 1929, there were 218 such mining companies, a 15% increase since 1920. At the time of the crash, these companies accounted for almost 60% of total production.

But, as Hale reminded, "for business in general, taking stock at the end of 1930 consisted largely in dolefully entering up the losses in red ink." By comparison with the rest of the economy, coal was doing about par. Bituminous production was down about 14% or 73,359,000 tons and anthracite dropped to just under 70 million tons, or about 5.5%. According to McGraw-Hill's sister publication *The Business Week*, the whole economy had contracted by another 15.9% year-over-year.



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Decreases in coal consumption by both railroads and public utilities hit industry hard. But “encroachment of substitute fuels” was “a subject of increasing importance. Fuel oil continued to gain in 1930, though at a slightly reduced rate; natural gas enjoyed a boom year with no evidence of recession in the near future.” Coal was being squeezed between cheap oil and natural gas market expansion on the one hand and declining needs by traditional customers—the same customers for whose needs many mines had been opened and for which they were producing. To best face common problems, coal companies began creating new combinations and associations to best legally coordinate their responses.

To get a better sense of how to advise the coal community, Hale and the editorial staff sent out queries to dozens of mine executives nationwide. In the May 1931 issue, they revealed that the predominant response was the necessity of further mechanization. “First installed for the purpose of cost reduction as an end unto itself, the machines have since demonstrated their utility as weapons at high-wage mines to combat the destructive competition of mines which have been driving down wages and prices in their war for business.” However, “patience is a virtue which must be practiced in mechanization. The new methods are revolutionary to the job habits to which the miner has been long accustomed. On a contract basis, the miner was his own boss. For some time he is lost under the new conditions and, unless properly handled, may expect the company to take every bit of the responsibility for his job and his safety.”

Mechanization, however, was also having a stabilizing influence throughout the industry. “Mechanization at this early stage of development has cut down labor require-

ments as much as 50 percent...Machines are putting mines paying high wage scales”—generally meaning mines with unionized workforces—“on equal footing with operations where wages are lower and working hours longer. It is felt that wages cannot be driven beyond the lowest limit now prevailing; that for this reason the plants now mechanized will enjoy a considerable measure of profit in the future over and above their present return. Tonnage gains to mechanized mines are being transferred from hand-loading mines.”

For the September 1931 issue, *Coal Age* presented to the industry a plan for stabilization. Not intended as a detailed blueprint, the plan was meant to stimulate further conversations and actions as the mining community continued to suffer incredible contractions. Looking back at the history of mining from 1870 through 1910, the editors stated the industry’s biggest problem during that time was assuring production ahead of demand. However, due to these various challenges “productive capacity was developed to a point outstripping peak demand, while the stimuli which gave the speculative surge to ‘good times’ in the bituminous coal trade either have disappeared or no longer excite. In the meantime, increased efficiency in the utilization of coal by the larger consumers and inroads of competitive fuels have been working to check the normal expansion of demand.”

Because of this, the industry now has “too many mines, too many operating companies, a declining market for coal as a raw fuel, weak marketing policies and methods, lack of research to develop new uses for its product, inadequate sales realizations, and an unstable labor situation. While the law of the jungle is driving out some of the inefficient, it is also draining

the resources of the many producers who richly deserve to survive. Under the law of the jungle, the lion is little more secure than the jackal.” Stating that “a gambling basis of profit for an industry so important to the industrial welfare of the nation as bituminous coal is neither conducive to stabilization nor safe for the nation or for the industry itself,” *Coal Age* presented its seven part plan: “More production control; sound merchandising; stabilized industrial relations; more mechanization; coordinated research to develop new uses for coal; more consolidations; and more safety.”

Surviving Through the Bottom: Roosevelt Brings Stability

To what extent these ideas were adopted or practiced is difficult to ascertain, but things did keep getting worse for the industry. 1931, 1932 and the first half of 1933 were “lost years” where companies were doing all they could to hold on having foregone hope of any profit: they just tried to keep money coming in the front door. Handloading continued to be a drain on the industry and, as more mines shut or slowed production, it was always the mechanized mines that held on. 1931 production figures from Illinois published in the February 1932 issue illustrated this point. Though overall production fell more than 9.1 million tons in 1931 to 42.9 million tons, mechanical output only dropped 223,817 tons. Handloading was down 9 million tons overall. “In other words, practically all of the tonnage drop in the state was lost by unmechanized operations.”

COAL AGE

Established 1911—McGraw-Hill Publishing Company, Inc.

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

SYDNEY A. HALE, Editor

New York, October, 1933



Under the Blue Eagle

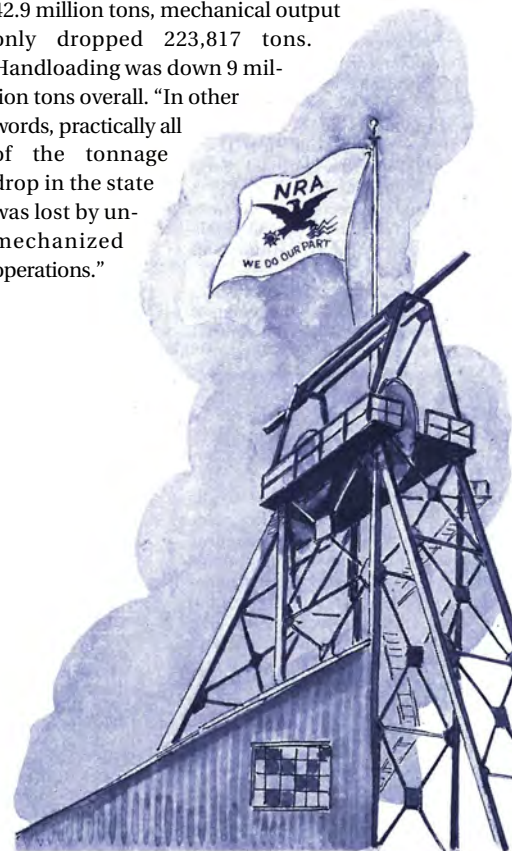
THE GREAT EXPERIMENT in tripartnership of industry, labor and the federal government in bituminous coal mining is now under way. By the terms of the code of fair competition, effective October 2, trade practices against

below which no seller may drop without creating a *prima facie* presumption of destructive price cutting and unfair competition.

Meticulous critics and others less microscopically minded doubtless can and will find many details in the code fair targets for ad-

Some of the

Coal Age editorial page carrying the National Recovery Act's Blue Eagle. **Coal Age*, October 1933



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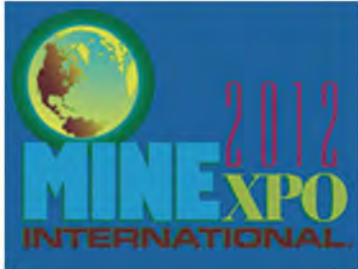
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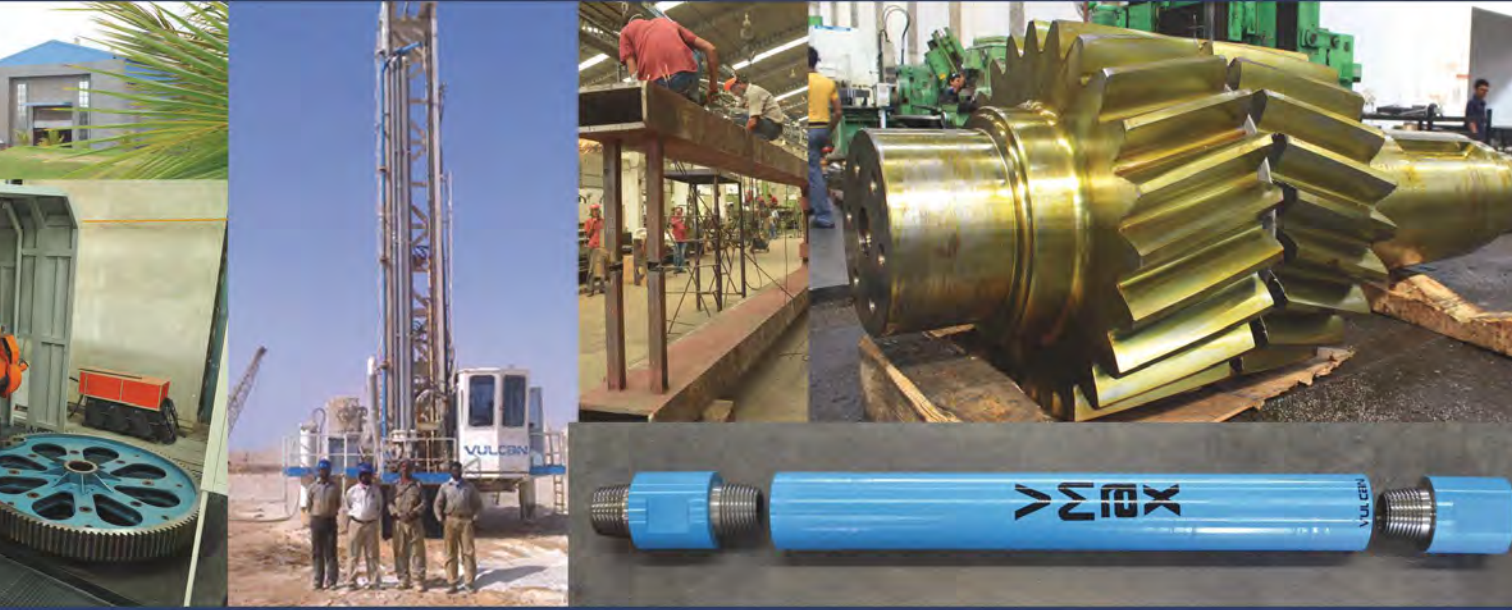
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In the June 1933 issue, Sydney Hale and staff begrudgingly accepted Roosevelt's New Deal and the beginning of the National Industrial Recovery Act (NIRA) knowing it meant national price, production and competition controls, and compulsory unionization. The industry was falling to new bottoms every day and even mechanization was unable to create a floor. It was up to the government. "Rugged individualism has had a glorious tradition which, emotionally, it is not easy to abandon. Yet even the most enthusiastic exponents of this tradition must admit that cherished social and economic standards have broken down under the impact of the industrial depression. Unfortunately there seems little reason to believe that these can be built back up as rapidly as national necessities demand without the government support and sanctions implied in this bill."

The National Recovery Act (NRA) and NIRA stopped the bleeding by establishing unprecedented government control over all sectors of the economy, from coal mining to publishing *Coal Age*. For that reason, even the magazine's masthead began to fly the NRA's Blue Eagle symbol in the October 1933 issue. "The great experiment in tripartnership of industry, labor and the federal government in bituminous coal mining is now under way. By the terms of the code of fair competition, effective October 2, trade practices against which leaders in the industry have inveighed for years are specifically outlawed," wrote Hale in that month's editorial.

One of the biggest changes brought by these acts was the adoption of a national minimum wage. "In the majority of cases, these minima represent...substantial increases over the rates prevailing prior to the enactment of the law...Definitely pegging wages puts an end to that particularly vicious form of competition under which the wage earner was the chief victim of a frantic scramble for tonnage at any price." A second provision of the NRA was the establishment of "fair market prices" below which no operator could fall under legal penalty. Though Hale knew there would be critics both of the new policies and *Coal Age's* endorsement of them, he credited "the groups of coal men who labored through the hot Washington summer, frequently surrendering cherished opinions and prerogatives in the cause of cooperation, that this great experiment might be possible."

Along with minimum wages came union representation and the open shop nationwide. Labor's incredible victory came straight out of the jaws of defeat. From a

1924 high, organized labor had lost tremendous support—or at the very least, it had lost the ability to represent workers throughout much of the eastern coalfields, particularly in battleground states like Pennsylvania and West Virginia. Roosevelt's election not only changed that but brought to reality 60 years of liberal, progressive and socialist fantasies. Writing in the October 1933 issue Hale noted, "Three months ago, recognition of the United Mine Workers in the bituminous fields east of the Indiana-Ohio state line was confined to southern Ohio, a few scattered operations in Pennsylvania and several companies in northern West Virginia: today, thanks to the new freedom granted organized labor by the NIRA and to direct presidential intervention, operators throughout the great Appalachian region have signed wage agreements with the Lewis organization. The sheer drama of this swift revival and expansion of union power needs no theater; the task of consolidating these gains and of making the new contracts effective instruments for the betterment of the whole industry, however, is much less spectacular but infinitely more important." *Coal Age* published the entirety of the new NIRA codes for the coal industry that issue as well, a very different blueprint for recovery than what they had proposed just a few issues before—but in many ways, it was able to achieve precisely the same ends. At least, the bottom had been reached, albeit through government fiat.



Night on Summer Hill. Strip shovels now work where Ginter stumbled over "stone coal" in 1791. **Coal Age*, October 1934

And so marked an end both to the lowest points of the Depression, and of unregulated free-markets. For the next 16 years under Roosevelt and later Truman, and through the beginning of the Reagan-era, the economy would be much more regulated, unions would have much more power, and American capitalism would be practiced very differently. Though the Depression was far from over and industrial recovery still far off, 1933 was to borrow from Churchill, the end of the beginning.

Stability Brings Recovery & Innovation

Throughout 1933, operators, the UMWA and the government worked out new wage scales and the government set new price scales as well. This was in exchange for labor peace, something both sides wanted. Though the agreements all had sunset clauses, operators, for the most part, agreed to unprecedented controls. In the case of disagreements between labor and operators, by law there must be arbitration. "The procedure calls for conferences between the management and the mine committee, after which the dispute is referred to a board of four, two selected by the operators and two by the miner. In case the board fails to agree, the matter is referred to an umpire selected by the board or, in case the board fails to agree, by the NRA Administrator. No consideration of disputes is permitted as long as the mine is shut down in violation of the contract," wrote the editors in the March 1934 issue.

However, labor peace nationwide was hard to create as both the union and operators jockeyed for position in the various different coalfields. Wages and prices were understood not to be equal for each field and for each task. How unequal and who made that decision were basis points for further strikes and lock outs. In April, *Coal Age* announced the adoption of a 35-hour work week for much of Appalachia. First adopted in the north, southern operators, particularly in Alabama, held out. Strikes brought in the National Guard, who, unlike previously, sided with labor and against the operator's guns. Throughout the various sets of negotiations nationwide, the UMWA either was given or achieved preference over other organizations such as the Progressive Miners Union in the Midwest.

Though some companies fought the administration out in the courts, others adapted. Though wages trebled, Eugene McAuliffe, president of the Union Pacific Coal Co., was able to report in the July 1934 issue that, through careful and progressive mechanization, his mines were once again

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viable. Reviewing the 66-year history of the company and its operations near Rock Springs, Wyo., McAuliffe was able to put costs and wages into perspective. In 1890, the basic wage paid “white labor working inside the mine was \$2.50 for a 10-hour day.” On September 1, 1907, UP adopted the 8-hour day and under the new controls of the Code of Fair Competition for the Bituminous Coal Industry, a 7-hour day was established effective April 1, 1934. But despite a 210% rise in hourly labor costs, “the principal changes that have made it possible to produce coal today include the substitution of electricity for steam hoists and pumps. Electricity also made possible the present-day cutting machine, the haulage locomotive and the loading machine.”

After reviewing the new equipment currently in operation, McAuliffe said it was mechanization, “the result of scientific technique contributed very largely by the manufacturers of mining machinery and equipment, reinforced by the U.S. Bureau of Mines, plus substantial capital investment, [that] has made it possible for the industry to pay wages in 1934 equivalent to 310 percent of the wage of 1890.”

Finally, in the August 1934 issue, *Coal Age* was able to once again report on expansion within the industry. Several stories in that issue treated the growth of the Grundy, Va., southern high-volatile fields. “Five to 10 years ago few would have been bold enough to predict that this generation would witness the opening of a new coalfield in southern Appalachian territory. And yet today the state of Virginia can boast of such a mining district. The first shipment of coal from the...Grundy field was made in May 1932 and now seven mines are in production.”

Coal Age would report on these mines throughout the rest of the decade as production expanded throughout the region.

1934 and 1935 marked slight increases in anthracite production as well. Though the anthracite industry was still weak and waning, for its mid-decade 15 Annual “Numbers” issue Hale decided to feature the “Old Company” as it was still known: The Lehigh Navigation Company. Chartered in the early part of the 19th century, the old company was well known for innovation. “As part of the development of a system for recovering coal from heavily pitching seams, for example, Lehigh Navigation drove the first mining tunnel in the United States. Some of the earliest wet-cleaning processes were the brain children of its men. Again, at Hauto, Lehigh Navigation pioneered in mine-mouth generation of electrical energy. Today, Lehigh stands as a leader in anthracite stripping practices. When big shovels were regarded as suitable only for bituminous open-pit work, the Navigation company demonstrated its faith in larger-capacity buckets.

Late 1930s Recovery, Expansion, Innovation & Labor Compromise

In 1934, coal production began to rise out of the doldrums to just over 417 million tons. And while 1935 was not a break out year, at least production was steady, and even a bit more. Final numbers showed a small rise to 424 million tons. Steady incremental growth was the hope of the government officials who took control over the economy. However, “were tonnage the sole yardstick of progress, the record would not be particularly inspiring. But, in these unusual times, production figures may not tell the whole story,” wrote Hale in his February 1936 edi-

torial “The Balance Sheet for 1935.” Price, production and competition targets were created and largely met. New Deal bureaucrats established economic zones to create wage and price uniformity. Operators continued to fight labor gains, but both sides were eventually satisfied—for the most part—that the bleeding had stopped and peace was at hand. Stability allowed operators to expand production in some zones and to innovate once again.

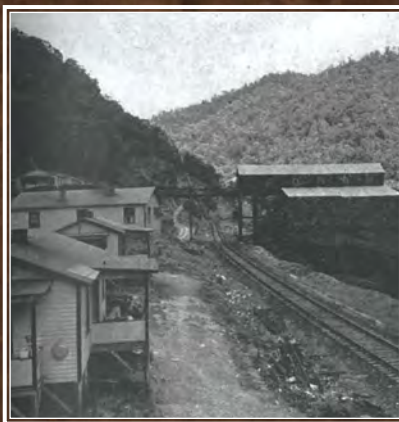
Mechanization and cost cutting was still key and operators were largely free to increase productivity. Moreover, increased “underground mechanization—the development which enabled Midwestern mines to survive during the era of excessive disparity in wage rates between what then were union and non-union fields—has been making real headway in the Appalachian area in the past year. Further expansion appears inevitable...” continued Hale.

Importantly, mechanization helped lower coal costs in comparison to other fuels. However, increased coal preparation and cleaning also helped hold the line. Though “slide-rule purchasers may complain that beneficiation is overdone, the producer who is interested in selling above slaughter levels knows the appeal modern cleaning, sizing and dustless treatment makes to the consumer. As a result, last year saw activity in the preparation phase...unmatched since 1931.”

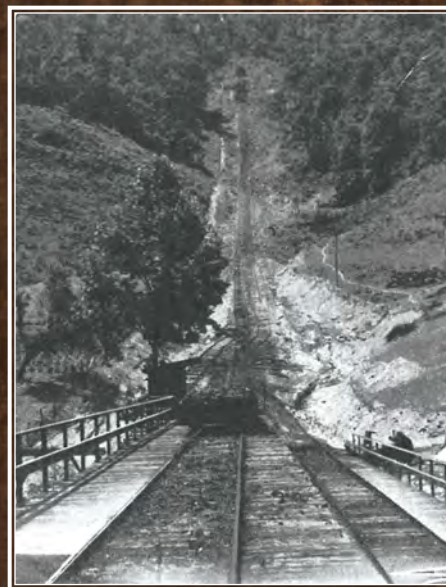
In the September 1936 issue, Hale defended the industry against the jeremi-



Home Creek Smokeless Coal Co. plant and retarding rope-and-button conveyor. This operation shipped the first coal from the Grundy field. **Coal Age*, August 1934



No. 2 mine, Buchanan County Coal Corporation. As yet, only this company has built houses for the miners. **Coal Age*, August 1934



Mine-car plane, Buchanan County No. 2 mine; to be changed to monitor plane. **Coal Age*, August 1934

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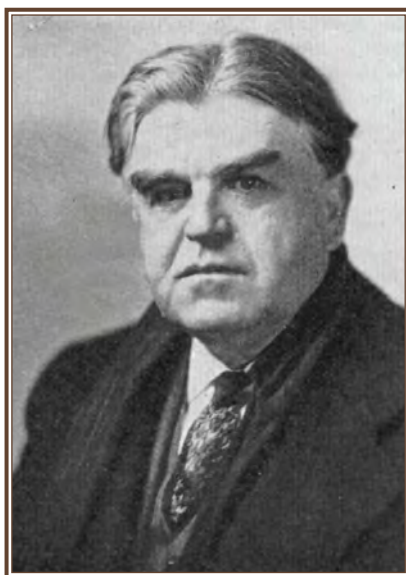
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ads of “the little brothers of gloom” who “with more fervor than grief” were lamenting the “crumbling of the vast empire of King Coal.” New studies found coal was still the dominant fuel for house heating nationwide. In 64 cities nationwide ranging from Cleveland, Ohio, to Columbia, S.C., and both Portland, Ore., and Portland, Maine, 78.6% of the U.S. was still using coal in their homes as opposed to 13.6% using gas and 7.8% using oil.

The October 1936 issue also marked the 25th anniversary of *Coal Age*'s publication. Available now on-line, the expanded edition chronicles and celebrates both the short history of the magazine as well as the much longer history of the industry it served and continues to serve. But there was no doubt that King Coal in the Depression was getting kicked about. To do its share, in the October 1938 issue, *Coal Age* published a very detailed and colorful, for the time, “Public Relations Manual for Industry.” Presented both by *Coal Age* and McGraw-Hill, this special insert provides a unique snapshot of where the mining industry was during the middle of the Great Depression. In 1935 dollars, mining was the fourth most valuable industry in the U.S. Employing more than 565,000 men in coal alone, the industry was worth more than \$3.1 billion. Though production per man had gone up, mechanization by 1936 only accounted for 16.3% of total production. Of total 1936 coal consumption of 488 million, utilities took just under 44 million tons, coking coal represented 66 million tons, the main railroads used 82.7 million tons and domestic coal accounted for more than 122 million. Other industries used over 153 million tons that year.

1935, however, saw another change as more scientific study was given to the causes of why so many miners were developing bronchitis—later correctly diagnosed as silicosis. Throughout the late 1930s, more studies would reveal the horrific spread of the disease. Additionally, old age pensions began to be developed and deployed throughout the industry as management and the public began to question how long a person should have to work. What seemed like a foregone hope for millions became a reality as, by the end of the decade, workers throughout all industries, including coal miners, began to retire from their careers instead of expire while still employed.

Labor won a significant victory once again with Roosevelt's re-election in 1936 and wages were increased nationwide. At the 34th Constitutional Convention of the United Mine Workers held in Washington in early 1936, John L. Lewis boasted that almost



John L. Lewis. **Coal Age*, March 1936

95% of the nation's mines were now union. Since 1934, Lewis told the 1,716 delegates that “being more completely organized than ever before, collective bargaining more universally accepted, membership of the union greater than ever, the financial resources at their peak, the potential strength of the organization is transcending the imagination of the organized labor movement of the country and the public at large.”

In May 1936, *Coal Age* reported the new Department of Labor was launching a study of silicosis and silicosis legislation. Additionally, from 1935 through 1939, the magazine published several stories about old age pensions and the problems of “old age dependency”, i.e., the fact that so many



William Gibson. **Coal Age*, January 1939

older people were both out of work and without money or property. By 1930, the average life expectancy had grown to 60 years, but people over 65 represented 5.5% of the total population or 6.6 million people. “Studies of the economic status of this group invariably show a substantial proportion is entirely dependent upon others for continued existence.” In an era before Social Security, the Depression hit this group very hard. Many coal miners, particularly in the anthracite fields, chose to continue working past 60 if possible. And, in eastern Pennsylvania at least three large anthracite companies proudly employed miners with 50, 60 even 70 years of service.

Of the 190 men who had worked at the Lehigh Navigation Coal Co. (out of 6,400) more than 50 years, the oldest was William Gibson who, at 83 years old was still continuing work as a shop foreman. The gentleman had accumulated more than 75 years in the industry, beginning his career at the age of 8. “Two or three years ago, the company thought he should be pensioned, but the outside foreman did not want to lose his services, as he felt he was doing more and better work than many of the younger men.”

In 1936, coal production grew slightly that year to 493 million tons. But in 1937 steady growth was halted by the onset of another recession. Republican pressure in Congress led to incorrect assumptions about the overall strength in the economy leading to another contraction. 1938 production fell by 20%—more than 100 million tons—to just 394 million tons. And the decade ended with only slightly recovered production with numbers coming in just below 450 million tons. However, while the middle and end of the 1930s were not a return to the halcyon heights of the 1920s, or anything approaching the return to normalcy sought at the beginning of the decade, they were at least fairly stable—especially in comparison to the wanton bloodletting that preceded it.

The NRA and the NIRA were all challenged in the courts as were many of the New Deal policies and some were overturned. But the majority of the price, wage and production controls were kept intact. Though only World War II would really bring the economy back to 1920 levels, by the end of 1939 Americans, by and large, were much better off than at the beginning of the Great Depression—and a new spirit and society had replaced the free-market rugged individualism of the 1920s. As the decade ended, unionization, largely in the form of the United Mine Workers, was entrenched—as was the power of the federal government over both individual operators and the

industry as a whole. But the government was also, through the creation of the largely coal burning Tennessee Valley Authority (TVA), beginning to become an even larger customer of the coal industry as well. Nearly all sides were grateful for the economic stability the New Deal was successful in fostering.

World War II officially began in Europe in September 1939 with Germany's invasion of Poland and France, and England's subsequent declaration of war against the Nazis. Though the U.S. would remain officially neutral until December 7, 1941, in the November issue *Coal Age's* editors shrewdly published a piece on export potentials and the possibility of a major export boom to come. Though the U.S. tops all other nations in coal reserves, it was not an exporter. Exports to Europe rose to an all-time high in 1920 and 1926 of roughly 13.1 million and 14.1 million tons, by 1939, the U.S. only exported a woeful 10,000 tons excluding Canada. And in 1934 not a single cargo was cleared for European ports.

Surface Mining in the Late 1930s— Bigger, More Efficient

As the overall economy stabilized, producers were once again able to enjoy the economies of scale realized through surface

mining. Both anthracite and bituminous producers marked up additional gains in 1935 "by the installation of either larger excavating units or dippers and the extension of trailer haulage and in anthracite by a still greater reliance on this form of mining for the recovery of either virgin or partly mined coal near the surface. An increase in the size of equipment used characterized progress in the anthracite region also," reported the editors in the February 1936 issue. In the bituminous fields, there were

installations of 20 and 32-cu yd dippers at new operations in Indiana and Illinois. New advances in semi-trailer haulage allowed mines to dispense with the higher costs of temporary rail tracks and loading. With oil prices low, haul trucks were becoming integral components in surface mining. 15- to 25-ton bottom dump trailer units powered by new Mack trucks were put in service



Getting a load of about 75 tons of coal in the Tiger pit. This butane-electric tractor and semi-trailer, rated at 80 tons, has just turned in the space in front of the loading shovel. **Coal Age*, August 1939

throughout mines in the Midwest that year. At some operations, like the Enos Coal Mining Co. in southwestern Indiana, eight trailer units displaced six steam locomotives. "Transportation, however, takes place in two-stages, the trailers hauling to a dumping station at the mouth of the pit, where the coal is discharged into standard-gage railroad cars for movement to the preparation

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plant. Average round-trip haul of the trailers is approximately 1¼ miles, and the units in service account for approximately 4,300 tons in seven hours."

Also, breakthroughs in both welded alloy steel and aluminum allowed savings in weight and increase in tensile strengths. "Gross weight of a 16-cu yd dipper fully loaded is approximately 80,000 lb, or slightly less than the average 12-cu yd dipper of conventional construction."

Operators of the new Bobolink mine of the Binkley Mining Co. in Seeleyville, Ind., deployed "a Bucyrus-Erie 950B electric shovel with a 105-ft boom, 64-ft dipper stick and 30-cu yd welded alloy-steel dipper. Dumping range is 106 ft; dumping height, 70-ft. Instead of the conventional box-girder boom, the Bobolink shovel is fitted with an open-frame boom somewhat resembling the dragline type. A cylindrical dipper stick and rope crowd are other features. The dipper is counterweighted. Thirty General Electric motors with an aggregate rating of 2,500 hp operate the unit. Coal is transported from the pit to the tippie in 25-ton Austin-Western trail cars attached to six-wheeled White tractors with four-rear-wheel drive."

In the May 1936 issue, Engineering Editor R. Dawson Hall filed a long piece on the history of explosives use in mining. Though its use probably went back to 1627, "by far the greatest advances in the art of blasting in mineral recovery have taken place in the last 100 years. Development of high explosives, pellet powders, renewed interest in cushioned blasting, volley shooting and firing plugs are all part of the history of this latter period. With increased efficiency in use has also come greater safety." 1936 marked a century of safety fuse use. "Permissible Explosives" used particularly in the hard coal region, were omnipresent as coal mining became the largest user of industrial explosives in the U.S. In the rambling article, Hall detailed the history of explosives beginning in the mid-13th century and ending with the re-introduction of plugs in 1935, this time filled with ammonia nitrates instead of black powder or gunpowder.

Much of the March 1938 issue was devoted to the history and current operations of the United Electric Coal Co, the progress of which "very closely parallels the progress in the development of large excavating equipment and its application to coal mining. Although not incorporated until 1918, United Electric had its inception as far back as 1885, when the first mechanical stripping operation in Illinois was opened near Danville on properties controlled by individuals who were later to organize the present

company." From humble beginnings with the use of a "dry land" dredge purchased from the Marion Steam Shovel Co. equipped with a 50-ft boom and entirely built of wood, U.E., by 1938 was able to handle 1,600 cu yd per hour by a Bucyrus-Erie 950-B 30-cu yd shovel at the new Buckheart mine opened near Canton, Ill., the year before.

Capable of producing up to 16,000 tons each day from four operations throughout central and southern Illinois, United Electric had been the subject of many articles in *Coal Age* throughout the decades as the company pioneered advances in surface mining. As a way to trace the progress made in strip mining, "back in the clamorous days of 1920, when buyers were bidding feverishly against one another for tonnage" surface mining in Illinois had a combined total output of 589,540 tons. "Last year, United Electric's premier producer, Fidelity No. 11—alone poured out more than twice that tonnage."

The world's largest of its kind, Fidelity, located 6 miles west of DuQuoin, Ill., started production in 1929 as a three-pit operation. In 1938, it was producing from only two pits with a third one held in reserve. "Stripping in two pits is accomplished by one Marion 5480 shovel and one Marion 5480 dragline working in tandem. In this operation, the dragline, working in advance of the shovel, removes the clay, placing it behind the rock retaining wall which has been made by the shovel in removing the hard material down to the coal in the previous cut. The third pit is equipped with a Marion 5600 shovel, which in 1929 had the greatest capacity of any shovel built, and today, when judged by any factor other than dipper size, still is the world's largest shovel. It has a maximum dumping height of 82½ ft which exceeds by

about 25 percent the dumping height of other large shovels." Maximum dumping radius of the 5600 was 146 ft, max cutting height was 97 ft—both far in excess of the cutting height of other shovels. With a weight of 1,750 tons and a motor driven generation rated at 1,700 kva, it was "greater than any other shovel ever built."

However, in the August 1938 issue, the editors published a piece titled "Kansas Fields Use Largest of Shovels to Strip Thinnest of Seams." With major seams only 18 to 36 in. thick, producers there had long been using shovels that were larger and heavier than any others. "Ratio of cover to thickness of seam mined has ranged from 18 to 20. Because continuous progress is a real watchword in modern stripping, recent years have witnessed many changes in equipment and operating practices." At the No. 17 operation of the Pittsburg & Midway Mining Co., the 22-in. mineral bed is stripped by a Bucyrus 750-B shovel with a 62-ft dipper stick, 87-ft boom and 24-cu yd bucket. At the No. 22 mine of the Clemens Coal Co., the Weir-Pittsburg seam is 36 in. thick and lies under about 46-ft of cover. The stripping shovel is a 23-cu yd Marion 5560 with a 96-ft boom and 56-ft dipper stick. Other large equipment was also deployed throughout the Pittsburg coalfields in eastern Kansas as the regional producers strived to stay competitive with other fuels as well as other surface mined coal.

Though attention was often paid in the magazine to the stories of the largest machines in the nation, often it was the smaller ones that made the most difference to a producer's bottom line. In the August 1939 issue, Associate Editor Ivan A. Given penned a piece about the recently approved use of butane fuel powered 80-ton semi-trailers then being used at several Sinclair strip mines throughout the Midwest. "The first to use tractor-trailer haulage on a major scale, the Sinclair stripping organization has been continuously active in the development of this medium of transportation since it adopted the automotive type of equipment nearly seven years ago in 1932. Since then capacity has increased culminating last February in the installation of an 80-ton semi-trailer being pulled by a two-engine butane-electric tractor equipped with two 125-hp electric driving motors."

Automobile haulage had proven a large savings over rail and locomotive uses as well as an increase in operating flexibility. "At the end of February 1939, the 80-ton unit was making about 14 round trips per shift of seven hours. Average load per trip was close to 75 tons, or an average of 13 dipper loads of



25th Anniversary cover. **Coal Age*, October 1936

coal. Average daily mileage was around 85, and butane consumption was close to 20 gal. per hour. Between May 3, 1938, and January 8, 1939, the initial butane unit ran a total of 8,800 miles, during which time the engine was not touched."

Underground Mining in the Late 1930s

Mechanization of loading, as in past years, held the spotlight. *Coal Age* reported that 81 mobile loaders were purchased by some 35 companies nationwide that year. Not great, but certainly an improvement over years past. Mobile loaders were the most sought after items. "New high-tonnage machines pushed still higher the output per machine-shift. In one instance an average of 500 tons per machine per shift is reported." Though Indiana and Illinois maintained their equipment leadership that year, producers throughout Northern and Southern Appalachia began purchasing more frequently.

In the August 1936 issue, Ivan Given profiled the Robinson Run No. 1 mine near Morgantown, W.Va., that, through mechanization, was able to average 15.6 tons per man-shaft. "Using mobile loaders for both solid work and pillar robbing, the Christopher Mining Co., formerly C.L.S. Coal Co., extracts 90 percent or more of the marketable portion of the seam. Incorporating the principle of pillar extraction into its mining plan, the company has standardized on retreat working; i.e., development entries are driven to the boundary, after which rooms-and-pillars are mined back to the main entry serving the property. An even better than the 15.6 tons per man shaft is expected when additional equipment is installed."

Extracting from an 8 to 9 foot seam, normal operations at the mine consisted of three seven hour shifts per day. With direct current at 250 volts, "major equipment in use at the time this article was prepared consisted of one Joy 10-BU loader, one Joy 11-BU loader, one Sullivan 7-AU track-mounted cutting and shearing machine" and a variety of shortwall cutters and cable-reel locomotives, portable coal drills and drop bottom mine cars.

In 1936, operators installed an estimated 345 mobile loaders and 590 conveyors, "all evidences of the strides made in mechanization" that year. Swept up in the spirit of progress that year in West Virginia, the venerable Gay Mines fully mechanized. "The Gay Coal & Coke Co., of Mt. Gay, mechanized both its mines 100 percent. All coal at the No. 1, with a seam thickness of 6 ft, was loaded by machines, and starting June 1, all

coal at the No. 2 Gay mine, where the thickness is 4 ft was produced mechanically using power drilling." The company reported "Mechanical loading enabled us to produce 48 percent more coal this year than in our previous best year."

Another change in 1936 came in Illinois with the development of a new trackless-mining system by James Fletcher of Chicago. "The transportation unit is the connecting link between mobile loaders at the face and a belt system carrying the coal to the outside or to a mine-car loading station, depending on conditions. One such system was in operation at the property of the Blue Bird Coal Co. in Carries Mills, Ill., throughout the last half of the year. The new unit consists of a battery-powered tractor with rubber tires to which is attached by means of a swivel coupling, a two-wheeled bottom-dumping trailer. Front wheels on the tractor, which is steered like an automobile, are equipped with single tires; rear wheels on the tractor and the trailer wheels are equipped with dual tires. Tractor and trailer run on the mine floor." Several issues throughout the rest of the decade reported the progress of rubber-tired haulage. Calling it "the latest mechanization development," mines throughout the nation bought various different shuttle cars and loading machines as new models were developed.

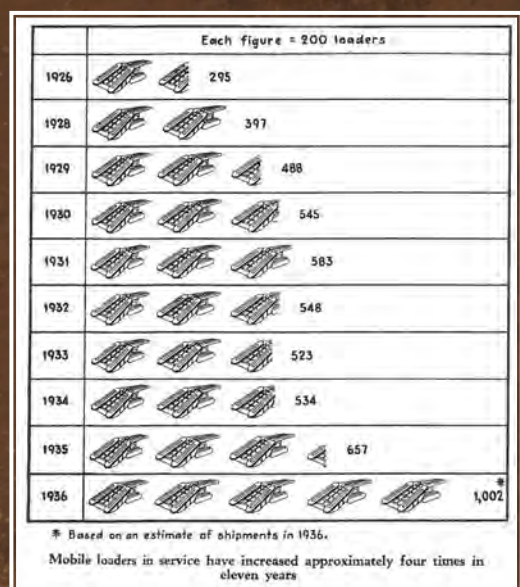
Conveyor machines also were more increasingly deployed, particularly in Central Appalachia. New in April 1939 was the system installed at the Cabin Creek No. 7 mine of the Carbon Fuel Co., located in the Cabin Creek district south of Charleston, W.Va., in Kanawha County. Mining the Powellton seam, the new mine was equipped with a fleet of brand new loading and haulage equipment. The new 2,000 ft conveyor sections were installed along the length of the main headings. Production started out high as "face crews have been loading 12 to 14 tons per man-shift." Carbon Fuel pioneered mechanization in the Kanawha field when in 1930 it invested over \$500,000 in preparation equipment, mobile loaders and auxiliary equipment to mechanize at its No. 9 mine.

Coal Preparation in the Late 1930s

To stay competitive, mines nationwide began installing new more mechanized equipment in their preparation plants as well as underground. Typical of these new plants and upgrades was the stoker coal plant at Consol's Millers Creek mine

near Van Lear, Ky., profiled in the July 1937 issue. "Steel and concrete construction, surge and storage bins equipped with coal-lowering devices, horizontal double-deck screens which reduce height, adjustable gate openings to mixing feeders of the constant-speed belt type automatic stops to forestall improper mixtures and oil sprays at six points are features of the design." The mine plant, profiled in the October 1935 issue, was modernized in 1935 by a slope conveyor and a 600-ton per hour four-track concrete and steel tipple designed and built by the Fairmont Machinery Co., which also handled the stoker plant.

In the July 1939 issue, *Coal Age* profiled Peabody Coal Co.'s Westville No. 24 plant. Fifth in a line of installations throughout its Illinois operations, the new mechanical preparation plant "features maximum flexibility, washing of all coal from 6-in. down, storage bins for washed carbon and a rescreening plant with bins and proportioning feeders for shipping stoker or screenings with definitely fixed percentages of the various size fractions. Rescreener sizes also may be returned to the main mixing conveyor for mixing with the larger washed and hand-picked sizes in making combinations or modifications with, if desired, specified percentages of rescreener grades." A "weak and treacherous soapstone" roof or "white rock" was the major impetus to adopt washing at the plant. Placed in service in January 1939, the rated capacity at the new No. 24 plant was 600 tons per hour.



* *Coal Age*, February 1937

The 1940s: Coal Provides the Fuel for World War II & the Cold War

1940-1949



When Japanese bombs rained down on Pearl Harbor that fateful Sunday, December 7, morning, America was surprised but not unprepared. Fierce fighting had been raging throughout Europe beginning in September 1939. Though officially neutral, America began supplying weapons, ships, tanks and raw materials to England and France. The Depression-era New Deal policies that had organized and controlled virtually the entire American economy were incredibly helpful in gearing up manufacturers, coal miners and the general public for the all-out war effort that was ahead.

But as the new decade began, America was still dealing with the Depression. Producer health was weak and economic recovery was still slow and somewhat fragile. Though coal production was increasing and new mines were opening, labor's much increased power and government regulation had altered the mining dynamic. Until after World War II, coal producers and management were often relegated to a minority voice in decision making as Roosevelt administrators and officials from John L. Lewis' United Mine Workers increasingly called the shots.

Coal and War 1940-1945

When the decade began, *Coal Age* Editor Sydney Hale lamented—in a newly streamlined typeface—that though the U.S. was the largest coal producer worldwide and the global leader in using mobile loaders underground, Great Britain “with a distinct and wide edge” was still far ahead in mechanization, producing more than 54% of their total output in 1939 via machine. Even though U.S. mines were healthier than they were the year before, mechanization was still the key to success. “In a year marked by an increase in industrial activity on the one hand, warmer-than-normal weather on the other, a twelve-months-long struggle by federal agencies to establish minimum prices and marketing regulations and a six-weeks stop-

page of work in the Appalachian region, the bituminous industry finally came through with a 12.6 percent increase in output.” Troubled anthracite, seemingly on the ropes following the collapse of the venerable Philadelphia & Reading Coal & Iron Co. and widespread red ink, also finished the previous decade with a 10.2% production gain year-over-year, finishing at just under 51 million tons.

Though coal was definitely on the rebound, oil, natural gas and other fuel options were becoming increasingly favored. A growing smoke-abatement movement throughout U.S. cities was leading to crackdowns on domestic and industrial coal burning and non-coal fired electrification projects like the new TVA—initially envisioned as mostly hydro-powered—were increasing throughout the nation. Only oil rationing during the war would really stem the inroads of that popular fuel—and then, only temporarily. Fuel-oil rationing in 30 states was first reported by the magazine in October 1942, and reports at the time indicated rationing would spread nationwide as more oil would be diverted into the war effort. Into this void: more coal.

Production continued to increase in 1940 to 512 million tons (combined between anthracite and bituminous). In 1941, with U.S. industries already humming with defense preparation orders, production rose to more than 570 million tons, the highest total since the beginning of the Depression in 1929. Following Pearl Harbor, the U.S. threw itself into an all-out war effort. The question became not what coal had produced, but what was it capable of extracting as experts realized that a greatly increased amount of production would be essential to victory.

Publisher McGraw-Hill, in the January 1942 issue, tasked readers with asking themselves “What can I do?” to help. “A BIG JOB [sic] is what it adds up to, but the industry can do it,” seconded Hale. “Sharing in this

confidence, *Coal Age* also accepts the responsibility of all out service to the industry in carrying out its part of the war effort and planning for the post-war future,” he wrote in the January editorial.

With a long war looming, Hale, in his February 1942 editorial “Peace and War,” chose to reflect on the industry's overall position. “With 1941 the last year of peace for the United States until victory is achieved, the coal industry can look back to improvements and modernization which give it a good start on the job ahead. Signing of new wage agreements, rising demand and price stabilization cleared the way for accelerated adoption of the modern equipment and practices for the production, preparation and safety so necessary for progress in peace and even more vital in winning the war as soon as possible.”

But going forward the industry still faced several pressing needs: stable manpower, a steady flow of machines and mining materials, a stronger maintenance plan and improvements in the transportation of coal to market. To assist, the federal government granted coal producers priority over many industries to purchase and receive the machines and tools needed for the production surge.

Coal miners, like most Americans, were quick to enlist—so quick that draft boards were asked not to take experienced miners away from the homefront. To combat the labor shortage, the UMWA agreed to change the mandated 35-hour 5-day work-week to a 6-day 42-hour week.

But with the war raging in Europe and the Pacific, Hale also was fighting his own battles—a losing one against terminal cancer. His death was marked with a tender obituary in the September 1942 issue. By all accounts a witty, urbane and widely read man, Hale was “every inch an editor, once he set himself to a task, however large and onerous, no reading was too dull and no effort too great to attain his purpose.” With

his passing, the magazine changed formats and longtime associate editor Ivan A. Given took over the reins.

But with each loss, victory seemed a little closer. Accident rates rose in 1942 but by year's end, with production totals at more than 643 million tons, the industry could proudly proclaim that "coal delivers." Anthracite enjoyed its best year since 1930 with an output of 59,961,000 tons. Bituminous production hit highs not seen since 1918. In his February 1943 editorial, Given wrote, "Despite natural and expected difficulties in equipment, materials and manpower, coal met all demands for its product and built up one of the biggest stockpiles in history, in addition to taking over the load dropped by oil and natural gas. With the first full year of World War II again demonstrating coal's position as a basic industry in war, as well as in peace, the industry was accorded appropriate priority assistance in obtaining equipment and materials. At the same time, management and men channeled their efforts toward getting more out of what was on hand or could be acquired. Thus, active installation of new mechanical-mining equipment was supplemented by the adoption of modern auxiliary equipment and up-to-date working methods."

Production in 1943 increased again and would have been higher if not for a series of contentious and controversial strikes called by John L. Lewis. The strikes led to the federal government seizing and taking over dozens of operations deemed vital to the war effort. With the disruptions, production barely rose to 651 million tons. Shortages loomed as man-power and absenteeism, both before and after the strike, took their toll.

But following the strikes and with government firmly in charge, production in 1944 shattered all previous totals and reached a high that would not be exceeded for more than 30 years. Tasked with producing 620 million tons of bituminous and 66 million tons of anthracite in 1944, America's miners pulled together and literally won a combined total of more than 683 million tons out of the ground that blood-soaked year. "How did coal measure up in 1944?" asked Given in the February 1945 year in review. "The record is clear: the greatest annual tonnage in history, compounded of a new high for bituminous and a 13-year record for anthracite. These totals were achieved in spite of the continued losses of manpower and increasing age of employees." Though producers would

nearly equal those numbers once in 1947 (682 million tons), not until 1976 would that number be exceeded.

If 1944 was the "Year of Invasion" as Given termed it, then 1945 was the "Year of Total Victory." To get there, for the first three quarters of the year the pace of production did not slow from the year before. In February, 48-hour work-weeks were initiated by Presidential Order as manpower shortages got worse. Not until first the Germans in April and then the Japanese were defeated in August 1945, did miners slow their pace. But peace finally came and by the end of the year, with many GIs coming home and heading back underground, production totals fell to just over 632 million tons.

Producers Caught in a Cross-fire Between Lewis' UMWA and New Deal Policies

By 1940, almost 95% of America's mines were unionized—and virtually all of these mines were represented by the UMWA. Lewis, however, was intent on more than just organizing coal miners, he envisioned a nearly 100% unionized economy with, as many of his critics including *Coal Age* would say, him at the head of the new national union. As he grew more powerful, Lewis grew bolder. Roosevelt's pro-labor stance encouraged Lewis to help organize steel and auto workers and he helped lead them to tremendous victories through the end of the 1930s. Other industries followed, joining

together in the new Congress of Industrial Organizations (CIO).

But during the run-up to the election of 1940, a hostile Lewis broke with Roosevelt over the Democrat's "international" stance that he believed would lead to war. Through his perch as head of the new CIO, Lewis encouraged labor to vote for Republican Wendell Willkie who promised to keep America out of the growing European war. But though labor loved Lewis, they loved Roosevelt more, voting in droves to elect him to an unprecedented third term.

Just prior to Pearl Harbor, in the July 1941 issue, the magazine reported that southern bituminous operators, who had been holding out against new contracts with the UMWA and were facing strikes and labor actions, capitulated to their demands due to the recently declared national defense emergency. In the January 1942 issue, the editors reported another victory for Lewis. "In a decision arrived on December 7, the three-man board named by President Roosevelt to arbitrate the union shop dispute in the captive coal mines..[mostly coking coal producing mines owned by steel companies]... reversed the decision of the National Defense Mediation Board and ruled that all workers in the captive mines should be required to join the United Mine Workers as a condition of employment...99.5% of all the coal miners in the country were now on its rolls." John L. Lewis, Dr. John R.



John L. Lewis and Charles O'Neill, representing the UMWA and Northern Bituminous Operators respectively, extend mutual congratulations on formal adoption of a new working agreement. **Coal Age*, July 1941

Steelman, on leave of absence from his post as director of the U.S. Conciliation Service and acting as chairman of the committee voted in favor of the agreement. Dissenting was Benjamin F. Fairless, president of the United States Steel Corp.

However, once war broke out the government began demanding even more of the coal industry: its men. Thousands of replacement workers were needed as absen-

teism and enrollment in the military were taking a toll. Though the selective service would eventually become more selective during the war and draft less miners, manpower was a constant challenge.

To help, as reported in the October 1942 edition, the UMWA agreed at its convention to a longer working schedule and a six-day work week. But in the same issue, Given wondered, with new wage contracts coming


up in 1943, how well operators were prepared to enter the negotiation period? Regardless of operators' positions, without a contract, the UMWA was ready to do battle of its own.

In the February 1943 issue, the magazine reported on a wildcat walk-out by some 17,000 anthracite workers in January. The nation's worst labor stoppage since Pearl Harbor, after several days of demonstrations, the miners were ordered back to work by President Roosevelt who cited the lost production and its effect on the war effort. Though the labor action was confined to Pennsylvania, it was but the opening skirmish in a longer struggle. Work weeks grew to 48-hours that spring for most miners and the UMWA announced it was beginning to organize supervisors and mine officials into the new Mine Officials Union of America.

Still without a nationwide contract, a larger, nationwide "stoppage" was announced in May and, after a short reprieve, a second one in June due to a breakdown of contract negotiations. Lewis ordered his men back to work after a few days under another threat from Roosevelt. Though most workers returned on June 7, the government began initiating a series of mine seizures, taking over the day-to-day operations from private industry. Lewis had forced the administration into a difficult position. Though by this time Roosevelt was beginning to seethe with antipathy toward Lewis, he needed labor's vote and support—and most of his administration did indeed side with them. But if the miners struck, dozens of other crafts might as well, courting disaster for the war effort.

Citing national emergency, Roosevelt ordered powerful Interior Secretary Harold Ickes to begin taking over mines that spring. "The coal-mine seizure reflects far more than an attempt to cope with the grave production problem precipitated by a defiant labor leader. Rather, when the administration chose this way out, it confessed its complete failure to capitalize on an unparalleled opportunity for developing a workable labor-relations policy that would safeguard not only the rights of employer and employee but also the rights of the government and the nation as a whole," wrote Given.

Unlike during World War I when miners strikes were met with troops who forced workers back into the mines at bayonet point, seizure forced mine owners to accept most union conditions. Mine operators were further threatened with outright nationalization of their assets if work stoppages con-




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tinued. Lewis, though facing tremendous threats, continued to order his men to hold out, slow down and not comply with labor board recommendations. With no quick end in sight, the road to nationalization seemed set. The industry, as reflected in the pages of *Coal Age*, was not pleased. "How did we arrive at the point where one man could defy government—and the government could find no way out but seizure? The inescapable answer is politics—the brand of politics that favors one class over another. The New Deal and John L. Lewis, in fact, are the combination that has presented the nation with one of its most difficult problems at a time when it is in war for survival," wrote Given in another editorial.

Through July 1, work stoppages had "cost the nation 27 million tons of coal and 170,000 tons of steel, enough for 43,500 P38 Lightning Fighters, or 16,000 B17 Bombers, or 6,000 medium tanks, or 38 Liberty ships." Lewis—by thwarting the war effort—was seen by many as a traitor to his nation. And many were calling for a rope. *Coal Age* quoted others' harshest words against Lewis and stuck to a safer road of mere editorial fury, publishing long pieces questioning Lewis' long-term intentions, his loyalty and his humanity.

Though miners were back on the job through summer, strikes broke out again in October and all mines producing more than 50 tons a day were seized a second time on November 1. Once again, wrote the editors, "Lewis put power for himself ahead of the war effort." Seizure was initially supposed to last no more than 60 days after the restoration of the productive efficiency of the mines with Interior Secretary Ickes once again designated to take possession and operate the mines. Management was permitted to continue its managerial functions to the maximum degree possible. In total, by December 1943, there had been four work stoppages and two property seizures nationwide. The government, by the end of the year, was running the coal industry and, at the time, no one knew how long that would continue or if permanent nationalization was next. Just the same, some steel mills closed briefly during the year.

Throughout November, with government employees running the mines, Lewis' UMW negotiated with coal operators. Many were quick to sign contacts and more than 230 companies settled by December 3—most in fact sooner. Southern Appalachian and Alabama operators held out longer, but eventually capitulated. One

of the problems being dealt with nationwide that all groups could agree with was a lack of manpower. Coal miners, all conceded, were working longer, harder and producing more with less and less hands. On December 3, the Coal Mines Administration formally asked for draft deferments of all mine workers going forward.

In all, the mine seizures lasted roughly 13 months through the end of June 1944. The

stability brought about was welcome to most of the public, though many questioned that methods used to get there. "With the end of Act II of the 'Seizure Follies' in sight at the first of June there were few to lament its departure from the boards," wrote Given in his July 1944 editorial. One of the precedents seizure had set "was grabbing the property of an industry to settle a labor dispute despite the fact that the owners of that prop-

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erty were not at fault. In the coal case, the defiant parties—the officials of the United Mine Workers—were actually rewarded for that defiance by being granted much of what they demanded...” One of the major issues of contract contention throughout World War II was portal to portal pay. Operators objected to the notion that travel time—commuting from the washhouse to the face, was time they needed to compensate. In the end, the labor friendly government sided against them.

The controversial series of walkouts and seizures, and the public’s divided reaction would prove a tipping point in the power of John L. Lewis, the UMWA and American industrial unions. The Taft-Hartley Act of 1947 limiting union powers would be a direct result of the contentious war-time strike. However, in the short run, with government either running the mines or keeping the labor peace, output increased to astronomical levels. The 684,455,000 tons produced in 1944 was the greatest volume of coal ever raised in the United States.

In early 1945, Lewis again threatened further work stoppages. In this round of negotiations, his opening gambit began with the boast that the UMWA would seek a \$0.10 royalty on each ton mined to be placed into a union run welfare fund. They also declared the right to strike at will. “Even the resounding words in which they are cloaked fail to

conceal the real purposes of these demands—a war chest for organizing backed up by ability to shut off fuel and raw material at any time,” wrote an enraged Given in the March 1945 editorial. “Contract by fiat is already an accomplished fact in coal mining and has given the industry no reason to anticipate that government officials making such contracts know or care what happens to the industry as a result.”

That issue the magazine published a long article analyzing what they felt Lewis really was after: the creation of a massive slush fund to help foster a totally unionized economy that could, at will, cut off the raw materials needed for existence. Or worse, that the 10-cent per ton tax could fund something of a Bolshevik revolution with Lewis at the head of the vanguard.

Safety During the War Years

Though remembered for other reasons, 1941 also marked the enactment of the federal mine inspection law, effective May 7, resulting in direct national government participation in accident-prevention work. The December issue contained in a “Special Safety Section” about what “that field is and how the United States Bureau of Mines is organizing to carry out its increased responsibilities and functions under the act. The section even included a “safety quiz” for fellow employees.

Though the Bureau had been making mine inspections for more than 30 years, “heretofore such inspections have been made intermittently and on a purely voluntary basis in so far as the mine management was concerned. Under the new law, a periodic basis is set up and the inspections carry a clear and specific legal authorization.” Penalties for denying inspection included fines up to \$500, imprisonment for up to 60 days or both.

Not coincidentally, that year would mark an all-time best safety record for producers. The 1941 death rate per million tons of coal produced reached the lowest point yet recorded. Best, bituminous miners achieved their historic low fatality rate yet while

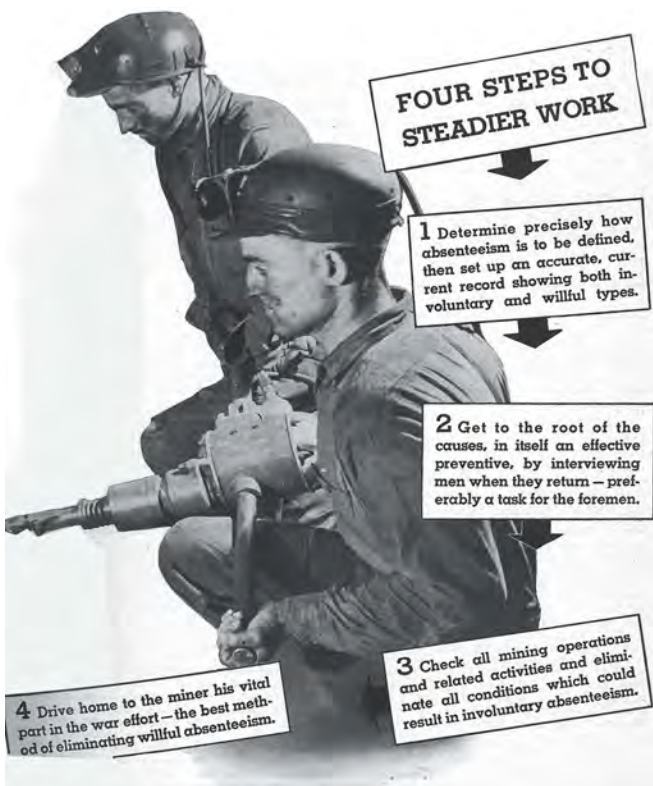


Cards such as this were awarded to safety key men to hang in their offices or working sections. *Coal Age, April 1940

increasing tonnage by more than 45 million tons. Though over 1,200 coal miners lost their lives, safety had improved.

That trend, however, would be reversed the following year. In the September 1942 issue, the editors reported the accident rate was increasing. “That fact should be a danger signal not to be overlooked even in the present hurly-burly of getting out the coal, as injuries and fatalities are directly reflected in lower efficiency and increased cost, not to mention loss of much-needed manpower for the war effort.” With many experienced miners fighting overseas and many newer, younger and older workers taking their places, accident rates increased throughout the year. Given lamented that “The evidence points strongly” that “war and its attendant dislocation of normal operation” was resulting “in the sacrifice of safety gains.” By the end of the year, loss of life rose 17% against a 12.5% gain in output. Total number of fatalities for 1942 was 1,482, more than 200 more deaths than the year before. Increasing casualty rates in the mines that year and carrying over into the next partially led to the controversial strikes of 1943.

This decrease in safety happened in the second full year of the Bureau of Mines’ new position as federal safety inspector. During 1942 agents visited 886 mines in 20 states employing approximately 258,000 men and producing more than 280 million tons. Roughly 40%-45% of producing mines were inspected. Fatality rates were virtually unchanged the following year, as another 1,471 men were killed as production increased slightly. Death rates were high again in 1944, but by the time the war ended in August of 1945, accident rates were falling



Reducing absenteeism in the mine. *Coal Age, January 1944



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again. By then 697 men had lost their lives in the mines, those figures were much improved compared to the 903 fatalities by August 1944.

Coal Age's "Coal for Victory Awards"

Presented with the support and cooperation of the federal Solid Fuels Administration for War, *Coal Age* created the "Coal for Victory" awards as an incentive to greater wartime production, a recognition of the contribution of the coal industry to the war effort, and as a stimulus to permanent improvement methods. Two awards were offered beginning in 1944. The Victory Production Award was offered to each mine or colliery that increased their fresh-mined output in 1944 by 6.5% or more over 1943 totals. The Production Efficiency Award was presented to each mine or colliery that increased their

fresh mined output per manshift by 10% or more.

In the March 1945 issue, *Coal Age* announced that "for outstanding service to the nation," the managements and men at 114 bituminous mines and two anthracite collieries had won awards. Fifty-five mines were double winners, and received both awards. Efficiency awards went to 15 additional mines. The bituminous properties receiving awards contributed more than 7.8 million tons, or more than 25% of the increase of 30 million tons of production in 1944 year over year.

Winners of the award gave several reasons for their ability to increase tonnage and efficiency: Nearly half listed management and mechanization as major factors in their results, followed by employee cooperation and better supervision. Other reasons listed

were improvements in mining methods, more stripping at deep mines, reduced absenteeism and fewer work stoppages and longer working times, among others. The board of judges, following presentation, addressed the 116 winners. "We extend our sincere congratulations on a notable and substantial contribution to the cause of Allied victory."

Surface Mining During the War Years

"New operations, new stripping and loading equipment, new drilling equipment and practices and increased used of automotive transportation, along with major increases in unit capacity and substantial gains in diesel engine installations, were features of an active year in bituminous stripping," wrote the editors of surface mining in 1940. The Midwest was still the leader in stripping

**"COAL FOR VICTORY"
AWARD WINNERS**

**WINNERS OF BOTH "WAR PRODUCTION EFFICIENCY" AND
"VICTORY COAL PRODUCTION" AWARDS**

- ALABAMA**
Alabama Power Co.:
Gorgas Mine, Gorgas, Ala.
Marigold Coal Mining Co.:
Marigold Mine, Jasper, Ala.
- COLORADO**
Bear Coal Co.:
Bear Mine, Somerset, Colo.
Minnesota Fuel Co.:
Morning Glory, Walsenburg, Colo.
- ILLINOIS**
Bunker Hill Coal & Mining Co.:
Bunker Hill, Collinsville, Ill.
Forsyth Cartersville Coal Co.:
Forsyth Cartersville, Cartersville, Ill.
Freeman Coal Mining Corp.:
Freeman No. 1, Herrin, Ill.
- KANSAS**
The Pittsburg & Midway Coal Mining Co.:
Central Cleaming Plant, Mines Nos. 15 and 18, Scammon, Kan.
- KENTUCKY**
Dawson Collieries, Inc.:
Dawson Collieries, Dawson Springs, Ky.
The Elk Horn Coal Corp.:
Elk Horn No. 8, Jackhorn, Ky.
Fayette-Jalisco Coal Co.:
Fayette-Jalisco No. 2, Warren, Ky.
Harlan Central Coal Co., Inc.:
Tots Mine, Tots, Ky.
Louisville Gas & Electric Co.:
Cherry Hill, Central City, Ky.
Peerless Derby Coal Co.:
Derby Mine, Splint, Ky.
Republic Steel Corp.:
Republic Mine, Pikeville, Ky.
Sizemore Mining Co.:
Turner No. 3, Drift, Ky.
Smith & Stokes Mining Co.:
Blue Valley, Madisonville, Ky.
West Kentucky Coal Co.:
Heale 1 and 2, Earlington, Ky.
North Diamond 2 and 3A, Earlington, Ky.
North Diamond No. 3, Earlington, Ky.
Poplar Ridge, Sturgis, Ky.
- MISSOURI**
Huntsville-Sinclair Coal Mining Co.:
Mark Twain, Huntsville, Mo.
- OHIO**
M. L. French Coal Co.:
Charter Oak, Pomeroy, Ohio
Hanna Coal Co.:
Dun Glen No. 11, Dun Glen, Ohio
Piney Fork No. 1, Piney Fork, Ohio
The David Z. Norton Co.:
Norton Mine, Adena, Ohio
- Ura Swisher:
Swisher Mine, Cheashire, Ohio
- PENNSYLVANIA BITUMINOUS**
The Buckeye Coal Co.:
Nemacolin Mine, Nemacolin, Pa.
Castle Shannon Coal Corp.:
Coverdale No. 8, Coverdale, Pa.
Johnstown Coal & Coke Co.:
Portage No. 2, Portage, Pa.
Pittsburgh Coal Co.:
Banning No. 1, Van Meter, Pa.
Lindley Mine, Canonburg, Pa.
Reitz Coal Co.:
Reitz No. 5, Scalp Level, Pa.
Republic Steel Corp.:
Crescent No. 2, Charleroi, Pa.
Rochester & Pittsburgh Coal Co.:
Lucerne Mine, Lucerneminas, Pa.
Waterman No. 2, Homer City, Pa.
Victoria Coal Corp.:
Johnson Mine, Monessen, Pa.
Weirton Coal Co.:
Isabella Mine, Isabella, Pa.
Westmoreland Mining Co.:
Watson Mine, Mowena, Pa.
Zeth Coal Co.:
Zeth Mine, Hopewell, Pa.
- UTAH**
Standard Coal, Inc.:
Standard Mine, Standardville, Utah
- VIRGINIA**
Stonega Coke & Coal Co.:
Imboden Mine, Imboden, Va.
- WASHINGTON**
Franklin Gem Coal Co.:
Black Diamond, Wash.
- WEST VIRGINIA**
Buffalo Eagle Mines, Inc.:
Riley 1 and 2, Broeholm, W. Va.
The Davis Coal & Coke Co.:
Mine No. 37, Coketon, W. Va.
Fairpoint Construction Co.:
Bridgeport Mine, Bridgeport, W. Va.
Marmet Coal Co.:
Cedar Grove No. 1, Hershaw, W. Va.
Pardee & Curtin Lumber Co.:
Bolair Mine, Bolair, W. Va.
Pond Creek Pocahontas Co.:
Pond Creek Mine No. 1, Bartley, W. Va.
Red Parrott Coal Co.:
Red Cedar, Prenter, W. Va.
The Weyanoke Coal & Coke Co.:
Arista Mine, Arista, W. Va.
Wilcox Coal Co.:
Wilcox Truck Mine, Daniels, W. Va.

WINNERS OF "WAR PRODUCTION EFFICIENCY" AWARDS

- COLORADO**
Oliver Coal Co.:
Oliver Mine, Somerset, Colo.
- KENTUCKY**
Dawson Daylight Coal Co.:
Dawson Daylight 6 and 9, Dawson Springs, Ky.
- OHIO**
Moore Coal Co.:
Cadiz Mine, Cadiz, Ohio
Roll & River Coal Co.:
Mine No. 3, Aults, Ohio
Mine No. 8, McClainsville, Ohio
- PENNSYLVANIA BITUMINOUS**
Pittsburgh Coal Co.:
Banning No. 2, Whitsett, Pa.
Warden Mine, Sutersville, Pa.
Westmoreland Mining Co.:
Graff (1-2), Blairsville, Pa.
Roaring Run, Apollo, Pa.
- VIRGINIA**
Stonega Coke & Coal Co.:
Derby Colliery, Derby, Va.
- WEST VIRGINIA**
Ames Mining Co.:
Ames Mine, Fayette, W. Va.
The Lorado Coal Mining Co.:
Lorado Mine No. 2, Lorado, W. Va.
Pardee & Curtin Lumber Co.:
Bergoo No. 3, Bergoo, W. Va.

WINNERS OF "VICTORY COAL PRODUCTION" AWARDS

- ALABAMA**
Republic Steel Corp.:
Sayre Coal Mine, Adamsville, Ala.
Sith Coal Co.:
Aldridge Shaft, America, Ala.
America No. 5, America, Ala.
- COLORADO**
Champion Coal Mining Co.:
Hawk's Nest, Somerset, Colo.
- ILLINOIS**
Chicago, Wilmington & Franklin Coal Co.:
New Orient, West Frankfort, Ill.
Orient Mine No. 1, Orient, Ill.
Franklin County Coal Corp.:
Mine No. 5, Herrin, Ill.
Mine No. 7, Royalton, Ill.
- INDIANA**
Knox Consolidated Coal Corp.:
Knox 1, 2 and 5, Bicknell, Ind.
- KENTUCKY**
Consolidation Coal Co.:
Mine 155, Van Lear, Ky.
Mine 207-14, Jenkins, Ky.
Sentry Coal Mining Co.:
Sentry Mine, Madisonville, Ky.
- OHIO**
Hanna Coal Co.:
Crow Hollow No. 3, Bradley, Ohio
Georgetown No. 12, Adena, Ohio
Willow Grove No. 10, Nefas, Ohio
The Lorain Coal & Dock Co.:
Blaine Mine, Blaine, Ohio
- PENNSYLVANIA ANTHRACITE**
Pennsylvania Coal Co.:
Ewea Colliery, Pittston, Pa.
Underwood Colliery, Scranton, Pa.
- PENNSYLVANIA BITUMINOUS**
Iseman Bros.:
Iseman Bros. No. 2, New Bethlehem, Pa.
Johnstown Coal & Coke Co.:
Logan No. 4, Beaverdale, Pa.
Logan No. 6, Beaverdale, Pa.
L. C. S. Colliery, Inc.
Virginia No. 14, Heshbon, Pa.
- Reitz Coal Co.:
Reitz 3B, Central City, Pa.
Republic Steel Corp.:
Brownsville Junction, Brownsville, Pa.
Rochester & Pittsburgh Coal Co.:
Sagamore Mine, Sagamore, Pa.
- TENNESSEE**
Fentress Coal & Coke Co.:
Wildor No. 5, Wildor, Tenn.
Pruden Coal & Coke Co.:
Buck Creek No. 2, Pruden, Tenn.
- UTAH**
Carl Nymon:
National Mine, National, Utah
- VIRGINIA**
H. E. Harman Coal Corp.:
Harman Mine, Harman, Va.
Jewell Ridge Coal Corp.:
No. 1 Mine, Jewell Ridge, Va.
- WASHINGTON**
Monarch Coal Mining Co.:
Monarch Mine, Centralia, Wash.
- WEST VIRGINIA**
Ames Mining Co.:
Mingo Division, Thacker Mines, W. Va.
Amherst Coal Co.:
Amherst 3-B, Accoville, W. Va.
Buffalo Winifrede Coal Co.:
Buffalo Mine, Chatteroy, W. Va.
The Gouley Mountain Coal Co.:
Ansted No. 2, Ansted, W. Va.
Rich Creek 1-3, Jodie, W. Va.
Lando Coal Corp.:
Lando Mine, Lando Mines, W. Va.
Mountain Fuel Co.:
Glen Cambria, Flemington, W. Va.
Red Parrott Coal Co.:
Mine No. 2, Prenter, W. Va.
Rutbrell Coal Co.:
Deep Hollow, Kingwood, W. Va.
West Virginia Coal & Transportation Co.:
Jeanne Anne, West Columbia, W. Va.
York No. 1 Mine, Clay, W. Va.
- WYOMING**
Sheridan-Wyoming Coal Co., Inc.:
Monarch Mine, Monarch, Wyo.

Coal For Victory award winners by region. *Coal Age, March 1945

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activity, though, for 1940 at least, most of the growth had occurred in smaller strip mines outside the Midwest with producers there increasingly using 2- to 3-cu yd shovels with longer booms and handles.

For the March 1943 issue, associate editor Lambur reviewed operations at the Sandown lignite mine in Rockdale, Texas. Owned by the McAlester Fuel Co., only 100,000 tons was being produced at the small mine, one of the few remaining lignite operations left in the state. Although Texas had an estimated 23 billion tons of lignite at the time, the vast amounts of natural gas and crude oil being cheaply produced in the southwest rendered coal uncompetitive throughout much of the region.

Underground Production 1940-45

For the January 1940 issue, *Coal Age* returned to New Orient in West Frankfort, Ill., to review the mine's improved transportation system. With a normal daily output of 10,000 tons, miners had to deliver an average of 2,300 loaded mine cars to the shaft bottom every seven hours. "Realizing that the haulage system is the life stream of the mine, the property has been developed so that a minimum of main-line entry will have to be maintained during the life of the operation." To handle the large number of loaded and empty trips (almost 14,000 per day), both loaded and empty haulageways in separate entries were employed. But with all of that rail, New Orient started to weld rail joints—making ribbon rail—in early 1936, decades before modern railroads began doing the same on today's mainlines.

Though rail dominated the industry, in the February issue the editors reported on the growing increase in rubber-tired haulage units behind loading machines.

"From three such units 3½ years ago, the total in the hands of operators had grown to 99 at the end of 1939." Rubber-tired haulage was originated by James H. Fletcher, a Chicago consulting engineer, and first installed in 1936. Fletcher equipment was followed by the Joy shuttle car, first installed by the Hanna Coal Co. of Ohio in 1938. Rubber-tired haulage would grow throughout the decade.

Mechanization was also allowing older mines to be rehabilitated and operated more efficiently. In the April 1940 issue, Given reported on the reopening of the Jefferson No. 20 mine of the Consolidated Coal Co. in Nason, Ill. Opened in 1921, it became a casualty of the Depression and had not worked in six years when Consol purchased it in April 1938. Reconditioning began later that year and by 1940, producing from a 740-ft shaft—the deepest in Illinois—Consol had another modern plant in operation.

Also in that issue, assistant editor Charles H. Lambur Jr reported on a series of tests of new du Pont hydraulic breaking units. At the Consol New Monarch mine in Herrin, Ill., one hydraulic unit was in operation breaking down coal for two loading machines, each averaging 300-320 tons per shift, necessitating the breaking down of around 10 faces in a 7-hour shift. The process, "in a semi-commercial stage of development, employs tubes expanded by oil pressure."

Mechanization increased throughout 1940. Almost 2,000 mobile loaders were in service nationwide. More than 1,500 conveyors were introduced that year alone, along with at least 155 more rubber-tired haulage units. This would increase further throughout the war years.

1942 saw the introduction and use of locomotive "radios" for communicating

from the cab of the locomotive with the dispatcher, as established at the Frances mine of the Frances Fuel Co. near Monongah, W.Va. Increased signaling and bigger haulage cares were also being deployed. "Just now the coal industry is passing through the same revolution as did the railroads a generation ago and is recognizing that heavier tracks, better ballast and stronger equipment will make greater speeds and longer trips possible, yet with fewer accidents."

During the height of the war years, some information became restricted and technical information, for a brief time, was somewhat restricted. However, with work stoppages, mine seizures, a manpower shortage and a war to be won, *Coal Age* focused, briefly, in other directions. But with victory on the horizon, editorial content opened up again.

In the September 1945 issue, associate editor R.R. Richart, and R.C. Oliver, president of the Oliver Coal Co., Somerset, Colo., jointly penned a piece treating mechanization at the new Oliver operation. "Loaders and shuttle cars are setting a fast pace in the development of the new mine, not yet a year old, located near Somerset, Gunnison County in western Colorado. One operating unit, comprising a loader and two shuttle cars manned by a 10-man crew, averages approximately 375 tons per shift...Like other properties, the Oliver mine has experienced a shortage of manpower. It too has learned that it pays to man one territory fully at the expense of another. As a result a 10-man crew in one territory, where two Type 42 D-7 Joy shuttle cares serve a 7 BU Joy loader, consistently produces almost 400 tons per shift. About 14 cuts are loaded out per shift."

With the World War over, the coal industry continued to grow and *Coal Age* was once again freely able to share this good news with its readers.

Hot War to Cold War, 1946-49

Compared to the war years that preceded it, 1946 was a down year for coal. Marred again by strikes, slowdowns and less demand, production fell to 594 million tons. But the following year, miners rebounded to wartime levels. "The bituminous industry, hoisting itself by its own bootstraps over some tough obstacles, broke all peacetime production records with an estimated 619 million tons in 1947, up 16% above the prior year's tonnage and enough to meet surging industrial and domestic needs," wrote Given in the February 1948 review issue. Incredibly, total



Shuttle car getting a load of more than 6 tons of coal. **Coal Age*, February 1941



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actual production of 682 million tons could have been even higher were it not for a nationwide shortage of rail cars that hit some mines as much as three and four days per week.

On the labor front, there were work slow downs and grumbling after the UJWA lost in front of the Supreme Court and the restrictive Taft-Hartley Act passed Congress over President Truman's veto. There was also a week-long shutdown in April to honor and mourn the deaths of 111 miners in Centralia, Ill., that April. Following the explosion, Interior Secretary Krug closed 518 mines for emergency inspections and full production was slow to follow. But, by year's end, the nation's mines would extract more coal than ever before save for 1944, though 1,165 miners would perish that year.

But 1947 was coal's last real high water mark until the 1970s. Just 1 million tons below 1944's record production level, oil, natural gas, railroad purchases of diesel locomotives, continued labor strikes and political wrangling would take their collective tolls on coal's markets. Through the late 1940s, *Coal Age* foretold of the coming "*Coal Age of Tomorrow*" and the many new possibilities the industry had to capture new markets by turning coal into oil or natural gas. All the while the industry lobbied to keep hydro and atomic energy from being used to generate electricity, jostled with Lewis' UMWA, and stumbled ahead in the competitive race for fuel of the future.

On the government-relations front, 1947 was also marked by the end—on June 30—of federal seizure of coal properties. This was timed with the legislative curtailment of most wartime government controls of the industry. Though mine inspections conducted by the Bureau and other activities would continue, gone were pricing controls and, it was hoped, the specter of government takeover or—worse—complete nationalization of the industry.

Though the industry employed more than half a million people, what may have helped most to create the post-war tonnage record was the addition of more machines underground. That, coupled with the maturation of a number of high-production mines that went into service during the war plus relative labor peace showed what coal was capable of producing. A new record in tons per machine shift was set on September 25 that year at Mine 207, owned by Consol of Kentucky. Using a crawler loader serviced by two shuttle cars, and mining in a height of 60 in., a 14-man crew pulled out 1,466 tons in a

single 8-hour shift. Rubber-tired haulage and the use of belt conveyors again racked up substantial gains in 1947.

Another new loading record was set in June 1948 when a 19-man crew at Consol of West Virginia's Mine No. 63, Monongah, mined 1,536 tons in their shift. In setting this mark, the crew loaded out 35 cuts of 8½ ft Pittsburgh coal using three shuttle cars, one Joy 11BU loader and a Sullivan 10RU cutter. However, while the continued introduction of loading, haulage and other machines would help keep costs-per-ton lower, as the post-war economy evolved into a new normal, industry was faced with the same problem they had following World War I's rapid expansion: overcapacity.

One major difference between the eras, however, was the political strength of the union movement. That difference was pointed up by John L. Lewis' audacious announcement at the UMWA '48 convention that he would impose his own work-sharing plan on the industry if renewed price-cutting threatened employment and wage rates in the postwar future. "Existing division among coal operators, with their lack of qualified trusted leadership to cope with the industry's problems on a national basis, has forced the UMWA to be prepared to lead the way once again to stabilize the operation in the eventuality the declining market for coal softens to the point where a repetition of the cut-throat competition of the '20's and early '30s is threatening."

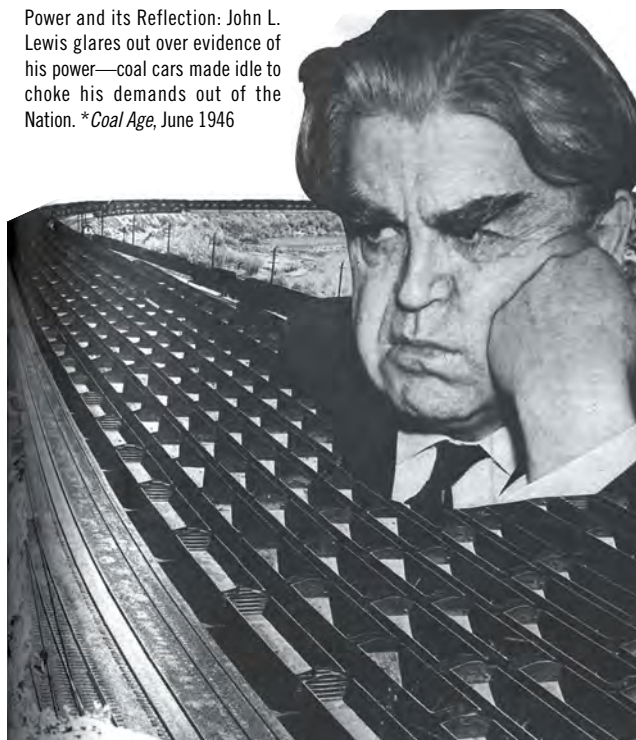
Though industry responded with a no-so polite collective "no thanks," *Coal Age's* editors were quick to point out that Lewis' instincts about the industry may not be so far off. In a February 1949 piece, they looked at how much excess capacity existed at the time and what could be done by the industry to protect employees, customers and stockholders. "In 1947, production in the bituminous industry was 624 million; capacity, 755 million. The spread increased in 1948 and included a substantial rise in new deep or strip-mine productions high in quality...thus increasing pressure on lower quality coal producers...The resultant pressure on prices, accompanied by curtailment or closing of a number of operations, undoubtedly precipitated

the Lewis statement." But, the danger of overproduction was out there just the same, and already some of the more marginal, higher cost or least prepared operations were closing—even as some mines curtailed production from six to five days per week.

By the end of 1948—"A pretty good year"—production was down slightly to a still robust 657 million tons. More than 70 new high production underground bituminous mines opened that year along with 40 strip mines adding a combined additional 220,000 tons of daily production—the highest rate of increase since before the war. But spring work stoppages growing out of the UMWA pension dispute, a drop off in exports from 43 million tons in 1947 to around 20 million tons that year and a 7.2% drop in railroad consumption accounted for the slight falloff in 1948. Though markets absorbed the still high output, production was about to go over a cliff in 1949 as Lewis made good on those threatened strikes. Fighting between union and management in turn curtailed output and raised prices and with America's economy modernizing rapidly, the railroads, the public and much of the nation's industry turned increasingly to the coal's more predictable competitors: natural gas and oil.

By the time 1949 was over, all that could be done was survey the damage. Lamenting that "by all the signs, 1949 was to have been a good year for coal," but then "there was Mr. Lewis. He called his miners

Power and its Reflection: John L. Lewis glares out over evidence of his power—coal cars made idle to choke his demands out of the Nation. **Coal Age*, June 1946



out for two weeks in March, a week in June, and for over seven weeks from September into November. From July 5 to September 19 and following December 5, he put his miners on a three-day week." Production fell dramatically to only 481 million tons combined between anthracite and bituminous—the lowest total since 1939. In his October editorial, an angry Given summarized not only the moment but the whole era since the implementation of the New Deal "the federal government has moved into the field of labor relations with the ostensible goal of achieving the desired stabilization. But, has it been achieved? The answer, as far as the coal mining industry is concerned, is an emphatic 'No.' As of 1949, the industry is further from stabilization of relations between employer and employee than at any time in history—and is suffering accordingly."

Demand was beginning to wane already, but with coal now more expensive and not always available, the editors asked "How much damage was done to coal's markets? How many customers, having switched to other fuels, can be persuaded to return to coal? What can we do to win customers back and secure our markets?" That question was to be asked throughout the 1950s as producers struggled from one challenge to the next.

Tomorrow's Coal Age: Just around the Corner

Beginning in the 1920s, as the coal industry began to compete with oil and natural gas, producers funded research to make coal more viable. One major breakthrough occurred early on in Germany when two chemical engineers, Franz Fischer and Hans Tropsch, developed a formula and system to make a diesel-grade oil from coal. Too expensive to compete with the flood of cheap oil that coal faced at the time, the FT process would eventually be deployed on a massive scale by the Nazi regime during WWII. Germany, cut off from the rich oil deposits of the Middle East and northern Africa, turned to its coal resources as a way to fuel the Wehrmacht. By 1943, both U.S. producers and the Allied governments had taken notice of Germany's success.

In a long series of articles beginning in April 1943, *Coal Age* began describing the potential of coal to fuel America's economy throughout the postwar period. In that issue, the magazine published a long piece by the immensely powerful Secretary of the Interior, and wartime Petroleum Administrator and Solid Fuels Coordinator

for War, Harold Ickes. Perhaps the second most influential person in the Roosevelt administration behind only the president himself, Ickes was tasked with essentially running the economy throughout both the Depression and World War. A famous curmudgeon, Ickes also had a large hand in developing long-term fuel policies and much of the postwar economy as well.

Like many, Ickes firmly believed that America's vast coal reserves would allow the nation to forever be energy independent. And he aimed to ensure that, in times of war and struggle, coal would be available as the backbone of the nation's economy. "A new industry based on the use of coal looms on the not-too-distant horizon. In its establishment I hope soon to lend an official hand," Ickes wrote in an April 1943 piece titled "Coal's New Horizons."

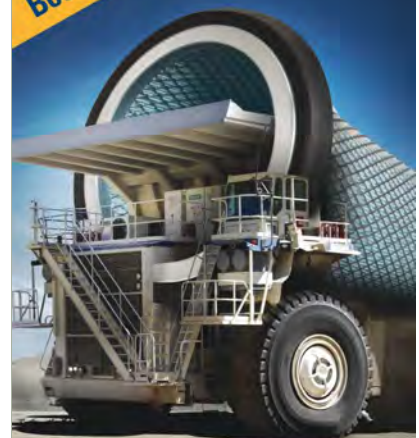
Even as domestic oil production was increasing, Ickes wrote "it requires no seer to foretell that the day is approaching when petroleum must be supplemented as an industrial and domestic fuel and as a source of gasoline...it is prudent to look to coal and oil shale as sources of liquid fuel." Indeed, since cheap energy, specifically petroleum derived energy, had become perceived as something of a "right" by most Americans, Ickes stated that "when our petroleum reserves and imports are inadequate to meet the demands of this mobile and industrial age" the most practicable alternative is to "develop, on a commercial basis, known methods of making liquid fuel from coal, lignite or shale oil." Beginning in the 1940s, Ickes and others in the coal industry began taking coal-to-liquids and coal gasification seriously, funding and initiating various experiments designed to take these processes commercial. And, just as they did, Big Oil and other industries lined up to thwart the process. Coal, too, stubbed itself in the foot. The *Coal Age* of Tomorrow might be possible, but it was not without hazards.

But how could coal miss out on a chance at an 80-million-ton market, asked the editors in the November 1945 issue. "Coal can supply gas and gas can furnish clean, completely automatic home heat and other services free from delivery and storage troubles. Needed is a cheap, practical process of complete gasification. The search is under way and intensified efforts can make it bear fruit quicker." The "House of Tomorrow" was what really concerned coal men in 1945: specifically the basement. Automatic heat and service, the editors knew, was the trend. Though coal could provide "community heating plants also providing hot water; gas



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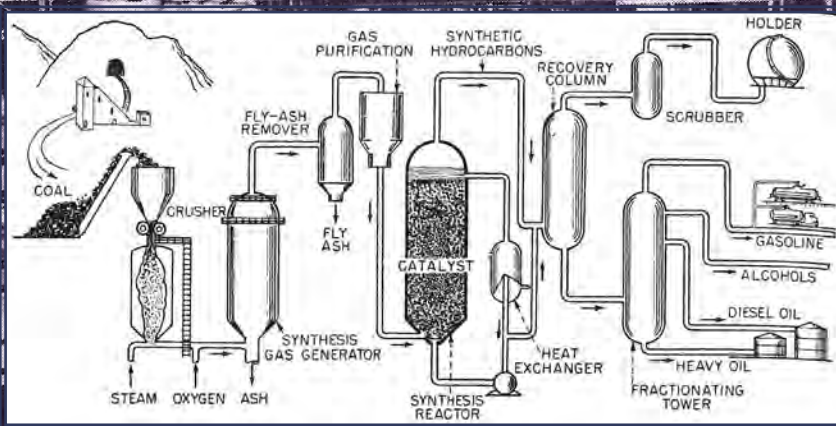


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Gas Synthesis Process, known also as the Fischer-Tropsch method, requires that coal be gasified as a preliminary step. **Coal Age*, July 1949

service for heat and also air-conditioning, hot water heating, cooking and refrigeration” as well as other services, doing so would require a concrete marketing plan as well as the ability to deliver constant fuel supplies. What coal possessed over both oil and natural gas, however, was supply. Without question, the resources and reserves were there, but would the market have patience and choose Old King Coal or would the new consumer culture be swayed by modern natural gas and oil, and the potential of atomic power?

Coal’s best hope could come in the form of district heating and building the right types of power plants. “With 10 million news homes commonly cited as necessary in the United States in the next few years, the battle for the job” of providing them with energy “is really on,” wrote the editors in the March 1946 issue. Steam generators, fueled by coal, could fill that role if enough research and development could be conducted and coordinated.

Making oil from coal was another continuing project. In the August 1946 issue, U.S. Rep. Jennings Randolph, of the 2nd District West Virginia reported that “substantial strides toward the establishment of an American synthetic-liquid-fuels industry

are evident as scientists of the Bureau of Mines, aided by the industrial and laboratory secrets of a decade or more of German experience, reach the end of the second year of a five-year program devoted to synthetic fuels research and development—an activity momentous to the national welfare and of particular significance to the coal industry.”

Randolph related that Bureau scientists “anticipated the laboratory and pilot plant at Bruceton, Pa., will begin making synthetic oil and gasoline from coal early in 1947. Contracts have also been let for converting the surplus synthetic-ammonia plant at Louisiana, Mo., into a coal-hydrogenation and gas-synthesis demonstration plant. Meanwhile, Bureau technicians, working in temporary quarters and with limited facilities, have reported important research advancements.” Federal subsidies and corporate partnerships provided further research throughout the decade.

In the December 1948 issue, the magazine reported that a new pilot plant for the gasification of coal built by the Pittsburgh Consolidation Coal Co. in cooperation with the Standard Oil Development Co. at a cost of \$500,000 had been formally opened. The previous November 15 an inspection tour of

there is no apparent economic justification for investment of large sums in commercial facilities to convert coal into gasoline, we must anticipate that the time will come when such conversions will be commercial justified or necessary in the national interest. While growing energy demands are expected to increase the use of coal in solid form, the establishment of new uses will add security to the industry’s future. These things—to be ready for a national need, and to establish new markets for coal—are the objectives of our research, which we can’t leave for others to do.”

In the July 1949 issue, assistant editor Stanbury reported on the progress being made in creating oil from coal. On May 8, the Louisiana, Mo., coal-to-oil demonstration plant began producing 200-300 bbl per day of various grades of liquid fuel from coal. “Full development of this new industry to a capacity of 2-million bbl per day of liquid fuels would make the U.S. independent of Near East oil in any emergency. For the bituminous industry, assuming that half of the liquid-fuel output will be from coal, there would be a need for between 190 to 210 mt additionally per year to feed the plants.”

Anthracite Takes a Postwar Dive

Almost at the end of the war, in the June 1945 issue, *Coal Age* ran a feature focusing on anthracite’s future. Titled “Anthracite Prepares for Tomorrow,” the editors delineate anthracite’s challenges, most of which conspired to finish off the old industry segment.

With commercial production going back through the early 19th century, at the time of *Coal Age*’s first issue in 1911, the eight counties that comprise anthracite country produced almost 90.5 million tons all by



General view of the synthetic-liquid-fuels laboratory at Bruceton, Pa., primarily devoted to work on coal. **Coal Age*, August 1946

dozens of coal executives, union and federal officials and executives from Consol witnessed its dedication. The purpose of the plant was to study the operability of fluidized coal gasification to reach conclusions regarding costs and commercial design. Though interest was high, costs were equally prohibitive.

Commenting on the company’s gasification program, Consol President George H. Love conceded that while “at present

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themselves. All time production heights came during World War I when anthracite miners won more than 99.6 million tons out of the ground in 1917. But less than a generation later, at the bottom of the Great Depression, production was down 50%.

World War II, however, brought another surge. In 1944, anthracite hit a modern high pulling 63.7 million tons out that year. With that momentum carrying over into the next year, the industry was starting to dream big again when *Coal Age* reported that “more than 6 million customers in 17 states burn it in anything from stoker-fired boilers to hand-fired pots.” Yet the writing was on the wall—the editors merely read it well. “The question remains, will those customers continue to burn it in equal or greater quantities after the war, when competitive fuels will be more available, when new and better equipment begins to flood the market, when every customer’s cellar becomes a potential battleground among anthracite, other solid fuels, oil and gas?”

The answer, sadly, was no. Though the coal industry as a whole lost ground after the war, by 1948, anthracite was stilling holding its own producing back-to-back 57 million tons years. But in 1949, anthracite took its first big step in its long slow demise. Production fell to just 42.7 million tons. That downward trend would accelerate rapidly through the 1950s due to the culprits listed above—and more. To add insult

to injury, some of the first railroads to completely convert from steam locomotives and “dieselize” were traditional anthracite consumers and carriers. Despite labor peace, lower production costs and better equipment, nothing could help. Those 6 million consumers just didn’t purchase anthracite anymore. A decade later in 1959, those same eight counties produced only 20.6 million tons—and falling.

Diesel Locomotives & the Beginning of the End of the Iron Horse

Beginning just before the war, oil had really begun to make deep inroads into coal’s traditional markets. No industry was more tempted to switch over than the railroads. Ironically, the iron horse had been, for generations, coal’s biggest customer. Indeed, many—including past *Coal Age* editors—had argued that the much smaller coal industry had really served as just the fuel subsidiary of the railroad colossus itself. By 1940, new diesel locomotives were beginning to win favor. First as switching engines, then on mainline passenger trains, both the public and the railroads were seemingly fascinated by internal combustion. General Motors purchased the first major domestic diesel-locomotive manufacturer and started a nationwide campaign promoting the technology. Only the war and diversion of those diesel engines into submarines and Liberty ships would slow delivery to the railroads.

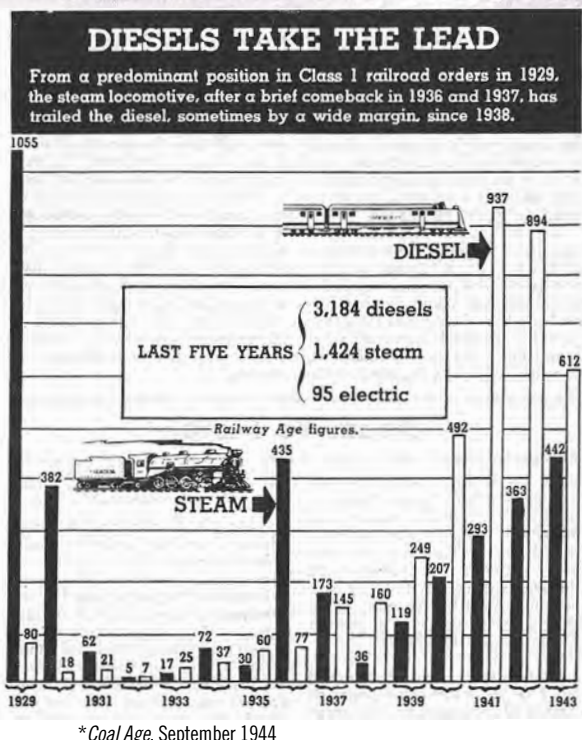
Looking at the history of diesel locomotive usage in the September 1944 issue, *Coal Age* ran a piece titled “The Iron Horse: Coal’s Big Market Problem.” Coal’s future as a locomotive fuel, the editors stated, “depends upon progressive thinking and general support of research into improved steam-locomotive design, however, the diesel has captured popular fancy and diesel manufacturers have sounded the them over and over again that diesel power is the modern power.” In 1942, there were only 1,667 diesel locomotives in service, more than 60% confined to switching duties against roughly 40,000 steam engines. In 1943, the railroads ordered 442 steam engines against 612 diesels, and that trend did not stop through the war or afterward.

Though 20% of the bituminous mined in 1943 went to the largest railroads, coal was down to 81.8% of overall railroad transportation fuel and falling. “There is no longer any question whether or not there is a trend to the diesel. It is now, in the opinion of many, a question of whether the trend can be stopped. There is obviously no danger of losing the entire railroad market overnight—or ever, for that matter. There are roads that will continue to use steam and would not be found dead in the same roundhouse with a diesel. Unfortunately, their motive is more one of coal traffic than of relative steam or diesel efficiency.”

The problem was that, even though diesels were 250% more expensive than steam engines, “according to its supporters, diesels do more than two and a half times the work and it does it cheaper.” Experimental steam and gas turbine locomotives were trotted out by the end of the decade, but, by then thousands of shiny new diesels were taking over crack passenger and crack freight trains. With coal supplies frequently interrupted as well, many rail lines started putting their older locomotives on deadlines. Throughout the decade, stories written by executives of the Hanna and Consolidated Coal Cos., would lament the losses and openly worry about the long-term impact of the loss of railroad customers.

Borrowing from Benjamin Franklin’s famous quote, “If we don’t hang together, we’ll hang separately,” R.L. Ireland, president of Hanna, stated that coal producers need to change both their merchandising attitude and provide railroads with a better, more consistent product if they plan on keeping them as customers going forward. “Too often in the past coal mines have sold the carriers coal that ill-suited their needs. With the excuse of keeping revenue traffic moving, surplus merchandise sizes have been foisted on railroad purchasing agents... Those agents have long memories,” he wrote in the April 1947 issue.

In October 1946, assistant editor W.A. Stanbury Jr. penned a long piece on the future of the gas-turbine locomotive predicting the new technology could prove a game-changer. Expected at the time to undergo on-the-rail testing by June 1, 1948, two types of gas turbines were, at the time, being developed by a consortium including the three major steam locomotive builders, the Battelle Memorial Institute and several other research groups. Though in 1949 several heavy coal burning eastern lines, including the Norfolk & Western and Chesapeake & Ohio would order new



* *Coal Age*, September 1944

steam-turbine electric-drive engines, these white-elephants would spend most of their time in the shop and would be scrapped by the middle of the 1950s. Only the Union Pacific Railroad would have any real success with turbines, and only after they were powered by diesel fuel.

Natural Gas Offers Stiff Competition, but Other Markets Beckon

In the September 1946 issue, the editors put together a long piece on the threat of natural gas competition to the industry. "Translating the natural gas to be available from the Big Inch line into tons of anthracite on a Btu basis, we find this 275 million cubic feet of anthracite coal, or 3,055,000 tons per year on a basis of 300 working days. In 1945, your company produced 3,379,275 ton of anthracite in domestic sizes. This stern warning, provoked by plans of the natural gas industry to pump peacetime gas instead of wartime oil from Texas fields to industries and homes in the Philadelphia-New York area through the Big and Little Inch pipelines, was voiced in a pamphlet recently issued to its miners by the Philadelphia & Reading Coal & Iron Co."

As soon as the war was over, natural gas began expanding its reach nationwide. "Realistic appraisal of the competitive situation gives coal men little cause for complacency—not that they have any on this score. Indeed, there is good reason for busy days and some sleepless nights these next few years if the coal industry expects to beat off this new threat without occurring too many losses." Since 1920, the natural gas industry had expanded nearly at the same rate as the anthracite industry had retreated, taking over much of its customer base in the process. This trend continued throughout the decade.

During 1946, miners dug more than 532 million tons of coal, which was used, among other things, to make two-thirds of the country's electricity. "At the same time, work was progressing on an experimental plant at Oak Ridge, Tenn., to produce electricity by splitting atoms," reported Eugene Snyder of the McGraw-Hill Economics Staff in the March 1947 issue. "Will this new source of power replace, compete with or merely supplement the use of coal?" Nuclear science, of course, was in its infancy in the late 1940s, but throughout the rest of the decade and for years to come, tremendous amounts of research and development dollars would be spent perfecting this science and developing commercial grade atomic power.

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1950s: Labor Peace, Continued Mechanization and a Changing Focus on the Environment

1950-1959



The decade of the 1950s began with a mixture of hope and fear within the pages of *Coal Age*. Reflecting upon the previous strike-filled year, editor Ivan Given asked if John L. Lewis, the UMWA and 1949 work stoppages were extracting too high a price from the industry and the nation as miners struggled with operators for control. Consistently inconsistent coal production was practically handing over market share to the natural gas and oil industries. All the while hydro-generation was gaining favor and scientists continued experiments with the potential of atomic energy. Coal's future depended on its ability to stabilize labor relations and reliably produce the energy vital for the America's expanding post-war economy.

In 1950, "underground, the mining-and-loading machine and roof bolting held

center of the stage. In stripping, increased equipment capacity was paralleled by growing use of big augers and other equipment for increasing coal recovery after the stripping limit had been reached. And in preparation, growing emphasis on higher quality and increased coal recovery further stimulated mechanical cleaning and the installation of special equipment for treating fine coal including both coal-washing tables and floatation units."

Throughout the late 1940s, numerous advances in underground production had led to the development of continuous mining techniques. In the February 1950 year in review issue, Given wrote, "experience in 1949 indicates that mining-and-loading machines are today averaging 200 to 400 tons per shift, depending upon seam thickness, with crews of 4 to 6 men." Mining

without shooting the solid and using conventional loading and cutting equipment were also inaugurated that year. Roof-bolting was spreading rapidly around the industry "with mounting evidence indicating that it will provide better roof support at a substantial reduction in cost compared to standard timbering." Underground conveyor belts were common, and higher capacity belts were getting longer. "At one mine, installation of a 30-in steel-cord belt conveyor 10,900 ft long, head to tail, was completed at the end of the year. Operating at 300 fpm and powered by a single 200-hp motor," wrote Given.

Nationwide, continued advancements in surface mining were allowing greater amounts of tonnage to more efficiently be mined as well. "Another increase in the number of large walking draglines and another high in the capacity of shovel dipper-pacers paced stripping developments in 1949. Other major advances included a substantial increase in deep pit operations, the use of larger and bigger augers at highwall operations, and an increase in dipper sizes. With additional coal being surface mined, producers were also coming under increased environmental scrutiny. New land-use policies were being debated as miners learned to be better stewards of the land. Tree farming, cattle raising and other post-mined land uses were becoming more common throughout the end of the 1940s and into the 1950s.

Negotiations between coal operators and the union went well in early 1950 and the contract they collectively settled on created precisely the labor stability needed for coal to move ahead. Deemed "a sick industry" by President Truman, full government takeover or nationalization—at the time happening worldwide—was looming unless all parties could find some middle ground, roll up their sleeves and get back to it. Labor peace began early that year. "Coal can offer more value and better service if it



Television Commentator Gets Background for Peabody Coal Show

Preparatory to launching a new television program for the Peabody Coal Co., Clifton Utley (left), well-known radio and TV news commentator, is shown on an underground tour of the company's mine No. 43, Harrisburg, Ill., accompanied by Stuyvesant Peabody Jr., president; Lloyd Anderson, Southern Illinois division superintendent; and Frank White, vice president in charge of operations. The new program, which was scheduled to start April 18, was a 15-minute news program on Tuesday and Thursday nights at 10:30 p.m., CST, over WNBO, Chicago. In addition to the news, Utley told viewers how coal is mined and discussed with accompanying pictures, the improvements in efficiency and safety resulting from mechanized operations. **Coal Age*, May 1950

has an opportunity to settle down and really work. With the 1950 contracts appreciably broadening that opportunity, the situation can be truly described as a new start," wrote Given in his April editorial.

The new UWMA contract was good through June 30, 1952—a period of 28 months—and could not be reopened for any changes until after March 31, 1951. "All this adds up to a chance for stability for at least two years and possibly longer." Following the agreement, George H. Love, president of Pittsburgh-Consolidated Coal, and the operator's lead negotiator at the talks stated, "This coal industry is not a sick industry... This country is one of a very few where coal mining is still in private hands operating under a free enterprise system... It is a modern aggressive industry with three to six times the productivity of the coal industry in any other country and we are going to do better than that. We need stability and the contract provides it."

Labor peace couldn't have come any sooner. By the middle of the year war with North Korea had erupted and, with the Chinese and Soviets backing the Communist government, World War III seemed like a real possibility. For coal, this "could bring a return to the conditions in 1944 and 1945," but this time, with the increased capacity created during the war, coal was ready. Combined between anthracite and bituminous, almost 800 million tons of production was possible. "Both industries are equipped with modern preparation plants that produced special-purpose fuels for industry and a variety of quality coal for home and commercial uses. In addition, there's no fifth column in the coal mines. Miners are loyal and patriotic citizens," wrote Given.

By the end of the year, the nation's 479,000 coal miners had produced approximately 560 million tons, an increase of more than 15% from 1949 figures. New machines and mining methods also helped bituminous operators increase efficiency from 6.43 tons per man-day to over 6.75 tons per man-day. But unlike World War II, the nation's war machine now ran almost entirely on oil. Railroads burned almost 20% less coal in 1950 than the year before and fewer consumers heated their homes with it. The

only real bright spot was in the electric utility sector; that year power plants burned an estimated 90 million tons, more than 7% from the year before and reflective of a longer-term trend. Though there were 637 fatalities—44 more than the year before, these fatalities occurred at the new record low rate of 1.16 per million tons, a 6% improvement over 1949. Key to improved safety: roof-bolting. "At the end of 1950, approximately 450 large mines producing over 1,000 tons daily were using the technique." The Bureau of Mines estimated that about 75 million sq ft of roof had been bolted through that year.

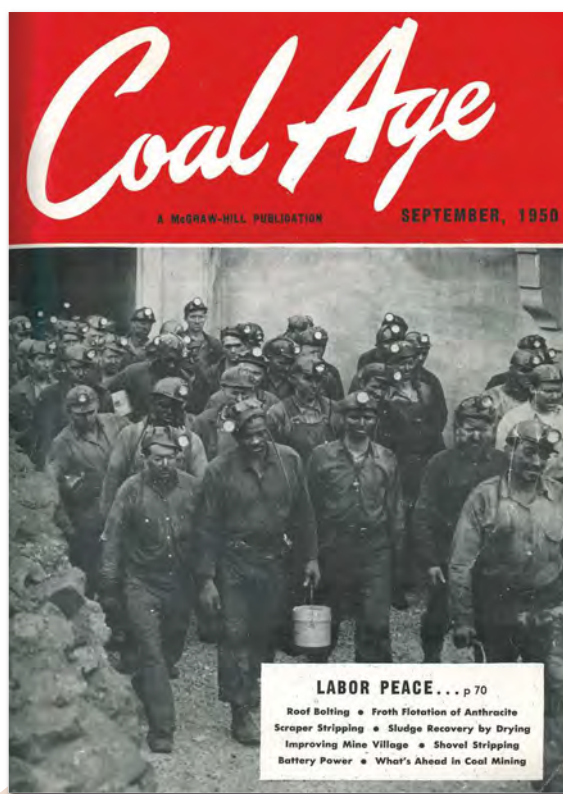
Things were going so well in the industry that labor and management came to a "voluntary agreement" on January 18, 1951, to boost miner's wages by \$0.20 an hour—

defense agencies urging that coal be made the No. 1 choice among fuels. In September, the Tennessee Valley Authority (TVA) announced the largest single coal contract ever: more than 18 million tons to be delivered over a 10-year period. Combined, through September 1951, the TVA had agreed to purchase a total of 27,795,705 tons of coal for use at its five steam plants at a total cost of \$92,647,705. Contract prices varied from \$2.45 to \$4.70 a ton. TVA consumption of coal at the time was projected to reach 13 million tons annually by 1956.

Production all year went smoothly and by year's end approximately 576 million tons had been mined—the highest total since 1948. Bituminous operators mined more than 535 million tons, almost 25% of which was surface mined and more than 55% of which was mechanically loaded underground. However, as 1951 came to a close, tragedy struck the coal industry. At 8 p.m. December 21, as the last shift before Christmas shutdown settled into work, the CW&F Orient No. 2—the fifth highest producing mine in 1950—exploded killing 119 men instantly. A stunning blow to the industry, the causes and ramifications of the disaster had long-lasting effects. And, in a way, the Christmas explosion marked a turning point in the coal industry.

Hopes were high, however, that 1952 would prove a better year. The overall economy and all basic industries, due to the Korean "Police Action," were producing at record rates—except coal. Stuck at only 80% capacity, one hoped for growth area for coal was powering the atomic weapons and energy sector. The semi-secret new cold war plutonium trigger and depleted uranium facilities required lots of electricity and coal was tasked to provide it. "As the impact of the

defense effort is felt by heavy industry throughout the United States, I believe that there will be an increase in the market's demand for coal, principally the steel industry, the backbone of our defense production, and by the power industry, which is basic to our national defense," said Stuyvesant Peabody Jr., president, Peabody Coal Co., in the February issue. New chemical plants were also built along the



Coal Age reports on the labor peace achieved. *Coal Age, September 1950

"the first time in some 30 years that a new wage agreement had been effected in the bituminous industry without prolonged negotiations or a mine stoppage." The \$1.60 increase brought basic wages to \$16.35 per day.

Stability was rewarded. In January 1951, Consolidated Edison, New York City, returned to coal. In February, the federal Munitions Board sent a memo to all

COST CUTTING TODAY . . .

A Decade of Machine-Mining Progress—1942-51

	Number in Use				Per Cent Mechanically Loaded		Per Cent Stripped		Tons per Man		% Rise, TPM				
	1942	1951	1942	1951	1942	1951	1942	1951	1942	1951					
Ala.	59	144	22	13	350	222	15	100	45.6	73.7	1.6	10.77	2.82	5.00	77.3
Ark.			2	67	83	8	14	63.8	53.6	9.2	10.73	2.99	4.41	47.5	
Colo.	25	40	149	184	103	95	8	47.5	62.1	0.1	18.47	4.31	5.49	27.4	
Ill.	559	475	16	16	10	4	128	172	63.6	62.9	24.3	33.8	8.62	11.04	28.1
Ind.	142	158				4	171	158	65.9	41.3	57.0	56.5	10.70	11.28	5.4
Iowa.	2	2	14	4	11		57	84	10.4	2.7	23.9	70.6	3.59	6.79	89.1
Kan.							60	47			85.5	96.2	7.18	11.73	63.4
E. Ky.	111	500	71	146	154	459	4	111	18.6	47.8	0.3	5.0	4.10	5.61	36.9
W. Ky.	67		116		11		18	118	58.2		9.7	41.6	6.51	14.24	118.8
Md.		4		3	27	15	4	24		13.1	1.2	28.2	3.41	4.53	32.8
Mo.							70	48			66.5	92.2	4.65	11.92	156.5
Mont.	44	30	2	14			5	8	48.8	33.8	32.1	63.7	11.57	16.61	40.1
N. M.	9	16		1							79.2		3.18	5.30	66.7
N. D.	5	3					49	49		7.0	67.6	92.2	10.46	20.06	91.7
Ohio.	151	229	135	60	57	35	273	681	47.2	36.7	28.5	56.9	5.95	10.35	74.0
Okla.		5				131	23	43	24.3	37.2	46.1	55.0	4.68	5.92	26.8
Pa. Bit.	477	1,015	66	61	803	834	440	1,476	29.2	53.9	8.0	21.6	4.71	6.01	27.6
S. D.							6	3			91.9	100.0	5.29	9.12	65.7
Tenn.	4	36	15	38	96	72	49	22.5	36.5		8.9	3.45	4.90	42.0	
Utah.	44	127	30	70	45	15		85.3	97.9			6.91	7.41	7.2	
Va.	45	131	15	52	92	156		59	22.1	44.8		6.4	4.23	5.78	36.7
Wash.	1	1	11	9	85	84		8	52.5	68.2	2.0	8.6	3.31	4.25	28.4
W. Va.	533	1,462	167	362	1,003	1,668	92	540	45.0	70.9	1.7	8.0	5.19	6.66	20.6
Wyo.	23	32	233	205	54	27	5	23	94.4	70.7	2.3	28.6	6.85	9.72	41.9
U. S. Bit.	2,301	4,410	1,062	1,242	3,041	3,904	1,438	3,810	40.0	57.1	11.5	22.0	5.12	7.04	35.6
Pa. Anth.	524*	528*			2,491†	3,282†	348†	595	24.4	25.4	15.0	26.0	2.95	2.97	

*All scrapers in 1942; includes 43 loading machines in 1951. †Includes self-loading scrapers and pit-air loaders. ‡Total is for 1940; data not available for 1941 or 42.

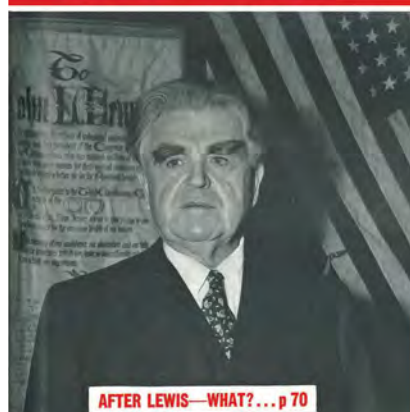
* Coal Age, May 1953

Kanawha and Ohio River Valleys, adjacent to water, rail and vast coal reserves, the aim was to construct something of a modern Ruhr Valley deep in America's interior.

1952 was also an election year. With no incumbent, the Stevenson-Eisenhower race would prove something of a referendum on the New Deal, the regulated economy and the power of organized labor. In September, the UMWA succeeded in achieving a \$1.90 raise to the basic daily rate of \$18.25 as well as a \$0.10/ton increase to the UMWA welfare fund, raising that contribution to \$0.40. And, for the second time since 1950, agreement came without government intervention and without a nation-wide strike. The steel workers strike, however, was a different matter entirely. Incredibly contentious and front page news all year as operators, the union and a divided federal government wrangled over control and nationalization. The strike lasted 54 days and, though the United Steelworkers won many of their demands, they lost in the court of public opinion. Truman, Stevenson and the Democrats suffered a serious rebuke as the national economy suffered. Coking coal production was down by more than 18 million tons as a result of the strike. Bituminous produc-

tion dropped 13% to 465 million tons. But oil and natural gas, in contrast, had great years. In November, General Eisenhower won the election handily and the Republicans took executive office for the first time in 20 years.

With much of the world fearing escalation, Ike, instead of expanding the Korean



Coal Age ponders what will become of labor relations after the retirement of John Lewis. *Coal Age, June 1953

War, ended it. And he ended many of the wartime restrictions on the economy as well. But coal production fell in 1953 and again in 1954, all the way down to 421 million tons. In the October 1953 issue, quoting from the *Keystone Coal Buyers* guide, the magazine reported that less than 11% of the estimated 6,500 coal companies in the U.S.—roughly 695—produced approximately 85% of the total mined or almost 400 million tons in 1952. Pittsburgh Consolidation, the largest U.S. producer throughout the decade, mined roughly 5.5% of the total that year, and U.S. Steel Corp., the largest captive miner, produced about 4.1%. As the markets contracted, however, the advantage went to the lowest cost producers—in particularly the more mechanized, less labor-intensive operators.

In the January 1955 issue, J.R. Forsythe, general manager of the *Keystone Coal Buyers Manual*, reported the nation's electric utilities would purchase more than 20 million tons more than they had in 1954 for plant operation and building up stocks. "This addition, the biggest annual increase in the history of utility fuel purchases, will accelerate the increasing reliance of the utilities on coal, and will push the use of coal by utility power plants to a new record of nearly 130 million tons in 1955." Forsythe analyzed the data and, based on announced contracts, forecast that by the end of the decade, the 62 largest utilities would be purchasing approximately 170 million tons alone.

Beginning in 1955, a wave of mergers hit the industry as markets continued to contract. In the February issue, the magazine reported that Col. Henry Crown, chairman of the board of the Material Service Corp., and owner of the Empire State Building in New York and the Freeman Coal Mining Co., would acquire the properties of the Chicago, Wilmington & Franklin Coal Co., owners of the Orient mines in Illinois. By the end of the decade, the merged company's flagship Orient No. 3 mine—new in 1950—would grow into the second most productive operation in the nation, consistently extracting more than 3 million tons annually.

On June 6, 1955, Peabody and Sinclair Coal announced they were going to merge. On June 7, Island Creek and Pond Creek Pocahontas Co. announced they were going to combine too. The Peabody/Sinclair combination would have a reserve base of more than 1.7 billion tons of economically recov-

erable coal. Island Creek/Pond Creek would operate 12 mines in southern West Virginia and eastern Kentucky capable of producing more than 9 million tons annually. Peabody/Sinclair, following their merger, became the second largest national producer after the Pittsburgh-Consolidation Coal Co. In the September 1956 issue, the magazine reported that Pitt-Consol would merge with the Pocahontas Fuel Co., then the nation's seventh largest producer. The merger gave larger Pitt-Consol access to low volatile coking coal in Virginia and southern West Virginia. Around the same time, Pittston Co. also announced it was going to merge with Clinchfield Coal. Finally, in the February 1957 issue, Island Creek announced its acquisition of Algoma Coal & Coke Co., securing the company's status as fourth largest annual coal producer.

Though still far below war-time highs, production increased both in 1955 and 1956, and held fairly steady again in 1957. But production peaked in the mid-1950s at 532 million tons in 1956 and then fell to 433 million tons in 1958—and held steady at those lows through 1962. Squeezed between oil and natural gas competition, higher transportation costs and increasing wage costs, King Coal was hurting. Railroad freight rates rose between 20%-25% from 1952 through 1956. Producers began looking for any way to cut down those mounting costs. Pitt-Consol began constructing a 106-mi pipeline. Truax-Traer constructed a massive combination preparation plant, rail and river dock on the Kanawha at Cerdo, W.Va., as the Inland Waterway System became a more cost-effective mode of transportation. Several new mines located adjacent to

new utility power plants and, by going to a mine-mouth arrangement, simply cut out transportation costs entirely.

Increased mechanization and reliance on new continuous mining technology helped producers control costs as the UMWA secured a \$2/day raise again in 1955. That year, more than 300 million tons or 64.5% of bituminous and lignite production was mechanically loaded. Only 11% was still hand-loaded. Roughly 25% of total production was surface mined. The use of continuous machines with roof-bolt drills mounted at the sides spread to more operations while rock-dusting machines helped contribute to better safety results mid-decade. Fatality rates in 1955 per million tons mined decreased to 0.71. Since falls of roof, face and rib were still the largest single causes of death and injury underground roof-bolting became standard operating procedure in the nation's most progressive mines.

In March 1957, *Coal Age* sadly reported on the death of Joseph F. Joy, founder of the Joy Mfg. Co. who died February 19 at his home in Ft. Pierce, Fla. "Mr. Joy, whose machine design revolutionized the mechanical loading of coal in the United States, began his experiments in mobile loading in 1916. In 1919 he organized the Joy Mfg Co. and began production of coal mining machinery. Principal product was the Joy loader. From 1925-1927 Mr. Joy served as a consultant to Russia during modernization of USSR coal mines. He

returned to the U.S. to organize Joy Bros. Inc. in Marion, Ohio, where he produced, among other equipment, the coal saw and the safety drill. Later, Mr. Joy joined the Sullivan Machine Co. as the head of design. Specializing in developing cutting machines, he developed the 7AU, which was the parent of many of the universal machines then in service. From 1938 to 1940, Mr. Joy was senior ordinance engineer with the War Dept. On completion of government service, he returned to private industry and was retained by the Joy Mfg Co. as a consultant." Perhaps no single individual had done more to change the way coal was mined in the U.S."

Exports, Barges & the Death of the Iron Horse: Evolving Transportation

One of the biggest surprises of the mid-1950s was a surging export market. In 1955, it doubled from 15 million tons to approximately 32 million tons. With Europe, Brazil and Japan expanding and short on coal, U.S. producers were quick to pounce. The railroads, of course, took their bite out of the expanding market as well. By 1956, it seemed like exports would become a steady 35 million to 38 million ton per year market for bituminous producers. In the March 1956 issue, associate editor W.A. Raleigh analyzed the export market by looking at the needs of 21 principal overseas nations worldwide. To help exploit the opportunity, operators, railroads and the UWMA band-

16 Tons

Tennessee Ernie fans will recognize the head on this piece as the title of a hit song that is helping in the process of putting coal in the limelight these days in more ways than one. Parenthetically, when your commentator started out, we expected to do at least 6 tons better and scrap a bottom to boot. But maybe we had a little thicker coal and perhaps better conditions. Incidentally, we stood higher with the shovel and pick manufacturers because our consumption per shift naturally was greater.

Then we have Stanley Skeens, an electrician at the Wharton No. 2 mine of Eastern Gas & Fuel Associates, in southern West Virginia, who took the Bible as his subject and took home \$32,000, minus taxes, for five quiz-answering sessions on television's "\$64,000 Question." He proved his right to the prize and he won the hearts of millions of people in the process. And in that same process he undoubtedly left with those same millions of people a favorable opinion of the coal-mining industry that could have been gained in no other way. Thus coal has been favored with a rare break. For it, and for those fine qualities of his own that he so ably demonstrated, a salute to Stanley Skeens, coal miner extraordinary.

* *Coal Age*, January 1956



Giant New Coal Burner Confirms N&W's Faith in Coal

Coal-fired steam-turbine electric freight hauler pulls heavier loads at lower costs over mountain terrain. * *Coal Age*, December 1954

ed together to create the American Coal Shipping Co. to carry coal from U.S. ports to foreign destinations. Capitalized at \$50 million, using mothballed Liberty Ships, the consortium viewed ACS as a way to control freight rates and ensure American coal prices would not be further hampered by exorbitant ocean shipping charges. Excluding Canada, exports would increase to 58 million tons in 1957, only to fall back into the mid-1930s for the rest of the decade.

Another era formally ended as *Coal Age* reported in the August 1958 issue that the Norfolk & Western Railroad, the last major railroad to rely mainly on coal power, had decided to scrap its fleet of 262 ultra-modern steam locomotives and switch to diesels. Championed just a few years before in the December 1954 issue as the Alamo of steam power, at the time the N&W was the nation's second largest originator of bituminous coal and dozens of coal users were located along its rail network. The company had also invested heavily in design and development of new coal-fired steam locomotion. But, by the end of the decade, no iron horse existed that was able to successfully compete against diesel power.

As late as 1925, American railroads had 65,006 steam engines in service and 352 electric engines. On April 1, 1958, there were only 2,113 steam engines left with more than 27,500 diesels and 560 electric locomotives in operation. That number would drop to zero by 1960 as both steam engines and the railroad coal market went by the wayside.

No longer buyers, railroads began to insist that coal do more to pay the freight.

As those rates rose through the 1950s, coal consumers started switching to barging instead. In the August 1958 issue, editor Given heralded June 14 of that year as a milestone. On that date in Paducah, Ky., "the tugboat Chippewa passed with the first complete barge shipment of coal destined for Tampa, Fla. Originating at the Peabody River Queen mine on the Green River in western Kentucky, the eight barges of coal traversed a 1,100-mile route down the Ohio, Mississippi and, after transfer to ocean-going equipment at New Orleans, across the Gulf of Mexico. Destination: an electric utility changing from oil. This trip, the forerunner of others, reflects vividly the broadening horizon for coal in generating electricity." The shipments to Tampa from western Kentucky were part of a 20-year contract and, since success always has its imitators, many more millions of tons of Midwestern and Appalachian coal followed up and down the beckoning Inland Waterway System.

Bolstered by various new lock and dam projects, it was more than up to the task. In the December 1956 issue, the editors illustrated how "slick, low cost barge loading swings coal to river transport." Many Midwestern producers were keen to locate their new operations along the river system. In the April 1959 issue, associate editor Raleigh reported how barging was keeping coal competitive, particularly as it eliminated "high-cost rail transport" that was fast becoming "a block to new customer sales." The "new 981-mi Ohio River system" stretching from Pittsburgh, Pa., to Cairo, Ill., now featured more than 50 new locks and dams and maintained a minimum 9-ft chan-

nel the whole length. Traffic grew from 11.5 million tons in 1951 to over 22.3 million tons in 1957 on the Ohio and from 49.6 million tons to 78.8 million tons along the whole of the Inland Water System during that time.

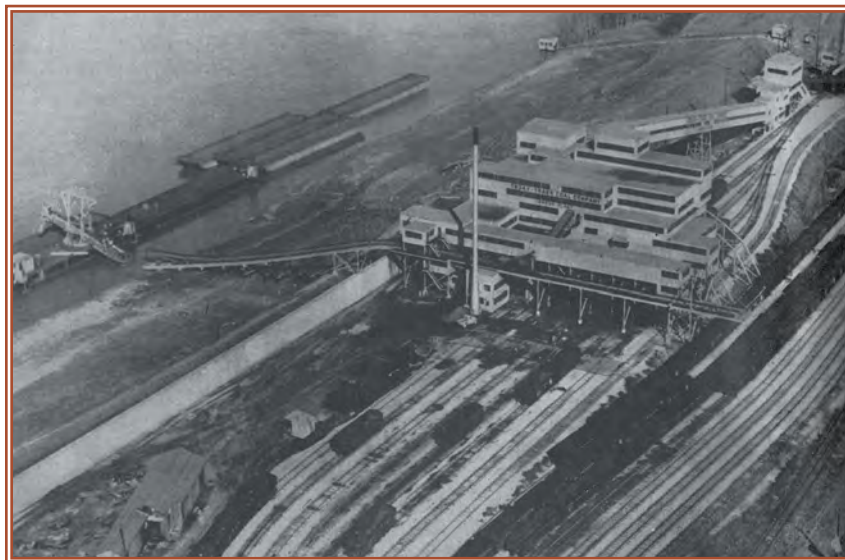
By 1959, coal had become "the premier power-plant fuel." And, in fact, the utility market was the only growth sector for the industry throughout the decade as the U.S. economy contracted throughout the later part of the decade. In 1958, utilities purchased 152 million tons and had become the coal industry's biggest customer.

In the October 1959 issue, the magazine reported that new coal-fired utility plants were being built out west as well, closer to coal deposits though further away from population centers. New high capacity transmission wires made transporting electricity to market cheaper than hauling coal instead. The main subject of the piece was the recent opening of the Dave Johnston steam plant of the Pacific Power & Light Co. at Glenrock, Wyo. The new 100,000-kW power station, built in sight of still visible wagon ruts from the Oregon Trail, was powered by deposits of nearby 7,000 Btu subbituminous coal. The citizens of Glenrock, according to the magazine, had requested the new power plant be built in town after a large oil refinery shut down. Ground broke June 30, 1956 and the plant was dedicated December 20, 1958. "Now instead of watching their town decline, the people of Glenrock are seeing construction of a new housing development for the additional employees that will be needed at the new Dave Johnston plant."

Bituminous production, however, was down to approximately 400 million tons by that point, a figure that would stay steady for several years to come. However, fatalities had fallen all through the decade, to new lows of only 477 in 1957 and 356 in 1958. Still far too many, but a remarkable decrease since the war years of the 1940s. By the end of the 1950s, most of the high-cost non-mechanized producers were out of business. Remaining were the large-scale fully mechanized outfits using continuous mining machines, roof-bolters and other safety machines to ensure a smooth production cycle.

Coal, Coal Age and the Environment

The questions of what to do with mined out land, how to treat acid mine run-off and other environmental concerns have long troubled the coal industry. Though not a regular feature topic until the late 1940s, *Coal Age* first began reporting on reclama-



Barge loading installation owned by Ceredo, Truax-Traer Coal Co. **Coal Age*, December 1956

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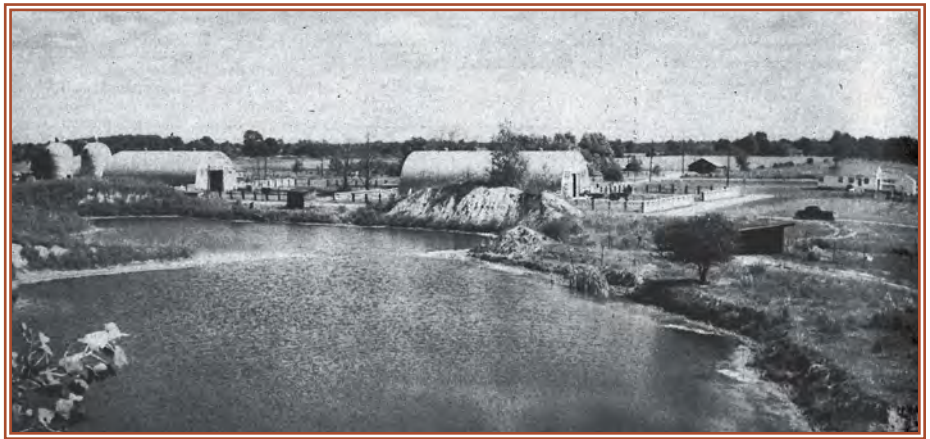
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LONGER LIFE • LESS DOWNTIME • LEADING SERVICE & SUPPORT

tion in the January 4, 1913, issue with a feature on reforestation efforts in the English Midlands and “Black country.” As reported in the June 1953 issue, “the nation’s first surface mining reclamation program was begun in Indiana in 1918 with the planting of peach and pear orchards that are still producing. Of the 50,000 acres of land strip-mined since that time, more than 40,000 have been revegetated, 5,000 have been devoted to public recreation and 1,500 have been converted to residential sites.” Tree-planting, surface mine reclamation and environmental mitigation would become a widely reported topic from the 1950s forward, especially as larger and more productive mining equipment was deployed throughout the decade.

Attempts to control acid water mine effluents were reported on as early as the June 3, 1926, issue. Reporting on a conference session, *Coal Age* quoted Andrew Crichton, consulting engineer, Johnstown, Pa., on the expense of treating acidic run off. Even as early as 1926, the enormity of the problem was apparent. The “cost of treatment to neutralize acid within the present area of developed and abandoned mines will be from \$80 to \$100 million yearly. The treatment plants would cost \$145 million, and the water would still be hard afterwards,” said Crichton. Though not an impossible task, mitigating environmental damage has long been a challenge for the industry. Federal control of stream pollution became a reality during the Great Depression and the New Deal. Though it was challenged in the courts, federal control eventually gave way to various state and regional authorities. Pennsylvania, easily the most mined out state, early on took an aggressive leadership role. In the February 1953 issue, the magazine reported on the Pennsylvania Water Board’s efforts to neutralize stream pollution and water runoff.

In the August 1955 issue, assistant editor Raleigh reported that more states were passing regulations on discharge of water and wastes from coal mines and preparation plants into the nation’s waterways. “States are enforcing or proposing new legislation aimed at reducing to acceptable standards the drainage of sewage and industrial wastes that ‘poison’ streams and make them unsuitable for municipal and industrial use.” These included efforts in the Ohio Valley, Missouri, Colorado, Montana, Washington and Kansas, as well as laws already on the books in Pennsylvania and elsewhere. In October 1956, the magazine



Studies into Reclamation from Strip Land

Creation of farms that will support farm families and add to the wealth of the community is Meadowlark’s aim. The plan includes best use of banks as well as reserve coal lands capable of bearing crops tests to find the best ways to rebuild worn-out soil; and experiments with crops and livestock to find what grows best, and where. **Coal Age*, August 1953

reported that President Eisenhower signed the federal Water Pollution Control Law providing more controls on both the state and federal level over water effluents.

Back in the early 1940s, *Coal Age* also reported on large-scale reforestation efforts on strip mines in southeastern Ohio and southern Illinois, some of the first such modern practices. In the August 1942 issue, the editors reported that more than 7 million trees had been planted since 1930 on more than 7,250 acres in Illinois and that old spoil banks statewide had been made suitable for grazing, fishing, wildlife propagation and recreation. Again in 1946 and 1947, the editors covered in detail efforts to farm, introduce and raise livestock and “reclaim” strip mined land in the two states. In the March 1950 issue, T.C. Cheasley, assistant to the president of Sinclair Coal, Kansas City, wrote a piece touting the company’s widespread efforts to return formerly stripped land to use. Stating that post-mined land may be more fertile or more suitable for human use, Cheasley wrote, “Strip mining actually adds to the value of otherwise worthless farm lands, makes forage crops and trees flourish where there was only scrub growth, conserves water and turns drab landscapes into attractive recreation parks for fishing, hunting and camping. Instead of a curse, strip mining, scientifically planned and carried out, is most often a boon for the community.” Accompanying photographs suggested ways Sinclair had solved the riddle.

In the December 1951 issue, G.H. Deitschman, forester, and R.D. Lane, officer in charge, Central States Forest Experiment Station, U.S. Forest Service, Columbus, Ohio, wrote about how strip

mined lands can grow trees profitably. A veritable how-to guide, the article presented tips which trees grower faster and bigger along spoil banks. A fairly new concept, “forest products also have been harvested from other scattered cuttings in Oklahoma, Ohio, Indiana and Illinois. Because spoils plantings are all relatively young, only small-diameter products, consisting of posts, poles and pulpwood, have been obtained.”

By the mid-1950s, however, strip mining—which accounted for about 25% of total tonnage, was driving a nascent environmental movement. And efforts were under way to address those concerns. In the August 1953 issue, the editors surveyed the work of Meadowlark Farms, Inc. Owned by Ayrshire Colliers Corp., and its affiliates, Delta and Fairview Collieries, Meadowlark’s farming operations embraced more than 57,270 acres of stripped and reserve coal lands in Illinois, Indiana and Kentucky.

Irwin H. Reiss, who had started out as an Illinois farm boy, had matured into Meadowlark’s general manager with 41 farm managers and employees working under his direction. “Much of Meadowlark’s land is marginal or submarginal, unfit before or after mining for ordinary farming with ordinary methods. But with sound doctrine, a fine public spirit, patience, agricultural know-how and a watchful eye on costs, Meadowlark has shaped a model program to reclaim strip-mined land and rebuild worn out farms on and near reserve coal lands. Meadowlark also makes it pay. That’s the way it should be,” wrote the editors.

In the September 1955 issue, F. J. Foresman, director of industrial relations



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at Pittsburg & Midway, wrote about his company's efforts to raise prize Angus on strip lands in southeastern Kansas where more than 5,000 acres had been reclaimed. In the March 1957, John Crowl, executive director of the Kentucky Reclamation Association, summed up the situation well. "Today's mammoth strip-mining shovels have focused public attention on what should be done with the scars left on the earth's surface after the land has been stripped. One of the main draw-backs to reclamation of the stripped lands was lack of knowledge about what to plant and when and where to plant it."

Surface mining began in the area in large amounts during World War I and operations grew in size dramatically in the mid-1940s. Beginning in 1948, a group of Kentucky coal companies banded together to bring that know-how together. Since the mid-1950s the group had developed research and test tree-farms at various points at different mine sites to determine which trees were best to grow in the disturbed areas. Fishing and recreational use were also being tried throughout the region.

Battle of the Behemoth Shovels: Surface Mining in the 1950s

In the rapidly expanding surface mines of western Kentucky, *Coal Age* reported that special drilling and heavy shooting had helped solve the double trouble of tough sandstone overburden and a hard limestone parting in strip mining the No. 12 and No. 11 seams simultaneously at the Colonial mine of the Colonial Coal Mining Co.—located some 10 mi west of Madisonville, Ky. As reported in the August 1950 issue, "The hard sandstone cover ranges from zero at the crop line up to 40 ft or more at the 70-ft stripping limit. The limestone parting between the two seams ranges from 3 to 10 ft thick and is extremely hard." Production runs about 3,000 tpd of washed industrial, domestic and stoker coal, together with some railroad coal. In addition to working the No. 12 and 11 seams, the company also strips the No. 9 seam. This coal, about 5 ft thick, lies about 80-ft below the No. 11. Heavy shooting prepares the sandstone overburden for the dragline—a Marion 7400 walker equipped with a 175-ft boom and 12-yd Escobac bucket. Other mobile equipment,

including diesel-powered Caterpillar D-8 tractors, went after the No. 12 seam.

In the Illinois stripping region, to increase productivity and better utilize equipment, the United Electric Fidelity and Buckheart mines both tested double-shift strip loading in 1949. Heretofore, strip mining had only been a single-shift endeavor. But, as reported in the March 1951 issue, with new equipment and better lighting, going to a second shift was almost immediately successful. At Buckheart, more than 3,000 additional tons with 49 extra men was produced over the regular first-shift output of 4,500 tons with 158 first shift workers including 56 men on maintenance. At Fidelity, a second shift crew of 55 was able to produce another 4,000 tons in addition to the nominal daily output of 7,000 tpd with a crew of 285. United Electric management believed that double-shifting could be accomplished without any additional stripping equipment. At Buckheart, improvements in the wheel excavator already in service permitted uncovering the extra coal desired, while at Fidelity there was enough equipment on hand already. The only ingredient needed was the additional workforce.

*Grove RT700E, Rough Terrain Crane
Surface Mining, West Virginia
ALL was assembling a CAT 785D Rock Truck*

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In August and September 1956, the magazine published two stories on Truax-Traer's massive surface operations in northern Illinois and southern West Virginia. The company's Fiatt, Ill., surface mine had recently begun employing the first production model of a wheel excavator in the U.S. working in tandem with a 33-cu yd shovel. Eventually the wheel took on more stripping duties as it was able to remove more of the softer top material thus reducing the amount to be handled by the shovel and allowing it to advance faster. The wheel strips and spoils an average of 10,000 cu yd of material in a shift, removing 25-30 ft and leaving 30-35 ft for the shovel. The wheel can work the top from an 80-ft highwall down to a 30-ft high bench.

At the Marfork mine in southern West Virginia, the company had recently deployed a Bucyrus-Erie 750B equipped with a 19-cu yd shovel. A 900-ton giant designed to "tear off the hilltops to recover the Dorothy seam. Towering 85 ft above the ground, the electric power shovel chews up blasted rock...while uncovering a 115-ft strip of coal."

For the October 1956 issue, associate editor Flowers reviewed the new Gibraltar Coal Co.'s massive new surface mine situated in Western Kentucky along the Green River. Supplying more than 2 million tons per year to the Atomic Energy Commission's new power plant at the Portsmouth atomic production center, Gibraltar began as a joint venture between Ayrshire and Midco mines and constructed with a 4 million tons per year capacity. Stripping from two seams, the Kentucky Nos. 11 and 12, overall stripping ratio was approximately 6 to 1. To handle the job, Gibraltar used a 42-cu yd Marion 5561 electric shovel with a 135-ft boom that worked 24 hours per day. "This unit is designed to strip the cover over the No. 12 coal, which will average 40 ft. A 6-cu yd Bucyrus-Erie 190B high-lift machine with a 70-ft boom removes the interval between the seams. The third stripper is a 13-cu yd Marion 7400 dragline with a 175-ft boom."

Less than a year later, the largest shovel ever constructed by Bucyrus-Erie, the 55-cu yd 1650-B River Queen began taking 80-ton overburden bites at the new River Queen Coal Co. mine near Greenville in Western Kentucky. Located not far from



Giant 70-yd Shovel

The world's largest at the time, sets the pace at River King mine. This unit is the first of three similar excavators to be owned or operated by Peabody. *Coal Age, January 1958

the giant Gibraltar operation, together the two new mines placed Muhlenberg County at the forefront of the nation's stripping areas. Jointly owned by Peabody Coal and the W.G. Duncan Coal Co., the two compa-

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"King of Spades"

The world's largest horses, the Anheuser-Busch Champion Clydesdales, and the world's largest electric-powered shovel, Peabody Coal Co.'s "Big Paul," recently compared stature at Peabody's River King mine at Freeburg, Ill., 30 miles southeast of St. Louis. Total weight of the horses and wagon is 10 1/2 tons. "Big Paul," the "King of Spades," can scoop 195 tons in one bite, or enough earth to fill two railroad cars. **Coal Age*, February 1958

nies were determined to squeeze all possible efficiency out of the new shovel as they worked to produce 2 million to 3 million tons per year. When three-shift operations began, the shovel uncovered "overburden averaging 45 ft to expose the 4 1/2 ft western Kentucky No. 12 seam. With the No. 12 removed, the River Queen will remove an 8-ft limestone parting to expose a 6-ft formation of the west Kentucky No. 11 seam. The two seams were to be worked simultaneously." With a 145 ft boom and an 86-ft dipper stick, the River Queen was able to dump overburden as far away as 300 ft from its dragging point. The working weight for the machine: 2,424 tons, or the equivalent of a Navy destroyer.

Later that summer, *Coal Age* reported on the "biggest shovel ever," a Marion Type 5760 shovel that about to begin operations at the new Peabody Coal River King mine in Freeburg, Ill. Equipped with a 70-yd bucket, and designed to remove overburden up to 80-ft deep, the shovel and new preparation plant at Freeburg were part of Peabody's \$38 million coal development program in southern Illinois. In the January 1958 issue, associate editor Flowers reported that the newly named "Big Paul" shovel, also known as the "King of Spades," was wearing a mighty crown uncovering coal at the rate of 2 million tons per year. "It digs, hoists, swings and dumps a 105-ton bite in 50 seconds." Located near St. Louis, the groundwork for the mine was laid in 1955 when Peabody started developing barge sites in East St. Louis as the company devel-

oped plans to mine out of its massive reserves in the area. Potential output was designed for 4 million tons per year over a 50-year period from both surface and deep operations.

Underground Mining: Roof-bolting & Continuous Mining Change the Game

In the 1940s, new equipment began flooding the best equipped mines. New loaders, better haulage machines and shuttle cars coupled with longer conveyors allowed more coal to flow to the surface. But two machines would change the 1950s: the continuous miner and the roofbolter. Together, productivity soared along with safety as the number of roof falls decreased dramatically through the decade.

Coal Age reported on the new 3JCM-2 Joy continuous miner late in the 1940s. "With a design capacity of 2 tons per minute," it was currently being produced in two models, a low seam unit for cutting in 40-60 in. and a higher seam model for cutting in 54 to 96 in. coal. The unit consists of a swinging front end comprising the ripping head, intermediate conveyor and necessary power units, plus the main chassis mounted on crawlers and including a hopper and swinging rear conveyor. Both can be swung 45° each way.

By the early 1950s, CM units were quickly being deployed throughout the nation, particularly as labor costs rose. In the March 1950 issue, J.J. Snure, production manager, Rochester & Pittsburgh Coal Co. wrote a piece titled, "How Continuous

Mining Works: Its Results, Problems and Future." "In the past, equipment has been considered the smaller part of a mechanized operation, with well-trained personnel and efficient management the greater. Today, receding realization and markets, extremely high wage rates with all the trimmings, and the general attitude of the worker, which is one of not assisting the industry in supporting our present \$15.70 average daily rate, have completely reversed this percentage. At this time, our only hope is the development of continuous mining." The miner machine's cutting and loading head was composed of six standard cutting chains that ran vertical to the seam. Coal was conveyed to the rear and dumped into one of two standard cable reel shuttle cars that work behind the miner.

Better shuttle cars were also being deployed. In the January 1950 issue, James W. Woolf, electrical engineer with Joy Mfg Co., discussed how new cars were being equipped with dynamic braking for operating over long steep grades and that cars could now operate over distances as great as 2,000 to 5,000 ft. Speeds had improved, but were still dependent on grades and loads, and averaged only 4 1/2 mph.

Beginning in the September 1949 issue, *Coal Age* began publishing feature pieces on the new roof-bolting technique. The magazine reported that small bolts inserted into bad top at a Pittsburgh seam mine had reduced roof falls by almost 80%. Quickly roof-bolting spread throughout the industry. In the April 1950 issue, *Coal Age* published a piece "How You Can Get More From Roof-Bolting." Written by Edward Thomas, mining engineer with the U.S. Bureau of Mines, he compared pneumatic vs. rotary drilling methods, bolt designs, anchoring methods and prevention of corrosion as well as how to overcome problems with dust. "Best results from roof-bolting have been obtained in highly mechanized mines in which efficient production cycles have been established." Calling for more experimentation, Thomas vowed the Bureau would help develop and prove various tools to enhance the new technique.

In total, from 1942 through 1951, the industry had invested approximately \$2 billion or more in new mines and new equipment including preparation plants and power equipment. But fully half or more of that capital had been spent on mechanical mining and stripping equipment. Tons per man per shift in the bituminous industry had risen from 5.12 in 1942 to 7.04 in 1951, an increase of 34%. The outstanding record



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Mine Safety Award Presented

The men and officials of the Green Diamond mine, located in Marissa Ill. and operated by Mid-Continent Coal Corp., a subsidiary of Snow Hill Coal Corp., were awarded the second certificate by the U.S. Bureau of Mines for the completion of 100% retraining in the accident prevention course of the bureau. The employees of the mine have received four awards by the Joseph A. Holmes Association for an outstanding safety record; the mine has produced 5,300,000 tons of coal since its opening in 1949 without a fatal accident. The retraining award is the first to go to a coal company in the United States, and is a symbol of the continuing efforts and cooperation at the mine to prevent accidents.



MEN OF THE GREEN DIAMOND MINE, Marissa, Ill., displaying safety plaque.

* *Coal Age*, December 1957

for progress over that decade was set in western Kentucky. In 1942, tons per man averaged 6.51 per shift. By 1951, that number had increased to 14.24 tons per man per shift—a 118.8% gain. Huge new surface mines would increase that number throughout the end of the decade. But underground, in the January 1954 issue, *Coal Age* reported that in the new Consol Hendrix mine in eastern Kentucky, crews were able to achieve 47 tons per man shift in 42-in coal with the help of new Model CM33 Lee-Norse Junior Miner mounted on the chassis of a Joy 14-BU loader.

Throughout the rest of the early 1950s, many features treated and tracked those developments. In the October 1953 issue, associate editor A.E. Flowers reported on successful roof-bolting at the Mine No. 44 of the Bethlehem Mine Corp., Idamay, W.Va., where 138.42 miles of entry had been bolted with no major failures of development over a five-year period. Bethlehem adopted roof-bolting early on in 1948 when they purchased the mine and subsequently began rehabilitation work that included replacing timbers and other supports. Initial roof-bolting was restricted to out-by intersections. But management soon realized that to really harness the potential of the technique, roof bolting must be done at the face as soon as possible after the coal was extracted. Once roof-bolting was part of the mining cycle, no problems were encountered and productivity increased significantly.

In the April 1954 issue, the magazine reported the Warwick No. 2 mine, owned by the Duquense Light Co., Greensboro, Pa., had mounted twin roof-bolting drills on their continuous-mining machines so they could place bolts while machines

cut at the face. The big benefit was a material reduction in timbering delays which formally consumed up to 15% of shift time.

In the April 1957 issue, the editors reported on the surge in roof bolting. The year prior, 424 bituminous operations used systematic roof bolting as a method of roof support. Of these, 159 mines used bolts as the sole method of support. In 1955, almost 3 million bolts were being used per month. Among the mines using bolts in 1956, 8% employed water to allay dust, 35% employed dry dust collectors, 10% used water with drilling in parts of their mines, and 44% employed no mean of dust control other than respirators.

In the June 1957 issue, *Coal Age* reviewed the new Pittsburgh & Midway Coal Co.'s DeKoven mine in western Kentucky. The old company's first venture underground, "modern is the word for DeKoven—the newest giant among coal producing properties." Intent on loading high quality industrial fuel on the Ohio River, the new mine boasted "a 2.5 mi overland belt conveyor system from mine to cleaning plant and from plant to river, a modern river-loading dock and efficient raw-and clean coal storage facilities at the cleaning plant. The DeKoven workings are in the No. 9 seam, which averages 59-60 in. thick. Coal is produced underground by four high-capacity conventional mining units operated by eight 12-man crews on a two-shift schedule." Two new Colmol units were in the process of being introduced to increase production to more than 100,000 tons per month in 1958.

In the July 1959 issue, *Coal Age* reviewed operations at the new Clinchfield Moss No. 3 mine where "specially designed equip-

ment enables section crews to mine up to 1,500 tons per shift from the 10 to 18 ft Tiller seam. Production target for end of the year is 22,000 tons of clean coal per day." Planned to be the world's largest mine able to produce up to 5 million tons per year, the new operation was designed from the beginning to take advantage of automation and continuous mining technologies. Management deployed Joy 10-RU cutters and 15-SC shuttle cars for section haulage. "Thus the main problem was to get a rugged high-capacity fast-tramming loader. Joy undertook the job of building a loader to Clinchfield's specifications and came up with the 15-BU."

In the December 1959 issue, the magazine closed the decade by reporting on the new Loveridge mine of the Mountaineer Coal Co., a division of Pitt-Consol. Planned output of 15,000 clean tpd spread over three daily shifts, production comes from boring-type continuous miners supplemented by shuttle-car, belt and mine-car haulage, plus belt hoisting. In the first room-and-pillar stages, equipment included two Joy Twin-borers, two 11BU pickup loaders, two 7-ton NMS Torkars and one Joy extensible belt for operation to a maximum distance of 1,000 ft in room advancement. The opening of the mine, in March 1958, brought up to 12 and 10, respectively, of the number of mines and preparation plants operated by Consol in northern West Virginia. These operations accounted for 35% of Consol's overall production.

Coal Preparation in the 1950s: Automation to Push-button Controls

Preparation would become more important throughout the 1950s as more loading machines were introduced. High wages were leading more companies to invest in higher productivity loaders and increase mechanical mining methods. "The use of loading machines underground has made it more difficult to eliminate impurities, and experience seems to indicate that the cheapest mechanical-loading costs can often be obtained by shooting considerable roof material, bands or partings in the seam, and even bottom material, with the coal," wrote John Griffen, consulting engineer, McNally Pittsburg Mfg. Corp. in the April 1951 issue. "These new mining methods, in addition to adding heavy refuse materials which can be removed from the coal fairly easily, often add materials with a specific gravity only slightly higher than the coal and thus pose much more difficult mechanical-cleaning problems." Some of these problems were beyond

the powers of conventional cleaning methods. New heavy media, cone type separators, cyclones, froth flotation and spirals would be introduced in new prep plants throughout the east and Midwest.

In the October 1950 issue, James MacPhail, field engineer, Denver Equipment Co., penned a piece titled, "Flotation for Fines" reviewing the flotation process, how it works, costs and factors and how to predict results. Relatively new in the United States at the time and not yet widely understood, MacPhail predicted that industry would soon find it a very "profitable new tool." By the end of the decade, flotation would be standard equipment in preparation plants nationwide.

One of the most modern of these plants would be the upgraded Truax-Traer Ceredo, W.Va., preparation facility. New in 1949, and already the subject of a feature article in 1950, *Coal Age* revisited the upgraded plant in the December 1955 issue to discuss the newly installed cyclones, filters, mechanical dewatering equipment and heat driers that were improving output at the high capacity plant. The 800 tph plant was built on a 150-acre tract near the confluence of the Ohio and Big Sandy Rivers and the intersection of the Norfolk & Western and Chesapeake & Ohio railroad mainlines—arguably the most heavily coal trafficked point in the United States mid-century. Taking in various run of mine coals with steam and coking properties, the improvements significantly lowered fine-coal loss and a reduction in labor. Installed were a 225-hp heat-drying plant, drum filters with metal screen surfaces, and a fine-coal surge bin especially designed to maintain uniformity of mixtures.

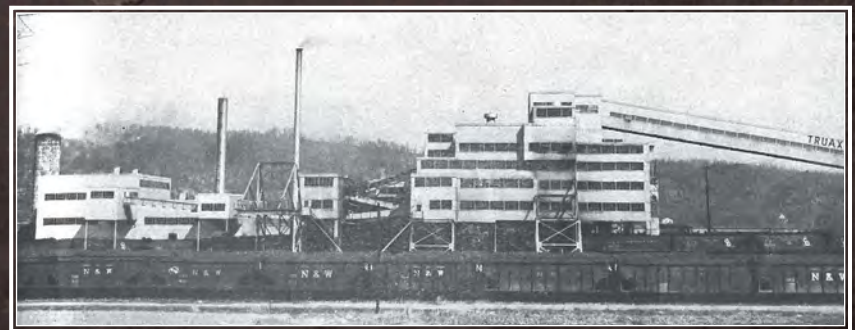
By the end of the decade perhaps no single plant embodied the technological developments of the era than that of the new Clinchfield Coal Co. Moss No. 3 plant where "one man has at his fingertips control of 90% of the 1,500 tph plant featuring four independent coarse and fine coal washing circuits. Nucleonic density controls on heavy media washers assure consistently high coal quality," wrote the editors in the July 1959 issue. The newest addition to the Moss group (Moss No. 1 was the nation's fifth largest mine, Moss No. 2 was 28th), "the aluminum-clad preparation plant was designed, built and erected on a turnkey contract by the Link-Belt Co. The coarse coal is cleaned in Link-Belt's new tank-type heavy-media vessels and the fine coal on Diester Concentrator twin-deck tables in four parallel coarse-coal and fine-



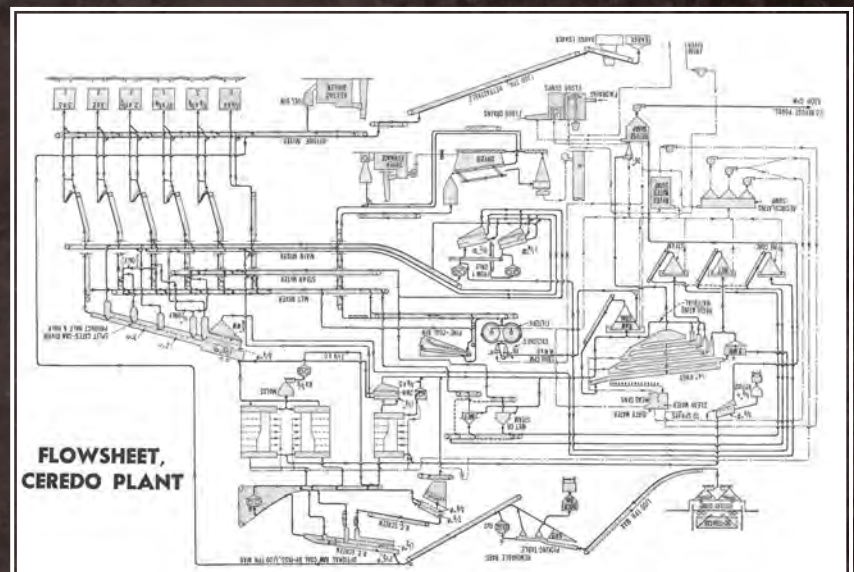
90% of machinery in the plant is controlled by a single operator. This 80-ft panel contains all pushbuttons, selector switches, indicating lights, ammeters, audible signal devices and other instruments for the washing portion of plant. **Coal Age*, July 1959

coal circuits. After cleaning, the coal undergoes additional processing, including crushing, sizing, mechanical dewatering and heat drying before being loaded onto

railroad cars." The new Moss No. 3 plant was so automatic that it required only 18 men per shift, including greasers and mechanics.



The Ceredo prep plant: The building at the left between silo and the shorter steel stack houses the new heat-drying plant, which handles coal from filters and centrifuges. A special 200-ton surge bin holds filter cake.



**Coal Age*, December 1955

1960s: Coal Fuels America's Critical Electrical Backbone

1960-1969



The 1960s were a period of transition for the coal industry. When the decade started, producers were struggling with a down economy and a public increasingly enamored by oil and natural gas. In 1958, natural gas bumped coal as the second place energy supplier and in 1959 almost 27% of the total energy picture was fueled by gas. Third place coal was down to only 23.5% that year, having fallen from 37.8% in 1950. As the new decade began, oil supplied 40% of the energy needs of the nation. Traditional markets like home heating and the railroads were gone. The saving grace of the industry was the development and build-out of America's new electrical power grid. Though in 1960, coking coal and industrial users were the largest consumers of coal, by the end of the decade, the electrical industry was by far coal's biggest client, receiving more than 310 million tons in 1969 as production increased to a high of 573 million tons that year—virtually all of it bituminous coal.

But increased productivity came with a price. Land conservationists and environmentalists began to fight for regulations to control the appetites of the new strip-mining operations. In return, the coal industry, with the help of *Coal Age*, waged a massive public relations campaign showcasing the efforts of producers to voluntarily reclaim, re-plant and re-develop strip-mined lands. Legislation treating both acid mine drainage and reclamation controls were passed by several states, eventually forcing the federal government to get involved. Coal's new ally, the electrical utility sector, also came under scrutiny as smog and smoke abatement campaigns and SO₂ management schemes successfully altered the way coal was being burned. Just as King Coal began to reconstitute its collective strength and begin producing at levels

not seen since the early 1950s, its detractors threatened to derail whatever gains were being made.

Labor peace was sustained throughout the mid-1960s, but at a high price. Wages rose throughout the decade and producers turned to even greater mechanization as a result. The huge new draglines and buckets that started to be deployed in the late 1950s were joined by and often replaced by even larger draglines and mobile equipment as a fleet of new machines took the field—particularly in Illinois, western Kentucky, Indiana and Ohio. Underground producers increasingly adopted and adapted new hydraulic machines and cutters, merging the technologies together into new long-wall installations. By the end of the decade, tons per man-hour had gone through the roof at these more progressive operations. But the industry still needed new miners. As coal looked to expand, there weren't enough workers to go around and not enough were applying for new jobs. As the industry faced its best opportunity in decades, creating a stable workforce became a challenge.

During the spring of 1967, *Coal Age* also went through a transition as editor Ivan A. Given retired after nearly four decades working for the magazine—the longest tenure of any staff member. He was succeeded March 1 by Alfred E. Flowers, who had been a long-time associate editor. A native of Sutton, West Virginia, Given was the fifth chief editor of *Coal Age*. After a 10-week editorial training course, he started his McGraw Hill career on June 25, 1928. On March 2, 1944, he was appointed the magazine's editor, a position he held longer than anyone prior.

As Given was retiring, King Coal was beset upon by myriad of challenges, “not only of competition, but the newly important ones of air and water pollution, land reclamation and improvement, subsidence, plant noise and appearance and

others.” Taking advantage at the market's bottom, oil companies started buying up coal producers left and right. By the end of the decade, many of the biggest miners, including top producer Consolidation, had been purchased by oil companies. Though now reduced to only corporate divisions, big oil brought with it deep pockets and coal producers were able to secure the vital capital to expand to new heights of efficiency.

Electrical Demand Drives Steady Production Gains in the 1960s

Slumping coal production had stabilized to approximately 435 million tons in the late 1950s and early 1960s. In 1961, production bottomed out at 423 million tons, but would gradually and steadily rise from there throughout the decade to a high of 573 million tons in 1969. “Hard hit by deeper-than-expected recession in '58 and a severe 4-mo steel strike in '59, bituminous entered the new year and decade poised to resume its growth destiny,” wrote the editors in the February 1960 issue. The top 15 coal companies (led by Consol and Peabody at 31 million tons and 25.7 million tons respectively) produced nearly 40% of the national total. For the 11th straight year, utilities increased their use of bituminous coal. 1959 totals were approximately 10% higher than the previous year as almost 170 million tons were burned by the growing utility sector. That would grow to 179 million tons in 1961 and 193 million tons in 1962. In the April 1963 issue, the editors stated that coal use by utilities was expected to grow at a rate of 13 million to 20 million tons per year.

In the new decade, industry management, through the formation of the new National Coal Policy Conference and the re-organization of the National Coal Association, challenged competitors to ensure coal's place at the head of the nation's energy future. Since research and

development was key, producers joined forces to help develop coal-to-liquid fuel technologies and other techniques to return to transportation markets. Producers also worked with the electrical industry to increase coal utilization. Together, they also teamed up to fight increasing railroad shipping rates by changing transportation patterns. Bargaining became much more common as new mines located along rivers and installed docking facilities—often foregoing rail transport entirely. Other producers began shipping in new unit trains to take advantage of efficiencies of scale and conditionally lowered freight rates.

Production patterns were changing as well. In 1960, five of the top 10 producing mines were in the Illinois Basin and six of the top 11 were surface operations. Some of the largest of these were concentrated in western Kentucky's rapidly growing coal-fields. Close to new TVA burns and with excellent river access, the region's shallow reserves were perfectly tailored for the moment. New production methods increased tons per man to approximately 13.5 as editor Given predicted that, by 1970, bituminous operators would find markets for between 625 million and 650 million tons of coal. Given would be off by only 20 million tons.

Coal exports, heralded in the 1950s as a steady 40 million ton market, were flat and falling by 1961. "Japan was the star in an otherwise dull export market, with shipments drifting from 37 down to around 33 million tons."

In December 1961, *Coal Age* reviewed the operating results of newly installed longwall technology at the Keystone mine owned by Eastern Gas & Fuel Associates in West Virginia. Manufactured by Westfalia Lunen, Germany, and marketed by Mining Progress Inc., the system allowed a 50% reduction in manpower, better roof control, increased production, and minimum maintenance and supply costs. At the time, it seemed longwall mining would become the technological breakthrough that underground producers had been hoping to make for many years. West German and British equipment was field tested in the U.S. in 1961 and 1962 and several longwall units were installed during the decade.

"The key to the situation has been the advent of self-advancing roof-support units that permit longwalling under the labor-economy conditions prevailing in American mines," wrote the editors in the January 1962 issue. "The times when 'revolution' is the appropriate description of a change in mining are quite few...[but]...deep mining in the U.S. is on the verge of a change that might eventually deserve the term," wrote Given in the March 1962 editorial. "The number of longwalls adapted from foreign practice is as yet small, but anyone who sees either of the two now in regular operation is most likely to be seized by an almost irresistible desire to go home and place an order for one or more of his own." The magazine would continue to report on Eastern's progress with longwall technologies in the October 1962 model mining number, as well as the August 1963, September 1964 and August 1969 issues. By the end of the decade, Eastern had become a leader in mining efficiency.

But conventional mines were still holding their own ground. In 1962, Peabody Coal's Mine No. 10 in Pawnee, Ill., one of the nation's most productive mine, set a world record in output, producing more than 5 million tons from a single opening. "The mine, which employs 840 men, working

three shifts a day, five days a week, produced the 5 millionth ton on Dec. 11, the 210th day worked," reported the magazine in February 1963. The mine would produce 5.35 million tons the following year. A close second was the conventional Pittston/Clinchfield Moss No. 3 in Virginia that produced 5.15 million tons that year. But, as a sign of the times, the rest of the top five productive mines in 1963 were all Illinois basin surface operations owned by Peabody, each mining between 3.6 million and 3.1 million tons.

For the October 1964 model mining number, the editors once again reviewed the operations of Consolidation Coal—that year celebrating its centennial. Having just produced its 1 billionth ton, "its quite likely that Consol will produce its next billion tons in less than 25 years—perhaps less. 'Consolidation,' in the case of Consol, truly means benefits to the energy consumer and the general public of the United States even now running to many millions of dollars annually as a result of its concentration over the years on a better product and better service at a lower price. Its contributions to the advancement of the industry's general welfare will continue to grow in scope and magnitude as Consol moves ahead in the production of its second billion tons,"

wrote Given. The nation's long time number one producer at the time, Consol held reserves in nine states and was mining in six, with operations in West Virginia being the most prolific. With overall tonnage expected to top more than 45 million tons in 1964—a nearly 14% increase year over year, the company was entering a period of tremendous growth, particularly following its 1962 merger with Truax-Traer.

Despite this, however, in 1964, Consol was overtaken as the U.S. production leader by a surging Peabody Coal Group that mined 46.6 million tons, 19% more than in 1963 and 1.3 million tons more than Consol. Following a large \$38 million build out in southern Illinois, Peabody had invested heavily in new dragline technology and was churning out massive amounts of surface mined coal in western Kentucky and Illinois. Consol and Peabody would vie for industry production leadership throughout the decade.



*Coal Age, April 1960

In the October 1965 issue, *Coal Age* reported that American Electric Power (AEP) was beginning to act on vast expansion plans throughout Appalachia. Designed to boost system generating capacity by 25%, AEP announced commitments of \$370 million through 1970 to add another 2.3 million kilowatts of new generation capacity in the area. When completed, the various projects would consume an estimated 146 million tons over their lifetime. The first expansion project would take place at the Muskingum River plant near Marietta, Ohio, where capacity would expand from 800,000 kW to 1.495 million kW, boosting the generating station's coal burn to more than 4.5 million tons per year. Other expansions, not all of it coal-fired, were also announced in West Virginia, Virginia and elsewhere.

In November, the magazine reported on the just announced "marriage of two giants" between Continental Oil Co. (Conoco) and Consol. The oil company's unexpected intent to acquire Consol, "representing the largest merger of oil and coal

to the introduction of new types. One face in West Virginia employs two ranging shears, working from opposite ends of the face toward the center then back to the ends. Longwall projections were changed at another West Virginia installation to correct a crushing problem in the tail entry. A mine in Utah is now on its fifth panel in coal that could not be mined by other means, and another operator in the Rocky Mountain region has begun operating a 330-ft long wall in a seam that pitches 30 deg. Here and overseas, a great deal of research is underway, especially in the development of improved roof-support equipment and automatic control of the face sequence."

Surface miners continued to add larger shovels to the fleet. In 1965, shovel capacity grew to 180 cu yd and there was a major breakthrough in truck design with the advent of the 240-ton shuttle unit. This new truck, designed to keep up with ever growing capacity of stripping machines, was undergoing tests in Illinois while more units in the 100-ton class went into service elsewhere. However, surface miners con-

tinued to be the largest crude oil producer worldwide. The 101-year-old Consol produced a record of nearly 49 million tons and had recoverable reserves estimated at 5.676 billion tons, "equivalent in Btu's to two-thirds of the total petroleum-liquid reserves in the country."

In September, the new Kaiser Steel Corp. York Canyon mine in northeastern New Mexico began making shipments of coking coal to the company's Fontana, Calif., blast furnaces some 1,100 mi away. To provide this service, the Santa Fe Ry. acquired 101 specially-designed 100 ton gondola cars, eight-four of which will move in continuous shuttle service on a rapid turn around schedule from mine to mill and back. At the time, this was the longest planned unit train shipment in the nation—a time when unit trains were coming into vogue.

Continued growth in electrical generating demand led to the decision to build a \$118 million 1 million kW power plant in Washington State using locally mined coal. In February 1967, *Coal Age* reported the

“ Though production increased another 20 million to 532 million tons, the list of problems confronting bituminous at the end of 1966 certainly was close to if not actually the longest in the industry's history. ”

interests in U.S. history, raised eyebrows both on Wall Street and in industry circles. As to the why of the merger, involving some \$620 million, little light was shed by the firm's announcements. Reasons suggested by Wall Street analysts included Consol's need to dispose of its immense cash flow and the importance of its Chrysler Corp. interests. Not to be overlooked in the turmoil over the merger announcement is Consol's 'Project Gasoline' which it is predicted will turn out gasoline from coal at 11c a gallon, including a 'reasonable' profit. This figure is said to be less than half any previous prediction for a coal-liquefying process of this type."

The coal industry's drive to decrease prices throughout the decade was rewarded by utility consumers. In 1965, bituminous production increased by approximately 20 million tons year over year, with most of the increase going into the utilities markets that burned a record 245 million tons that year. Production-wise that year, 12 longwall installations were being tested nationwide. "Much of the activity during the year was devoted to equipment evaluation which led

continued to deal with increasing pressure from federal and state agencies and more companies planned land reclamation as part of their mining operations. The goal "is to restore the mined land to new and continuing usefulness. As acid-water controls became stricter, more companies took positive steps to comply with new regulations."

While oil companies were intrigued about creating energy synergies with coal producers, Kennecott Copper, one of the leading hard rock mining companies, decided the time was right to buy Peabody Coal. In July 1966, spokespeople for the two companies said discussions were being held. Several months later in October, the Consol/Conoco "Energy" merger was completed. "In explaining the union of the two companies, L. F. McCollum, chairman of Conoco, said it is no longer a question of one source of energy pushing out another source. By 1980 the free world's need for economic sources of fossil energy for electric power, transportation and other basic industries will be doubled." In 1965, the 90-year-old Continental Oil Co. was the eighth

largest crude oil producer worldwide. The joint venture between the Washington Power Co. and Pacific Power & Light would lead to the opening up of the largely untapped Centralia-Chehalis coalfields. The power plant was designed to initially consume between 4 million and 5 million tons annually—more than the peak year of production—1918—for all the coal mines in Washington combined. Coal reserves to fuel the plant were acquired by the plant's owners and officials from the new partnership envisioned a large surface operation eventually providing all fuel needs.

Though production increased another 20 million to 532 million tons, "the list of problems confronting bituminous at the end of 1966 certainly was close to if not actually the longest in the industry's history. Nuclear power suddenly became a major competitor in the year just past—or at least was being increasingly credited with that accomplishment. And 1966 perhaps can be put down as the year in which the drive for better reclamation, control of air and water pollution, regulation of surface subsidence, reduction of plant noise, improvement of plant appearance, and so

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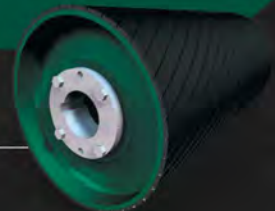


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on really began to confront coal with some potentially serious problems, not the least of them being the fact that a growing number of office-holders and vote-seekers feel that they can make political hay out of advocating rigorous restriction or complete barring of mine operation or coal use," wrote Given in his February 1967 editorial.

With the Johnson administration's Department of Health, Education and Welfare heading the drive, "air and water pollution, already problems for coal, became big ones in 1966. States, cities and other governmental entities along with a host of private agencies and plain people, got into the act in 1966, with more to come in the years ahead... Though HEW and other agencies had been active for some time, credit for opening the pollution ball of 1966 perhaps should go to New York City, and its mayor, John V. Lindsay. In his campaign he promised to stop the use of coal in the city... The City Council, in May, adopted a new air-pollution-control law, said to be the toughest in the nation, requiring reduction of the maximum sulfur content of coal and oil from its original level of 2.8% to 1% in three stages in five years. Con Edison, New York's utility, also was required to install 99% efficient dust-collecting equipment in three years. Bituminous coal was banned for space and hot-water heating."



Strip-mining pluses: Recreation and more. **Coal Age*, April 1966

New pollution laws treating federal installations were set to go into effect in October 1968. The standard would require cuts to all sulfur emissions. Both the coal and utility industries commissioned feasible studies on cutting SO₂ emissions, particulate matter and other pollutants in an effort to "head off the promulgation of unworkable regulations with the potential of grave injury to the fuels industry."

Also, as the year ended, the Commonwealth of Pennsylvania forcibly closed its first major mine, the Melcroft mine of Eastern Associated Coal Corp., due to violations of the new Clean Streams Act, which had classified acid mine drainage as industrial waste and forbade its discharge to any stream. Federal and other state efforts continued along similar lines as more AMD laws were put forth and debated. "Against a backdrop of increased federal, state and local pressure for tighter legislation, a new high was reached in land involved in reclamation in 1966—and in the quality of the job. One result was a significant increase in the cost of reclamation per acre—\$100 to \$300 in the majority of cases... there was additional emphasis on the creation of facilities—fishing, camping, picnicking and the like—to help meet the growing need for reclamation. Conversion of mined lands into sites for housing, commercial and industrial facilities and, even, college campuses also was being carried out on an increasing scale."

Production grew again in 1967 to 567 million tons and it was expected to rise rapidly from there as new mines came on line throughout the next few years. "The upward climb in bituminous production, dating back to 1961, continued in 1967" with 551 million tons mined that year. The 1967 output was the highest since 1948, when production reached 600 million tons. Five of the top six producing mines that year were in the Illinois Basin; four of these were surface mines, and four of the top six were owned by Peabody. But top on the list was the Southwestern Illinois Captain surface mine that produced more than 5.8 million tons that

year. New in 1964, it quickly vaulted to the top of the heap. Just behind it was the Peabody Dynamo No. 10 underground mine in Illinois. Third was the Clinchfield/Pittston Moss No. 3 mine and the next three were the massive Peabody surface mines River King (Illinois), River Queen (western Kentucky) and Sinclair (western Kentucky) averaging more than 5 million tons per year each. Though Captain would be overtaken by the River King mine, the same operations were also the top five producers in 1968.

As good as the year had been, the near term future was even brighter. "Coal's big expansion, which took a giant step in 1967, will accelerate rapidly in 1968, when some 47 new mines will go on stream," wrote new editor Alfred Flowers in the January issue. "When they are up to full capacity, these mines will add 79.5 million tons to annual output. Another 23 mines, capable of producing 68.3 million tons, already are on schedule to begin production by 1972. Nearly 83% of the new production will be dedicated to long-term contracts with utility customers, demonstrating that coal has recognized and taken advantage of its opportunity to share in the sharply expanding electric energy market." 17 new deep mines representing more than 30 million tons were planned for West Virginia alone. Most of the new operations were already under contract at the time of the survey, meaning that "the full production of these new mines has been sold not only for a few years, but for the expected life of the property." An additional 17 metallurgical mines were in the advanced planning stage as well. Representing a total capacity of more than 26 million tons, only three of the new mines were captive.

With all of the new production coming online, needed were new miners, and lots of them. In the August 1968 issue, *Coal Age* repeated Consol's call for 10,000 new workers. Equally hungry for workers, Eastern Associated in West Virginia rolled out a campaign to recruit and train 5,000 men through 1973 and had immediate needs for 1,500 employees in four mines already. By 1969, estimates of additional mining manpower needed in the next five years ranged up to 40,000 or more, requiring in turn a significant increase in recruiting and training efforts.

But environmental challenges remained at the forefront of the industries concerns, particularly the problems concerned with sulfur dioxide created by coal-burning electrical power plants. Though *Coal Age* analyzed the known data in the



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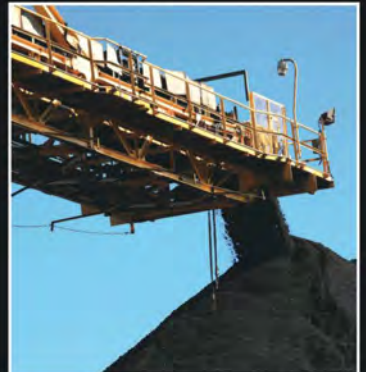
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April 1968 issue, Flowers was still skeptical. "There is some doubt about whether sulfur dioxide is a health hazard in the concentrations encountered by the average person... Even though the health hazard is minimal or under normal conditions nonexistent, fuel users can expect continuing pressure to provide clean air. This pressure already is being reflected at some new power plants in the construction of tall

stacks, up to 1,200 ft high, to disperse and dilute the sulfur oxides to an acceptable standard," Flowers wrote in the April editorial. Additional research, he and others felt, was what was really needed.

As the year ended, wildcat strikes broke out following frustration over new contracts. Labor stoppages were more often than not reflections of frustration with UMWA policies and producer acceptance

of them. Though demand was there, production fell to 545 million tons. Utility burn, however, continued to climb to approximately 296 million tons that year, roughly 7.4% higher than 1967. Another bright spot were continuing high export levels, some 51 million tons in 1968. Japanese purchases of coking coal increased significantly as some 16 million tons was absorbed into the growing market.

Coal was used to producing 63.6% of America's energy in 1968. And, in early 1969, plans were confirmed to continue constructing large coal-fired power plants in the western U.S. to serve the region's growing population. These included the 2,300 mw Navajo facility near Page, Ariz., and the 3,000 mw San Juan plant near Farmington, N.M. At the time, roughly 19,000 mw of power from a dozen power plants was either under construction or being considered throughout eight western states. Additionally, the Basin Electric Power Cooperative was beginning to site new plants in Wyoming as efforts continued to develop the state's vast coal resources.

Also, continuing a trend of oil companies entering the coal sphere, in February, *Coal Age* reported on the plans of Ashland Oil to acquire or lease substantially all of the assets of Ayrshire Collieries Corp. With large reserves in the west and Illinois Basin, Ayrshire was a leader in the development of highly productive surface operations and the 11th largest overall producer in 1968.

In May 1969, AEP formally dedicated stripping operations at the company's new mine near Zanesville, Ohio. Front and center was the Big Muskie walking dragline. Capable of taking 325-ton overburden bites, it was the largest mobile land machine ever built. Manufactured by Bucyrus-Erie, "the new giant can move more earth faster and farther than any machine of its type ever built. The machine's 240-ton bucket has a capacity of 220 cu yd. Its 325-ton load would more than fill three large 100 ton railroad hopper cars. In full operation Big Muskie could handle about 19,500 tons of material an hour, about 7,000 tons more than the towering machine actually weighed. The huge machine capped a dragline and shovel race that began in the 1950s as various surface producers ordered ever larger equipment capable of achieving successively greater efficiencies of scale."

Also capping the decade, on November 20, Senate and House conferees agreed on a compromise version of the new Federal



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Coal Mine & Safety Act of 1969. It was expected, at the time, that the new bill would be on President Nixon's desk by the end of the year. Generally referred to as the Coal Act, the new body of law was more comprehensive and stringent than any previous federal legislation governing the mining industry. The Coal Act included surface as well as underground coal mines within its scope, required two annual inspections of every surface coal mine and four at every underground coal mine, and dramatically increased federal enforcement powers in coal mines. The Coal Act also required monetary penalties for all violations, and established criminal penalties for knowing and willful violations. The safety standards for all coal mines were strengthened, and health standards were adopted. The Coal Act included specific procedures for the development of improved mandatory health and safety standards, and provided compensation for miners who were totally and permanently disabled by the progressive respiratory disease caused by the inhalation of fine coal dust pneumoconiosis or "black lung." Also created by the Act was the Mining Enforcement and Safety Administration (MESA), later renamed the Mine Safety and Health Administration (MSHA), as well as a National Mine Map Repository, within the Department of Interior.

Production in 1969 was flat, maintaining roughly the same levels as the previous year for the same reasons: wildcat strikes. Nevertheless, bituminous producers pulled approximately 571 million tons out of the earth that year, and utilities took 310 million tons of it, an increase of 4.7% over 1968.

By the end of the decade, a majority of the largest coal producers including Consol, Eastern, P&M (Gulf) and others had been folded into larger energy conglomerates and oil companies. (Peabody was the one exception as the company was doggedly pursued by Kennecott Copper throughout the end of the decade.) That trend continued throughout 1969 as Island Creek, part of Occidental Petroleum beginning the year before, acquired the assets of Maust Coal & Coke; Sun Oil acquired nearly 15,000 acres of coal containing approximately 600 million tons, near Rock Springs, Wyo.; Gulf Resources & Chemical took over C&K Coal Co. in Clarion, Pa.; Kerr-McGhee began metallurgical production near Stigler, Okla.; Humble Energy created a new subsidiary to set up and start production of the Monterey Coal Co. in Ill.; as well

as others. As big oil continued to invest in coal, the energy industry continued to expand, new electrical power facilities continued to be placed on drawing boards, and a stable growth curve seemed just within reach. Or was it?

Labor in the 1960s

In 1960, aging union warrior John L. Lewis passed on the reins of the UMWA to his

long-time Vice President Arthur Kennedy, ending his 40 year reign. Kennedy himself, a longtime veteran of the fight, died several years later and was succeeded by new Vice President Anthony "Tony" Boyle. Boyle, once Lewis' right hand man, wielded power with a tight fist, resisting efforts by the rank-and-file to assert more rights and local controls. Frustrated by a leadership accused of being more sympathetic to corporate needs

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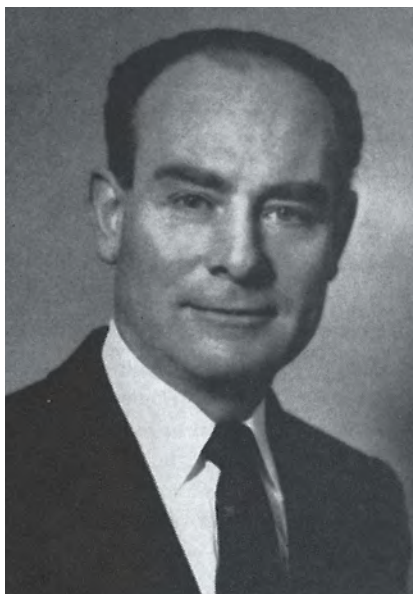
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Tony Boyle. *Coal Age, May 1963

than worker desires, dozens of UMWA locals increasingly turned to wildcat walk-outs, protesting not their employers, but the union itself.

In January 1965, the UMWA celebrated its 75-year of organizing and struggle. At its peak in the 1930s and 1940s, the union controlled nearly 90% of the bituminous tonnage and practically all of the anthracite. But in 1965, the bituminous figure had dropped to roughly 70%-75%, "in large part reflecting the fact that the benefits won for union members, particularly the \$0.40c Welfare Fund assessment, plus the changing nature of the bituminous market, have provided a margin and incentive for non-union producers. Whether it can hold its own and possibly recoup some of its losses is a major problem for the union. There also is a question for producers: What would follow if the stability provided by the fixed union wage and working conditions was lost, as well as the help of the union in marketing, public relations and legislative areas," wrote Given in the January 1965 issue.

By the mid-1960s, however, activist miners began to threaten the entrenched Boyle leadership and the stability of the union. Though new contracts were signed for both bituminous and anthracite in 1966, when its terms were released and read by rank-and-file members a near "rebellion" broke out, primarily in Ohio, Pennsylvania, West Virginia and Kentucky where there had long been disaffection. Production was cut by some 12 million tons in a three week period of labor actions. After another wage

increase, in 1969, Joseph "Jock" Yablonski challenged Boyle for the presidency of UMWA. Yablonski had been president of UMWA District 5—an appointed position—until Boyle had removed him in 1965. His challenge, the first of a sitting UMWA president, represented a fracturing of the union with many activist miners backing Yablonski and reform.

When John L. Lewis died in June 1969, the proud organization he had lead through the Great Depression, World War II and the Cold War was splintering. In an election widely perceived as corrupt, Boyle defeated Yablonski on December 9 by a margin of nearly two-

to-one (80,577 to 46,073). Yablonski conceded the election, but on December 18, 1969, he asked the Department of Labor to investigate the election for fraud. He also initiated five lawsuits against the UMWA in federal court. On December 31, 1969, three killers shot Yablonski, his wife, Margaret, and his 25-year-old daughter, Charlotte dead, as they slept in the Yablonski home in Clarksville, Pa. The bodies were discovered January 5, 1970, by Yablonski's son, Kenneth. Shocked UMWA members increasingly turned against their own leadership and the 1970s became a period of massive labor unrest as union solidarity ceased.

Death of a lion

For some 40 years, John L. Lewis dominated the American labor scene, battling mine operators, courts, Congress and even presidents. Sometimes he won, sometimes he lost. Regardless of the outcome, he never begged. And he always was respected by friend and foe.

When he took over the reins of the United Mine Workers in 1919, he set the tone for the coming decades by leading his 411,000 miners in a strike for higher wages. He never relented in his drive for higher wages and better working conditions for the members of his union. In the lean and turbulent years following World War I, particularly during the depression, the union grew weak and membership dropped. But with the advent of the New Deal and the National Recovery Act, Mr. Lewis rebuilt the union and won higher wages and shorter hours for the coal miners. His efforts on behalf of his union can be best summed up in his own words:

"I have never faltered or failed to present the cause or plead the case of the mine workers of this country. I have pleaded your case not in the quavering tones of the feeble mendicant asking for alms, but in the thundering voice of a mighty host, demanding the rights to which all free men are entitled."

In 1935, after bitter fights with AFL leaders, Mr. Lewis and other unionists took steps to form the Congress of Industrial Organization. As its first president, he brought the auto, steel, rubber, textile and electrical workers into the fold. But this success was marred by the Little Steel strike in 1937 and its accompanying violence. When President Roosevelt was asked what he thought of the steel dispute, he replied, "A plague on both your houses." This reply enraged Mr. Lewis and sparked one of his most famous responses:

"It ill behooves one who has supped at labor's table and who has been sheltered in labor's house to curse with equal fervor and fine impartiality both labor and its adversaries when they become locked in deadly embrace."

A gifted orator, Mr. Lewis used his talents to full advantage, whether addressing his union, bargaining with coal operators or challenging political leaders. And when his position was weakest he often was able to gain sympathy through the strength of his personality. His ability to dramatize the life of a coal miner contributed in large measure to the passage of the federal safety code and won for the miners the royalty that provides their welfare and pension benefits.

The last years of his leadership were marked by the absence of formal strikes, and labor and management profited accordingly. Coal thus was able to build a reputation as an industry that could deliver its products on schedule and at low cost. While pushing for better wages and improved working conditions for the miners, he also recognized the need for the industry to mechanize and increase productivity. This vision, coupled with the industry's willingness to invest in better equipment, made it possible for coal to build a foundation for solid growth. Continuing dedication to that philosophy by management and labor will help insure coal's bright future.

Alfred E. Flowers' editorial on the death of John L. Lewis. *Coal Age, July 1969

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Safety Gains Marred by Massive Fire and Explosion in 1968, Leading to Sweeping Federal Legislation

Safety-wise, gains were made throughout the decade, specifically as a fleet of highly productive machines were increasingly deployed. Roof-bolting was keeping American miners safer, and, by 1961, more than 60% of production was mined under bolted roof. Fatalities in the mid-1960s were averaging at under 300 per year, falling to a total of 240 in 1964. However, 24 of those fatalities occurred in anthracite mines. Producing less than 18 million tons, anthracite's incident factor was more than three times higher than bituminous producers where fatality rates per short ton had fallen to .45, down from .55 the year before. However, fatalities increased in 1965 by 15 to 255 total and 247 in bituminous, though rates per ton rose only slightly to .49.

By the middle of the decade, fatalities had continued to fall, particularly in bituminous. Even as production climbed again in 1967, the number of fatalities dropped to 208 from 227 in 1966, or 8.4%. Roof falls, which accounted for 52.8% of the underground fatalities, again were the No. 1 killer. Safety training was becoming more common and one company was already holding weekly one-hour safety sessions at which selected safety topics were discussed.

With safety improving throughout the decade, few were prepared for the news later that year. In November 1968, an explosion and fire at the Consol No. 9 mine in Farmington, W.Va., trapped inside and killed 78 miners. The disaster made national headlines and placed the environmentally controversial industry back in the public eye. Days of billowing smoke emanating from the mine and repeated rescue attempts made for compelling television coverage. The attention led to hearings in Washington and the call, in particular by Interior Secretary Mark Udall, for greater safety rules. With 305 lives snuffed out that year, federal and state governments clamored for strict changes in mine safety—with no let up in continued curbs on pollution, emissions and strip mining.

Roughly a year after the disaster, Congress passed the Federal Coal Mine Health and Safety Act of 1969. The comprehensive mine safety legislation, much more strict than any that preceded it, established the groundwork for the cur-

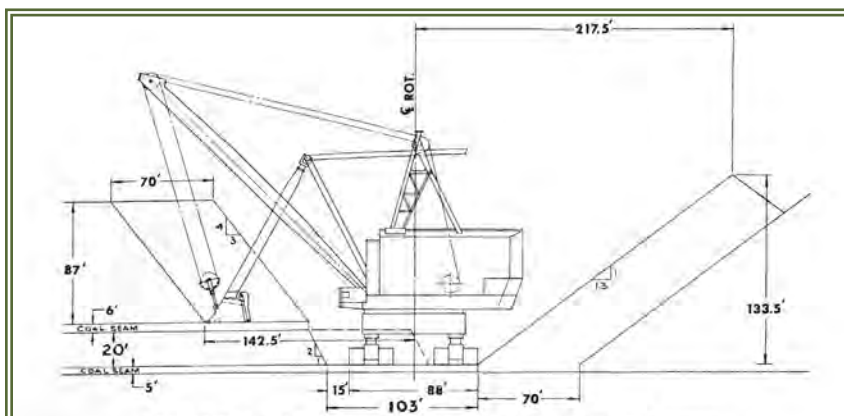
rent Mine Safety and Health Administration. Included in the "Coal Act's" language were provisions addressing silicosis (black lung), and other miner's health issues, as well as operational safety concerns. Combined with new environmental regulations, by the end of the 1960s, producers were dealing with a blizzard of legislation even as the power industry continued to turn to coal to generate more electricity.

Battle of the Buckets: As Stripping Machines Grow in Size, Calls for Reclamation Laws Grow Louder

The cartoonish massive stripping machine depicted dwarfing a coal train on the April 1960 cover of the magazine

heralded the continuation of the battle of the buckets. Throughout the late 1950s, several producers seemed to be vying to commission and deploy ever larger draglines. The latest titanic Bucyrus-Erie shovel, to become the largest land vehicle yet constructed, was destined for one of Peabody Coal's western Kentucky strip mines. A second one was built to follow it and in April 1961, a third Peabody dragline, this time a 85 cu yd Marion Power Shovel, was in the process of being constructed.

Throughout the Midwest and later the southwest, advances in stripping technologies enabled producers to deploy ever larger units into a variety of applications. Not all, of course, were giants and



LONG REACH and high discharge are important requirements in two-seam recovery.

total width of 105 ft. The expected duty of the 6360, which began operating on Oct. 15, 1965, is the removal each month of 4½ million cu yd of overburden. This will sustain a coal-loading rate of 20,000 tpd or 500,000 tons per mo.

Associated equipment includes at present a Bucyrus-Erie 61-R rotary drill for sinking blastholes in the main cover above the No. 6, and a 50-R for drilling the interval be-

tween the seams. The 61-R sinks holes in two steps, using a 13½-in auger to penetrate softer surface material and 12½-in rotary rock bit to drill the rest of the way. The 50-R sinks 10½-in holes.

Hole spacing is on a 37-ft-interval pattern, and the blasting agent is Airmite. Each hole is primed with an electric blasting cap in a 1-lb Trojan booster.

The coal-haulage fleet includes

eight 100-ton Caterpillar-Athey tractor-trailer combinations, with others to be added as production builds up. Two Marion 181-M loading shovels are in service, one swinging a 16-cu yd dipper on a 45-ft boom and the other a 12-cu yd dipper on a 60-ft boom. The latter is designed to load coal from the lower seam into haulers running on the upper seam, but it is presently used in the conventional manner, working at the same level

The Measure of "The Captain"

Dipper capacity, cu yd.....	180	Cutting radius, max, ft.....	236.8	Rear-end radius:	
Boom length, centers of foot pin and point shaft, ft.....	215	Cutting radius at 39-ft elevation, ft.....	209.5	Max 61 ft from ground, ft.....	74
Dipper-handle length, including dipper, ft.....	133	Radius of cleanup at grade level, ft.....	156.8	At lower edge of upper frame (39 ft from ground), ft.....	66.7
Crowd-handle length, effective, ft.....	102	Radius of cleanup at 31-ft elevation, ft.....	142.5	Clearance under upper frame (jack pistons out 45 in), ft.....	39
Stiff-leg length, ft.....	104	Length of lower frame, center to center of jacks, ft.....	58	Roller-circle dia (mean), ft.....	64.3
Boom-point sheaves, pitch dia, in.....	144	Width of lower frame, center to center of jacks, ft.....	56	Swing rollers (85), mean dia, in.....	24
Boom-paddock sheave, pitch dia, in.....	120	Depth of lower frame girders, ft.....	14	Hoist drums, pitch dia, in.....	125
Hoist cables (four, double-hitch), dia, in.....	3½	Length over propel units, ft.....	103	Rail pull, max, lb.....	1,700,000
Boom-support cables (eight, bridge strand), dia, in.....	3½	Width over propel units, ft.....	45	Electrical equipment:	
Working ranges:		Length of each crawler, ft.....	50	(Rating, 75 C rise continuous)	
Boom angle, deg.....	45	Width of each propel unit, ft.....	30	Hoist, motors (eight) with blowers, total hp.....	8,000 @ 230 V
Dumping height, maximum, ft.....	153	Width of crawler belts, ft.....	10		16,000 @ 460 V
Dumping radius (max height), ft.....	211½	Crawler bearing area, total, sq ft.....	3,140	Swing motors (eight) with blowers, total hp.....	5,000 @ 230 V
Dumping height over spoil, ft.....	133½	Crawler bearing pressure, lb per sq in.....	58.7		10,000 @ 460 V
Dumping radius, effective, over spoil, ft.....	217.8	Bore of jack cylinders, in.....	66	Crowd motors (four) with blowers, total hp.....	2,000 @ 230 V
Dumping reach, effective, over spoil, ft.....	173.8	Center journal dia, in.....	80		4,000 @ 460 V
Dumping height at max radius, ft.....	113.7	Main swing gear, pitch dia, ft.....	55.5	Propel motors, total hp.....	3,200
Dumping radius, max, ft.....	219.8	Width of upper frame, ft.....	70	Steering, total hp.....	200
Cutting height, max, ft.....	189.7	Depth of upper-frame girders, ft.....	10	AC motor load, total hp.....	20,000
Cutting radius at max height, ft.....	218.5	Center of rotation to boom foot, ft.....	32	Total horsepower.....	33,900
Cutting height at max radius, ft.....	122	Elevation, ground to boom foot (jack pistons out 45 in), ft.....	50		

*Coal Age, February 1966



As the Captain stretched to dump its 270-ton load, its size required that the rear of the house swing over the upper seam. The interval between the upper No. 6 and lower No. 5 seam is about 25 ft. *Coal Age, December 1967

many smaller shovels performed herculean tasks in the shadows of their more well-known cousins. But still, the glory went to the giants. In the October 1962 issue, the magazine breathlessly reported on the start-up of Peabody's first 115-cu yd shovel, the world's largest machine, which had just taken over the stripping job at the Sinclair mine at Paradise in western Kentucky. Part of a fleet of machines that would help mine more than 4 million tons per year, the new dragline was capable of moving over

3 million cu yds of material a month. The new Bucyrus-Erie 3850-B, the first of two on order, had a total working weight of 9,000 tons and was far-and-away the largest land machine able to move under its own power yet to be constructed.

In July 1963, the editors reported on the new wheel and 70-yd shovel then working in tandem at the Peabody River King mine. Production records were toppling at the time as the shovel, wheel excavator and two 30-yd draglines were removing 3,950,000 cu yd per month to



Side-by-side views show a 12-yd dragline (right) leveling working bench for Big Muskie, the giant 220-yd machine. *Coal Age, December 1969

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make possible recovery of 17,000 tpd of raw coal. River King wound up 1962 with a record day—17,730 tons—in a record month—340,000 tons—climaxing a record year of 2,910,905 tons. And the target for 1963 was 3 million tons.

Perhaps the most famous of them all, however, was the massive Captain shovel at the new 1964 Southwestern Illinois Coal Corp. Captain mine in Percy, Ill. Reviewed and featured in the February 1965, February 1966, August 1966 and December 1967 issues, the huge machine became a veritable celebrity in and of itself. The Marion 6360 shovel, featuring a 180-cu yd dipper, a 215 ft boom length and 33,000 total horsepower, was expected to remove 4.5 million cu yd of overburden each month so as to sustain a loading rate of 20,000 tpd or 500,000 tons per month. A fleet of 240-ton Caterpillar diesel-electric coal haulers, powered at both ends and operated from one of two cabs, were deployed to keep up with the behemoth.

But all the attention and publicity associated with the new dragline machines, coupled with an increase in stripping operations, accelerated an environmental backlash. Already a concern throughout the 1940s and 1950s, what to do with post-mined land became a serious concern throughout the decade—at times the debate overshadowed the stripping operations themselves. Prior to moving any dirt, a post-mine plan was becoming vital to an operation's success. In the September 1965 issue, the magazine reported that new TVA coal contracts would include and set reclamation requirements.

By 1966, "land restoration became integrated more and more into overall mining plans as operators strove to meet the requirements of stricter reclamation and anti-pollution laws....most operators used AN-FO to break overburden, either mixing the ingredients at the hole-site or buying pre-mixed products. However, minimizing noise and vibration were of concern to companies operating near populated areas," reported the magazine in the February 1967 issue.

From 1966 through the end of the decade, the coal and power industry would wage a public relations campaign to convince the American public that strip mining was actually beneficial, in the long run, to both the landscape and human activities. In fact, once stripped, post-mined lands were incredibly mal-



Self-advancing roof support system reduces manpower more than 50% and effectively controls the roof. *Coal Age, December 1961

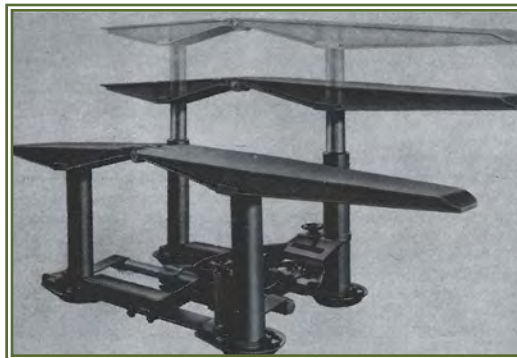
leable and could be transformed into all sorts of recreational areas, fishing lakes, swimming holes, housing projects and cattle farms. In the April, May and December 1966 issues, the editors used hundreds of color images to illustrate the potential beauty of post-mined lands. Calling strip mining the "Total Benefit Industry" producers joined in with the magazine in advertising their best reclamation jobs. All the greenery made for some impressive images, and, to be sure, millions of Americans then and now have enjoyed the benefits of recreated reclaimed lands. But, by the end of the decade, Congress and various state legislatures were not so accepting. New reclamation and environmental standards were being adopted, with the federal government establishing minimum regulations that states could then improve upon. Various bills would be put forth, many of which were later wrapped up and bundled into sweeping surface mine legislation in the mid-1970s.

The Longwall Miracle: Thanks to Hydraulics and the West Germans

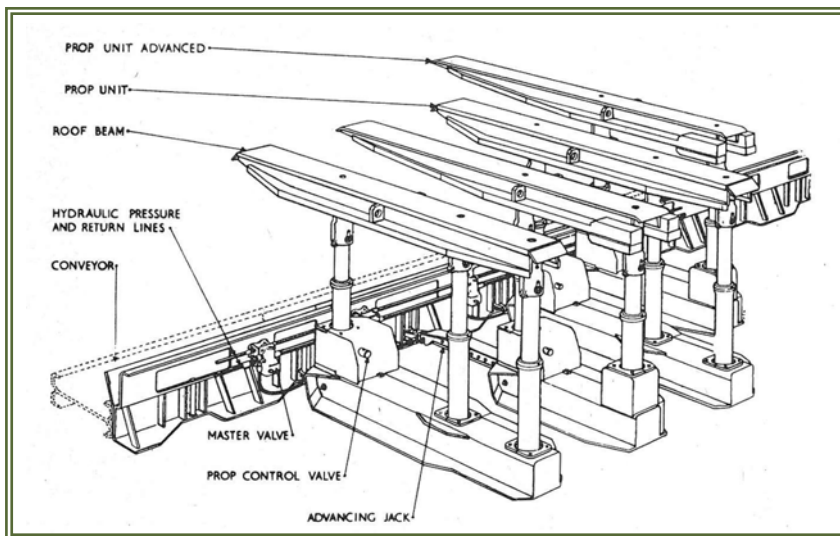
Beginning in December 1961, *Coal Age* published several features about new longwall technology. After first profiling Eastern's experience, in the May 1962 issue, the magazine reported on how a British-made face unit and self-advancing roof support system were being employed for increased productivity and greater coal recovery at the Sunnyside, Utah, mines of

the Kaiser Steel Co. "Providing a big part of the answer to difficult mining conditions...the unit has now marked up more than 5 mo of successful operation at the Sunnyside No. 3 mine...Productivity figures already achieved are expected to be bettered significantly when the unit completes the present 308-ft wall experimental section and goes into service on the 750-ft wall that will be standard for future work. The unit was equipped with an Anderton shearer-loader with 5-ft drum 2 ft 3 in. wide; a British Jeffrey-Diamond face conveyor; and a Dowty Roofmaster support system. Horsepower of the shearer was 125, weight with the plow was 8 tons. Under average conditions, width of the cut is 2 ft. The best shift thus far had produced over 700 tons with the longwall."

In August 1963, *Coal Age* returned to Eastern, where a second longwall planer,



Roof support unit illustrates how variations in seam height are obtained. The jacks are designed to accept extensions for various seam heights. *Coal Age, December 1961



Self-advancing roof support system. * *Coal Age*, December 1961

equipped with self-advancing hydraulic roof-support units, had been installed at the Kopperston mine. During its first 10 months of operation, the Wesfaila Lunen unit produced some 325,000 tons and one panel with a 340-ft face and 3,000 ft deep had been mined out. "Comparing the cost of the planer section with that of a continuous miner shows that face cost on the planer is approximately 33% less while repair and maintenance runs about 25% less." While the greatest savings was reported in timbering, production on a tons per shift basis more than doubled while tons per face man was approximately 60% greater than conventional operations.

In the September 1963 issue, Albert Evans, mining consultant, wrote a long piece explaining the modern history of longwall production and discussed how it could be adapted to U.S. operations. A year later, D.B. Shupe, chief engineer, Eastern Associated, discussed the longwall progress made at his company. "As a result of producing 2,750,000 tons from 29 faces in four mines in three seams, Eastern has achieved notable reductions in mining cost—33% in face labor and 25% in maintenance at one mine over continuous miners, and 45% in total section labor and materials over conventional mobile loading at another."

In February 1965, *Coal Age* published a Longwall Mining operating guide, thoroughly treating the possibilities of longwall mining, the equipment needed and available, operations, roof action and servicing techniques. Offering up the pro's and con's of the new technology, the edi-

tors repeated that longwall mining, once adapted, will have a rich future in the U.S. In the December 1966 issue, associate editor Daniel Jackson Jr. reported on how a newly installed longwall unit at the Cannelton Coal Co. mine had helped make a marginal coal more profitable by reducing overall production costs.

In 1966, "further experience in longwalling led to improved methods for moving equipment from one setup to another, cutting the cost of the moves, and brining them more in line with the costs of moving conventional sections. Operating experience at one mine demonstrated the value of limiting the length of the face and deepening the panel to provide an equivalent block of coal," wrote the editors in the February 1967 issue.

For the May 1968 issue, the editors placed the record setting Barnes & Tucker longwall unit on the cover. "Mining 5,270 tons in 24 hr from a single longwall face may be a new record that Barnes & Tucker Co. can claim at its Lancashire No. 24 mine near Nicktown, Pa. Company officials believe that this is the highest production, in three consecutive shifts, for any longwall operating in the U.S. (and possibly the world) to date. On Feb. 15, 1968, first shift got the ball rolling by completing 10 passes along the 460-ft face with the Joy/Eickhoff EW 130 single-drum shearer/loader. The second shift, not to be outdone, followed this with an impressive 14 passes. And the third shift sewed up the shooting match with a final 10 passes. Needless to say, management was thrilled."

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1970s: Coal Offers America Energy Security

1970-1979



The energy crisis that many pundits had been warning about finally occurred in the 1970s. And when it came, amid Arab Oil Embargos, feared natural gas shortages, and rolling blackouts, coal offered itself up as the solution. With tremendous reserves and the ability to power the nation, the Nixon administration accepted coal's suggestion, but on several conditions, following passage of the Coal Mine Health and Safety Act of 1969 (often referred to as the Coal Act), the federal government was going to even more thoroughly regulate production, safety, reclamation and air pollution. And though the utility industry rapidly expanded by building more coal-fired power plants nationwide, the coal industry had never before come under such scrutiny. A large "ecologically" minded populace demanded more environmental controls and dogged the industry all decade.

Without a doubt, the most comprehensive piece of legislation affecting the operation of coal mines ever promulgated, this law regulated all aspects of mine safety, limiting the kinds of environments in which men could work. Though coal entered the 1970s "with a solid base for continuing growth and possibly in the strongest position in its history...the strict standards incorporated in the new federal law will make the cost of mining go up in 1970 and will challenge the industry to come up with ways of boosting efficiency to keep costs as low as possible," wrote editor Alfred E. Flowers in the January 1970 issue.

Continuous mining methods, further advances in longwall technology, and the increased size of surface mines allowed production to soar, and a series of energy shocks and oil embargoes improved the industry's profit margins.

In 1971, Congress passed the Clean Air Act (CAA) limiting sulfur and nitrous oxide (NOx) emissions. To enforce this and other

sweeping environmental legislation, and to help corral various state initiatives, the Republican Nixon administration created a new federal bureaucracy, the Environmental Protection Agency (EPA). Equipped with enforcement powers, a green police force was let loose upon the land.

New plants being built nationwide assured a growing future for the industry, but various challenges remained. Chief among these was labor, both attracting, training and retaining enough manpower as well as keeping the United Mine Workers of America (UMWA) from totally imploding. Immediately following the vicious murder of former UMWA presidential candidate Jock Yablonski, along with his wife and daughter on December 29, 1969, questions about the assassination arose. When the criminal investigation led to arrests in 1970, fingers pointed back to union leadership. Witnesses began implicating individuals out of President Tony Boyle's office as initiating, authorizing and paying for the hit. With unrelated federal corruption charges raining down on Boyle's head, the lurid details about the murder came out. New elections were called, and as union members went to the ballot box, not since the dark days of the Depression had the UMWA been that divided.

Turmoil and Questions Surround New Regulations

In 1969, electric utilities burned a record 310 million tons and total coal production reached 573 million tons. In 1970, with the electrical markets demanding even more coal, production jumped to more than 610 million tons—the highest total in more than 20 years. Not since the postwar days of 1948 had coal production reached 600 million tons. Better still, as the decade began, total demand was outstripping production by a margin of some 20 million tons. Meeting the production goals throughout the decade would require capital expendi-

tures at record rates. In 1970, producers boosted spending almost 30% as they quickly moved to open up and equip new mines and build new preparation plants.

But in the April 1970 issue, Flowers warned of trouble ahead. "An unprecedented demand for low-cost energy is sweeping our country and satisfying that demand already is imposing a great responsibility on our energy resources...The difficulty of meeting our energy needs in the years ahead is compounded by the growing concern about pollution. Every large metropolitan area has set standards limiting sulfur oxides emissions and most of them are being tightened. Very little of the coal mined east of the Mississippi River can meet the present standards and when the tighter regulations go into effect, virtually none of this coal will be suitable for power generation."

East Coast utilities, which had turned to gas and oil because of the stringent sulfur standards, were increasingly dependent on foreign energy sources, in particular Middle Eastern oil producers. "Thus our highly industrialized Northeast is rapidly becoming dependent on the eastern hemisphere for energy—and at the risk of our national security," wrote Flowers.

Natural gas was not a cure-all either as production levels fell. "As a long-range solution to the energy problem, it would be logical to divert funds to the perfection of sulfur-removal processes now being tested or under development," wrote Flowers.

But the key problem, Flowers wrote in his June 1970 editorial, was lack of available manpower. "In the past several years the subject of attracting good men to the coal industry has been on the lips of virtually all management men. The problem still remains acute and, as our industry becomes more complex, it probably will become worse." Right he was. In the late 1960s, Consol and other producers were already nervously watching much of

their workforce approach retirement. Management knew those numbers would increase throughout the decade.

With coal production costs rising due to more stringent regulations and with other fuels also become more expensive, Flowers declared in his August 1970 editorial that “the era of cheap energy may be coming to an end. There are restrictive regulations that hamper coal production, the public clamors for pollution abatement, the railroads cannot provide enough cars to haul coal, wildcat strikes continue and labor shortages plague the coal industry...The public, which as grown accustomed to consuming electric power in larger and larger gulps at lower and lower cost per kilowatt, must face up to the fact each new restriction on either the fuel producer or the power plant will make it impossible to deliver electric energy at today’s low cost.”

At a moment when an example of proper coordination was needed, *Coal Age* returned to the massive Chestnut Ridge energy complex in the October 1970 issue to showcase how planned efficiencies can actually come together. The subject of several articles in the late 1960s, for the 1970 Model Mining Number, Flowers celebrated how energy for millions of Americans was being created in this one small area. “One of the world’s largest concentrations of new generating stations—Conemaugh, Homer City and Keystone—has been built on top of the Chestnut Ridge reserves and receive their coal from adjacent deep mines.” With roughly 12 billion tons of bituminous reserves, “coal also moves from the area by unit train to other generating stations, and soon will be going to the new Montour plant now under construction.” Combined, the six

stations were capable of generating more than 6,500,000 kW per hour and would consume some 17 million tpy. But “this coal-energy explosion did not just happen. It came about rather as the result of foresighted managements of coal producers and investor-owned utilities. And it goes back nearly a decade.” Stability, in other words, takes planning and, as the national energy system was being built out, sustainable, realistic policies needed to be created in order to avert the looming energy crisis.

As the year ended, a short rail strike cut production back a few million tons. Add wildcat strikes throughout the beginning of the year, and labor continued to be the biggest drag on production—though it continued to soar. However, “the impact of the new federal health and safety law became apparent in 1970, with some operators of deep mines reporting significant increases in costs and corresponding decreases in productivity. Hardest hit were the older mines that sometimes required major changes in ventilation or equipment. Complying with the new law while keeping costs down could be one of the toughest challenges the industry has faced.”

The manpower crisis showed no signs of diminishing in 1970 and, if anything grew worse. “For the foreseeable future, this problem will be of major concern for management. Only an all-out effort, by individual companies and the industry as a whole, will bring the needed workers.” In the January 1971 issue, the magazine reprinted part of a college advertising campaign by AMAX designed to attract student mining engineers.

Surface Mining Comes Under Fire

Just after Christmas 1970, West Virginia’s Secretary of State, John D. (Jay) Rockefeller IV announced a campaign to ban the surface mining of coal “completely and forever” throughout the state. Key West Virginia lawmakers pledged their support when the legislature convened in late January. Much of the political establishment “jumped on the popular ecological bandwagon” as did the influential *Charleston Gazette* which backed Rockefeller completely. By February, legislation seemed like a done deal. But the industry fought back. Faced with a public battle, the West Virginia Surface Mine Association hired Alexander Co., a New York Public Relations firm to design, create and deploy a series of television commercials as part of a larger cam-

Top 10 Coal Producers, 1974 (millions of tons)

Peabody Group	68.1
Consolidation Coal	51.8
Island Creek	20.8
Amax	19.9
Pittston	17.4
U.S. Steel	16.4
Arch Mineral	13.9
Bethlehem Mines	13.3
North American	9.8
Peter Kiewit	9.7
Total U.S. Production	516.0

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paign. By the time the legislature adjourned in March, it had passed much weakened regulations. The commercials made the difference.

Of course, Rockefeller and his sympathizers were just parroting the new line from Washington where, on December 20, 1970, President Nixon established the EPA. Armed with sweeping powers, Senior Editor Nicholas P. Chironis, detailed the still developing EPA in the August 1971 issue. Already employing more than 6,000 people and showing “evidence of a remarkable rate of growth in both authority and size, its operating budget for this past year has been a nice, fat \$1.3 billion—yet, surprisingly, the House just passed next year’s appropriation at the level requested by EPA, nearly \$2.5 billion—without a quibble.” Functions already transferred to the agency: control of water pollution and pollutants that impair water quality; air pollution; waste disposal; radiation pollution; and control over the use of various pesticides.

The federal government’s requirement that industry submit detailed data on all waste discharges that may wind up in navigable rivers, lakes and coastal waters, challenged the coal industry. More than 50,000 applicants were expected by the October 1. Deadline and skepticism was mounting that the new agency was up to the task of evaluating and processing all of those permits in time. Helping to enforce new laws and collect fines was the Justice Department. “We are not in any popularity contest,” said Walter Kiechel Jr., deputy assistant attorney general. “We’re the enforcers, we’re the litigators. In the words of the Scriptures, Chapter 10, the Gospel according to John, verse 24—‘I come not to bring peace but a sword.’” Then, referring to the fact that the Act provides a fine for violators of up to \$2,500 and imprisonment for a year, he went on to say, “A \$2,500 fine doesn’t have much impact on a large corporation, but it does get your attention.” On August 17, the EPA published new air quality regulations. Setting limits on particulates, SO₂ and NO₂, the new standards would apply to new stationary sources but also to existing plants that are modified in such a way as to increase or alter the nature of their emissions.

Buffalo Creek Tragedy

On February 26, 1972, tragedy struck the coalfields once again. An earthen embankment holding more than 20 million cu ft of water failed at the head of the Buffalo Creek in Logan County, W.Va., sending more than

150 million gallons crashing down an 18-mile stretch of the creek. A total of 117 people were pronounced dead and more than 30 were still missing as *Coal Age’s* April issue went to press. In addition, the floodwaters from the Pittston-owned mine destroyed 502 homes, 44 mobile homes, and caused major damage to 273 more dwellings. With coal already in the crosshairs of the state government, renewed calls for regulations in West Virginia and throughout the nation spread nearly as fast as the floodwaters. Legislation to ban surface mining both on the West Virginia state level and on the national level was debated and introduced in both Charleston and Washington, D.C.

“The rebuilding of Buffalo Valley is expected to last over a year. But what happened there will have a permanent impact on the coal industry and the people of West Virginia. In addition to the numerous investigations and new legislation in West Virginia, Buffalo Creek has increased chances for the passage of the mine area protection act now before Congress, as well as further legislation,” wrote the editors in the April 1972 issue. Strict surface mine legislation was later passed that year in Ohio, West Virginia and Illinois, and similar rules were considered nationwide.

“The tragedy along Buffalo Creek stuns each one of us. The first concern now is to serve the physical and material needs of the victims as well as possible in view of the totality of destruction in the 18-mi long hollow. Many of them are bereft of the bare resources they will need to face tomorrow

and next week and the weeks beyond,” wrote the editors. *Coal Age* and McGraw-Hill employees created a special relief fund to help assist families in the Buffalo Creek disaster. As relief efforts continued along Buffalo Creek, legislation nationwide dealt with surface mining or ecological issues.

Though the U.S. Supreme Court ruled in 1972 that states could not set up stronger anti-pollution regulations than the federal government, sustained ecological, mine safety and black lung legislation continued to be sought and passed. Regulation of surface mining on the state level was running at an all-time high despite the fact that coal operators graded and planted more than 81,600 acres of surface mined land in 1971.

At least 14 of the 22 major surface coal-producing states strengthened existing statutes, while Missouri and New Mexico enacted their first state reclamation laws in 1971 and 1972. This brought the number of states with reclamation laws to 21. Because regulations differed from state to state, “the coal industry supports comprehensive federal legislation which will establish criteria for achieving sound reclamation and which will require the states to develop and enforce regulations that will meet those federal standards,” said Carl E. Bagge, president of the National Coal Association (NCA) in the July 1972 issue. Though Congress would adjourn to hit the campaign trail without passing surface mining legislation, that summer President Nixon signed the Black Lung Benefits Act of 1972 with “mixed emo-



Aerial views show the damage to housing and railroad tracks along Buffalo Creek. **Coal Age*, April 1972

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Westmoreland congratulates the men and women of the Rosebud mine in Colstrip, Montana for their outstanding dedication to a safe workplace and for winning the Sentinels of Safety award

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tions” stating, “Responsibility for black lung compensation clearly should lie with the owners and operators of the mines,” and not the federal government.

Early Profiles

The September 1971 issue of the magazine featured something unexpected and unprecedented on the cover: female coal miner Betty Gibbs, mining engineer, Consolidated Coal Co. “Even in today’s rapidly changing world—in which women are making noteworthy contributions in fields once considered the exclusive domain of men, you’ll seldom find a woman mining engineer. A 1969 graduate of Colorado School of Mines (CSM), Betty was recruited by Consol. Moving to Colorado in 1964, Betty was a draftsman in Boulder, an engineering aid for the City of Boulder and a draftsman and secretary for a surveyor before enrolling at CSM. Her first assignment for Consol was to survey a possible coal deposit for the Western Exploration Office in Denver. Her duties later took her to Utah and New Mexico. *Coal Age* is grateful to Betty Gibbs for her presence on our cover, and we welcome her to the mining fraternity.”

The cover surprises kept coming that year as the magazine published another rarity in October: the first ever model mine issue profiling Peabody Coal. Nearly as old as the magazine, Peabody up to that point had escaped *Coal Age*’s near annual spotlight on a single mining company. Consol had been featured several times. Peabody had, up until this point remained something of a mystery. Operating 49 mines in 12 states as well as Queensland, Australia, and gearing up to produce more than 100 million tons by 1975, at the time of the review, Peabody was tenuously owned by Kennecott Copper.

Kennecott was involved in anti-trust litigation with the Federal Trade Commission (FTC) since August 1968, just six months after the two companies were conjoined. Kennecott would fight the FTC throughout the decade, losing virtually every time. In the October 1971 issue, *Coal Age* was given a rare tour of the nation’s largest coal producer.

Surface mining accounted for almost 80% of the company’s total production of more than 54 million tons. Peabody’s largest operations were in the Midwest. New surface mines in the area accounted for much of that tonnage, but the company was also in the advanced development stages of the



**Coal Age*, September 1971

new Black Mesa mine in Arizona as well as developing new markets for Montana coal from the company’s Big Sky property where overburden was removed by a Marion 7400 dragline. Though River King attracted more attention, the new Marion 8900 145-yd dragline at the Indiana Dugger mine was the largest in the company’s U.S. fleet. Assigned the task of uncovering 200,000 tons of coal per month from the Indiana Nos. 6 and 7 seams, this required the removal of more than 2.8 million cu yd of overburden each month. With operations concentrated near water, approximately 30% to 35% of the company’s production moves in water transportation to some 38 utility and industrial accounts.



Tony Boyle.**Coal Age*, March 1977

Organized Labor Stumbles

The decade opens with the national media following a trail of salacious material coming from the investigation into the murder of Joseph (Jock) Yablonski, former candidate for president of the UMWA. Seven defendants were found guilty killing Joseph, his wife and their daughter in a grisly killing in December 1969. Both those found guilty and witnesses implicated Tony Boyle and several of his underlings as hiring the defendants to commit the act. Silous Huddleston, a Tennessee local president of the UMWA confessed on May 3, 1972, that he had directed and handled the payoff for the murder with what he said “I believe” was union money. He said the money was channeled to him by two UMWA officials including Albert Pass, a member of the union’s international executive board. In March 1973, William Prater, the highest ranking former UMWA official tried to date in the murders was convicted.

On May 10, Boyle and three other union officials testified before a grand jury about using specially-designated union funds to hire the killers. Also in May, the 1969 election results between Yablonski and Boyle was overturned by a U.S. District Judge. In a 33-page decision, the judge found that evidence of wrong doing was “too strong to resist.” A new election was to be held in December 1972. However, Boyle would not be on the ballot—or at least able to serve. He was found guilty of misappropriating union funds for political reasons that spring and would continue to face all sorts of other charges. On September 6, 1973, Boyle was



Arnold Miller.**Coal Age*, January 1974

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arrested and charged with Yablonski's murder. 18 days later, Boyle tried to commit suicide and was admitted to George Washington University Hospital after taking a "massive overdose of barbiturates."

Boyle was convicted of ordering the killings in 1974 and again at a new trial in 1978. Eight other people, three of them UMWA officials, either confessed to having taken part in the murder plot or were convicted of having done so. He would spend most of the rest of his life in prison, dying in 1985.

Arnold Miller, a member of the Miners for Democracy, was nominated to challenge Boyle's successor in the election. Miller, of Ohley, W.Va., was president of the Black Lung Association and a disciple of the late Yablonski. Miller at the time was best known for his leadership in the successful drive by rank-and-file miners and widows to push a black lung compensation bill through the West Virginia legislature in 1969. Miller himself was forced to leave the mines in 1970 when he was diagnosed with the disease. He had also been president of UMWA Local 2903 at Eskdale, W.Va. After winning the election in 1972, Miller helped establish more local controls and, for the first time, UMW rank-and-file would be able to directly vote to decide the contract.

This election marked a turning point in the history of the UMWA and brought an end to the calm 20 years that had followed the stormy 40 years that went into establishing the union as the preeminent voice of labor in the coal industry.

The UMWA signed a three-year contract with the BCOA on December 5, 1974. UMWA President Arnold Miller calls it the best contract in the union's history. It will increase the basic daily wage about \$9, from \$45.40 to \$54.39 over the three-year period. It's estimated the contract will cost the coal industry about \$4.6 billion over the same period. The BCOA released a statement that simply said, "While a very costly one for the industry, it is a very forward looking agreement and it will be of great benefit for the miners. We hope that it will serve the public interest as well by providing improved productivity and greater stability of production for the nation's coal mines."

The decade closes with the longest strike in the nation's history, which left a trail of singed careers and bruised egos, according to *Coal Age*. It was not until the union had turned down two proposed contracts and the government had to invoke the Taft-Hartley Act that real progress was made in the talks. By that

Editorial

Age and the UMW

Some social scientists maintain that all organizations, no matter what their nature, follow a pattern similar to that of the human life cycle. The United Mine Workers (UMW) is an example that supports that premise. The UMW had a difficult birth, a stormy adolescence and a vigorous, powerful manhood. In its prime, the UMW was one of the strongest, most influential organizations on the American labor scene. In its acceptance of mechanization it showed a wisdom that is even today rare among labor unions.

The UMW was born in 1890 and its maturity ran roughly parallel to the reign of John L. Lewis, 1920-1960. To pursue the human life cycle comparison, one could describe UMW's present stage as senility. The union's behavior these days fits the pattern of senility. Its halting, disorganized, ill-conceived actions suggest the direction of a failing mind. The rash of strikes over the cutbacks in the union's health and benefit funds is typical of the reasoning of a senile brain at work. The funds have been depleted because of wildcat strikes and UMW's solution is to have more wildcat strikes, reducing even further the money available to the funds.

There seems little chance of rejuvenation of UMW under Arnold Miller's presidency. In the manner of a human being who is 87 years old, the UMW seems doomed to linger on for years in ever worsening stages of invalidism before it finally expires.

**Coal Age*, September 1977

time, the operators had replaced their bargaining team and union had augmented theirs to deal around their discredited president.

While Miller was criticized as an ineffectual leader, dissension among the operators also contributed to the prolonging of the 110-day strike in 1978 and forced the BCOA to change its negotiating team in the middle of the bargaining session. Ralph Bailey, chairman of Consol's parent company Conoco, was so dissatisfied with a lack of cohesion among larger producers, he ordered Consol to pull out of the BCOA.

Ultimately on March 14, 1978, the two groups negotiated an agreement that would increase the average hourly wage to \$10.20 from \$7.80 by the contract expiration in late 1981. The important part of the package was the health benefits. Benefits would no longer be free. Free health care

was endangered by a 1977-1978 crisis in the UMWA fund and health care would now be guaranteed under company plans. For the rest of the decade as the coal industry saw its fortunes and reputation improve, labor once again grew restive and sought the kind of leadership that would have allowed it to cash in more directly on the industry's improved prospects.

Women Enter the Mines

During the 1970s, women enter the workforce. The first woman coal miner went to work at a U.S. mine in 1973. By 1980, of the 255,888 U.S. coal miners, 15,252 were women. An article in the June 1977 issue, "Women Dig into the Coal Industry", discusses how females, who are considered bad luck underground, are now contributing in all aspects of the coal business. Women want to be coal miners. They can

Kentucky orders women hired as miners

An order to be issued to the US Steel Lynch mine in Harlan County, Ky., by the Kentucky Commission on Human Rights will require that 20% of new employees hired be qualified women.

US Steel officials in Pittsburgh said the company had expected the order. It stems from a sex discrimination complaint filed a year ago under Kentucky's 1972 sex discrimination law.

If the commission approves the order, which has been drafted by the commission staff, US Steel will be the fourth company forced by Kentucky to include women on its mining and warehousing staff.

Commission attorney Tom Eberdorf says there are six other similar complaints pending before the commission. He would not release details. The writing is on the wall for other Kentucky mines, as far as he is concerned.

"Women are going to take their place. It behooves other mines



A new face at the face could be Jill Buchanan, one of 19 women studying mining or petroleum engineering at West Virginia University. She is one of the first women to be elected president of a student chapter of the American Institute of Mining, Metallurgical and Petroleum Engineers. Both her husband, Fred, and her father, Jack N. Gerwig, are mining engineers.

preferential list, and another has been preferred a job. has four women working underground among his total work force of about 600.

**Coal Age*, February 1977



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make more money than they can by doing any other kind of work. In 1976, there were 4,700 women employed in all segments of the coal industry out of a total of 182,000.

Oil Embargo Thrusts Coal into the Spotlight

The Arab oil boycott exploded on the nation late in October 1973, surprising the coal industry as much as anyone. In November 1973, Bagge called for a coal research program comparable to the Manhattan Project, which developed the atomic bomb. The same issue reported that large East Coast utilities were switching to coal. The National Petroleum Council concluded that coal could make a major contribution to the nation's energy needs.

Coal Age's editorial in August 1974, remarked that "...for a number of reasons the demand for coal is outrunning the supply...and cited the case of Scranton, Pa., once known as the anthracite capital of the world, where the price of coal had jumped from \$25 to \$40 a ton within a year."

In the next few years, *Coal Age* reported the promises of Presidents Nixon, Ford and Carter that coal consumption would triple by 2000, that coal would be the savior of the nation. There was so much news about plans for the production of synthetic fuels from coal that a special department in the *Coal Age* news section was created.

Additional coal-fired generating capacity was bought online quickly (and some would say hastily). From the mid-1970s to the early 1980s, about 10,000 mw of new coal-fired capacity was added each year. By 1978, Congress, concerned with national security aspects of energy matters, passed a law forbidding the building of large, new oil-fired plants, enhancing coal's encroachment in the energy mix. Coal's share of the electricity generation rose from about 46%



Carl E. Bagge.* *Coal Age*, April 1976

to nearly 56% during the 1970s. During the same time, however, 70 new nuclear generating stations went into service, dampening some of coal's chances for an even greater energy market share.

To keep up with the surge in demand, the coal industry was expanding rapidly and hiring great numbers of miners. Some 45,000 new miners were hired in 1974 alone. The average age of coal miners dropped from 45 to 35 in the five years from 1970 to 1975.

At the end of 1975, President Ford signs an energy bill that rolled back crude prices. It also authorized up to \$750 million in loan guarantees for opening new underground coal mines by small operators. Under the provisions of the bill, the federal government could guarantee loans up to \$30 million for individual underground mines if the operators could establish they were not controlled by an oil company and there was a reasonable chance they could pay back the loan.

During the sixth annual Institute of Coal Mining Health and Safety, August 26-28, 1975, at Virginia Tech, Carl Bagge, president of the National Coal Association (NCA), talked about the need for increased productivity and safety. In his presentation, "The Health of the American Coal Industry and the Safety of the American Public," he stressed the twin goals of increased productivity and mining safety. He noted that most accidents occur at marginal mines or marginal companies. To keep up with future demand, Bagge described a scenario where the U.S. would have to open on average one new deep mine and one new sur-

face mine, each with 2 million tpy capacity, every month for the next 10 years. He believed the industry would have to hire and train 125,000 new miners by 1985. He saw technology as the best means for achieving this goal and called for more emphasis on research.

As an example, Pittston, the nation's fifth largest coal producer at the time, planned to spend \$350 million over the next five years in a nine-mine expansion program aimed at boosting its annual production by 1.5 million tons of met coal. Four of the operations would begin in 1975 and the remaining five would come online in 1976. When they reached full production in 1980, the company anticipated they would have created 4,500 new jobs.

Tense labor situations eventually resulted in a 1974 contract with the UMWA that dramatically increased production costs. Operators would again turn to better underground mining techniques, such as super sections and longwall mining, to improve productivity and offset costs.

Underground Mining's Unprecedented Scale-up

Because of the 1969 Mine Act, continuous miner manufacturers were occupied with physical design changes to mitigate noise and dust problems. By 1970, about 1,600 continuous miners were in use, and rotary-headed units were being built with more powerful cutting performance. Cutting tools were one key to the success of continuous miners. A burst of innovation in the mid-1970s led to the installation of remote controls on test miners to keep operators back from the dust area and out-by the unsupported roof. Both radio and cable controls were used, and mines reported up to 15% gain in produc-



President Ford accepts a clock mounted in a lump of coal as a memento of the March 21 White House conference on the coal industry.* *Coal Age*, May 1975

Continuous-Miner Statistics, 1950-80				
Year	Continuous miner production thousand tons	Number in use	Number needed for new capacity (including spares)	Number needed for replacement
1950	4,850	90	—	—
1955	27,460	385	—	—
1960	77,928	879	—	—
1965	141,938	1,218	—	—
1970	169,897	1,566	—	—
1971	152,943	1,781	—	—
1972	178,375	1,849	—	—
1973	178,600	1,866	—	—
1974	185,000	1,976	—	—
1975	211,975	2,200	360	110
1976	233,915	2,360	360	110
1977	255,235	2,552	360	110
1978	270,000*	2,746*	360*	110*
1979	290,000*	2,934*	360*	110*
1980	300,000*	3,100*	360*	110*

* est.

* *Coal Age*, February 1980

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tivity. Jeffrey Mining Machinery Co. developed a digitally coded FM radio-control system that would permit two or more machines to operate simultaneously and prevents one transmitter unintentionally operating the wrong machine.

A March 1975 *Coal Age* article, "Boost Your Productivity by Adding Continuous Miners," written by Stan Suboleski, an instructor at Penn State, explained the rationale for operating two continuous miners in one production heading. The technique offers the promise of nearly doubling present tonnage rates with about one-half of the capital and manpower required for a complete new section. This method of room-and-pillar

mining would become very popular and eventually be known as a super section.

Another article, "The Yardstick of Productivity..." (July 1975) asks, "Is it high tons per man-day or is it low cost per ton?" The author, who is advocating high horsepower over manpower, explained that the answer is both. The graphic provided depicting major technological eras in underground mining does not yet include longwall mining.

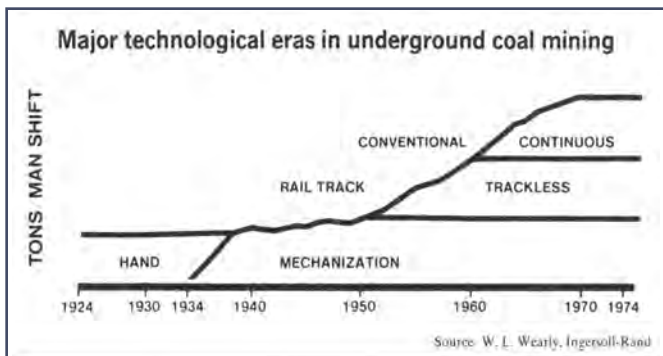
The new health and safety laws gave new impetus to the interest in longwall mining. The absence of the need for rock dusting, the ease and efficiency of ventilation, good and almost automatic roof control with little consumable material appeared the chief attractions.

Longwall units produced greater tonnages in the 1970s and more were deployed the following year. In the March 1971 issue, Brian Watson, a long-wall engineer formerly of Bethlehem Mines, reported on improved operations at the com-

pany's No. 33 mine, Cambria Division, "where a longwall unit recently broke a world production record by mining 7,280 tons in a 24-hr period. The best shift production during this period was more than 2,860 tons.

In the May 1971 issue, William Laird, vice president of engineering at Eastern Associated Coal Corp. reported on his company's continuing usage and development of longwall mining technologies. The first company to install and successfully operate such a system in the Pittsburgh seam, in 1969 Eastern began longwall mining in its Federal No. 1 mine near Grant Town, W.Va. Operated by a seven-member crew, the highest shift tonnage was approximately 2,500 tons.

In the August 1972 issue, *Coal Age* published the forerunner to the annual Longwall Census. Written by Joseph Kuti, chief engineer at Mining Progress, he reported that as of April 1972, 41 longwalls were operating or delivered in the U.S. Sixteen of the 41 units were plows and 25 were shearers. At the time, 22 more contracts had been placed for additional longwall systems. Nine of those new contracts called for plows and 14 for shearers. Nationwide, the longwall leader was Eastern Associated Coal. By 1972, they



* *Coal Age*, July 1975

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had 16 systems active or on order; seven were plows and nine were shearers. Island Creek was number two in the nation with 15 plows active or on order.

True advances in longwall mining begin to take place with the introduction of the shield support, sometime in 1974. Within months, the operator of these supports, Consolidation Coal Co., established a new American coal production record—12,395 tons in a single 24-hour period at its Robinson Run mine—and that performance caught the eye of the industry. About 20 months later, in the January 1977 issue of *Coal Age*, the editors stated, “shield supports, a Russian development that came to the West in the early 1970s, are the most talked-about type of support today and the major contributing factor to the recent surge of longwalling activity in the U.S.” In 1973, shortly before shield supports were first to be imported into the U.S., there were only 40 longwall faces. None had shield supports. By the end of 1976, a survey published by *Coal Age* showed 72 faces operating, six with shield supports.

The rapid acceptance of shield supports by coal operator led to an interest in automating the control of those shields. Instead of manually operating each shield

along the face, controls were bunched so that a group of shields would move in sequence and could be operated from distant locations. These controls were introduced in the latter half of the decade.

Until 1978, virtually all equipment used on longwall faces either came from Europe or was manufactured in the U.S. by subsidiaries of those European companies. These companies continue to dominate the market. In 1978, however, Joy Manufacturing Co. became the first U.S. company to design and build a complete longwall system. It was installed that year on a 500-ft face in West Virginia.

By 1973, an electrohydraulic system for controlling a roof-bolter proved itself after operational testing. During 1974, the forerunner of the current automated temporary roof support (ATRS) bolters was built by FMC and operated in an Island Creek mine in Martin County, Ky. Two versions were built, one with four hydraulic legs for conventional mining, the other with two legs for continuous mining.

In the midst of the coal boom in the mid-1970s, many coal operators who had been leaving pillars for roof support began extracting them. This type of work required temporary roof supports for which FMC

developed a walking frame and a mobile support. About the same time, J.H. Fletcher & Co. developed a dual boom bolter with an ATRS consisting of two legs and a cross-beam, and Lee-Norse Co. integrated a safety arm into the boom bolter mechanism.

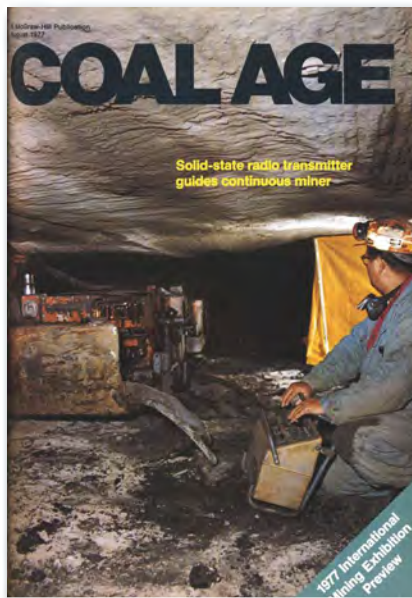
Overall, however, continuous miner productivity was on the downside from its high-water mark of 15.6 tons per man-day, achieved in 1969. By the end of 1974, productivity had fallen to 11.6 tons per man-day and was destined to go lower still. That year, four companies under contract with the Bureau of Mines (BoM) were busy developing designs for an automated extraction system for three-entry continuous mining. The goal was to boost production to an average of 8 tons per minute and to raise actual production time to 300 minutes per shift, resulting in a production rate of 2,400 tons. At the time, some 60% of deep mines used continuous miners that produced only 200 to 600 tons per section per shift. The resulting machines were essentially continuous miners but with added capabilities for continuous roof support and bolting, robot-like mimicking, and ventilation and dust control. Success was mixed but the machines produced served as precursors to some of today's modern equipment.

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* *Coal Age*, August 1977

Mine Safety: MESA Becomes MSHA

The 1969 Coal Act was more comprehensive and more stringent than any previous federal legislation governing the mining industry. It included surface as well as underground coal mines within its scope, required two annual inspections of every surface coal mine and four at every underground coal mine, and dramatically increased federal enforcement powers in coal mines. The Coal Act also required monetary penalties for all violations, and established criminal penalties for knowing and willful violations. The safety standards for all coal mines were strengthened, and health standards were adopted. The Coal Act included specific procedures for the development of improved mandatory health and safety standards, and provided compensation for miners who were totally and permanently disabled by coal miner's pneumoconiosis or "black lung."

In 1973, the Secretary of the Interior, through administrative action, created the Mining Enforcement and Safety Administration (MESA) as a new departmental agency separate from the BoM. MESA assumed the safety and health enforcement functions formerly carried out by the BoM to avoid any appearance of a conflict of interest between the enforcement of mine safety and health standards and the BoM's responsibilities for mineral resource development.

In 1975, *Coal Age* reported that the two groups were feuding over coal mine safety research dollars. The outgoing MESA chief criticized BoM research for focusing too much on long-range projects rather than

immediate solutions to the problem of making underground and surface mines safer. The UMWA and the NCA both believed that research should remain with the BoM.

By 1976, MESA was collecting more than \$8.5 million in fines per year. That figure is up from \$4.7 million in 1974 and \$100,000 in 1970.

On the night of March 10, 1976, the Scotia mine suffered two explosions killing 26. Methane gas was believed to be the cause of the explosions. MESA had inspected the mine the evening before and cited the mine over ventilation, which it promptly corrected. The day of the explosion, a foreman called out that something was amiss with the ventilation and the explosion occurred shortly afterward. Scotia Coal, located in Cumberland, Ky., was a subsidiary of Blue Diamond Coal. The mine produced about 1.5 million tpy from three seams. The first explosion occurred at 1:15 p.m. killing 15 miners in the lowest seams, 1,600 ft deep. Nine miners were killed instantly. The other six managed to don self-rescuers and erect a barricade. Ultimately the barricade leaked and they suffocated when the respirators expired. Approximately 121 miners were underground at the time.

A second explosion, March 11, took the lives of 11 more men, including three federal safety officials. They were part of a rescue team that entered the mine to reinforce the roof so that federal mine inspectors could begin their investigation. After months of investigation, MESA concluded a spark from a battery-operated locomotive triggered the first explosion. The second explosion was believed to be created when loosened roof rock struck steel machinery or possibly by exposed battery wires sheared during the first explosion.

Congress passed the Federal Mine Safety and Health Act of 1977. The Mine Act amended the 1969 Coal Act in a number of significant ways, and consolidated all federal health and safety regulations of the mining industry, coal as well as non-coal mining, under a single statutory scheme. The Mine Act strengthened and expanded the rights of miners, and enhanced the protection of miners from retaliation for exercising such rights. Mining fatalities dropped sharply under the Mine Act from 272 in 1977 to 22 year-to-date (July 17, 2007).

The Mine Act also transferred responsibility for carrying out its mandates from the Department of the Interior to the Department of Labor, and created the Mine Safety and Health Administration (MSHA) during March 1978. Additionally, the Mine

Act established the independent Federal Mine Safety and Health Review Commission to provide independent review of the majority of MSHA's enforcement actions.

Surface Mining

Fueled by the first Arab oil embargo of 1973, orders for draglines greater than 16-yd grew to 43 in 1973 from 16 in 1969, before skyrocketing to 106 in 1974. Almost all of these machines (90%) were for the North American coal industry. Then the bubble bursts. Orders plunged to 17 in 1975.

During the 1970s, more compact, powerful electric and hydraulic shovels began to appear in the coalfields to strip and load overburden and coal directly into trucks. Limited to shallower depths of overburden than draglines, such loading shovels proved effective for preparing benches for draglines and for multiple-bench mining applications.

Congress enacted the Surface Mining Control and Reclamation Act of 1977 (SMCRA), to which regulate environmental aspects of surface and underground mining. It requires all mines on federal lands to submit a mining and reclamation plan that could be approved as part of a larger permit to mine on those lands, and provides that in all cases mine operators must submit mining and reclamation plans for their operations that satisfy the authorities that the mine will not endanger the environment.

The regulatory program is administered by the federal Office of Surface Mining (OSM). In general, the regulations require separate removal and handling of all upper soil horizons capable of supporting vegetation cover. Topsoil may be redistributed only after the backfilled area has been properly prepared. All disturbed areas must be returned to their approximate original contours wherever possible. Spoil must be replaced to eliminate all highwalls, spoil piles and depressions. Final graded slopes may not exceed the pre-mining slopes, and the regulatory authority can require lesser slopes. Highwalls must be eliminated and graded to achieve permissible stability. Cut-and-fill terraces may be used only when approved by the regulating authority.

Mountaintop-removal variances may be allowed if the activity includes the removal of an entire coal seam from the upper fraction of a mountain or hill and the resultant landscape is a plateau. Such a landscape must be designed to meet a post-mining land use that will accommodate an industrial, commercial, agricultural, residential or public facility, including recreational facilities.

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Unemployment thins the ranks of Appalachian coal miners. * *Coal Age*, December 1979

Surface mine operators begin to modify mine plans to comply with SMCRA. Scrapers experienced a new wave of popularity because they can strip topsoil and overburden and spread the material precisely where it is wanted. Some scrapers are now fitted with sensors that feed information to microprocessors and shift gears at optimum time electronically. Other microprocessor systems are successfully throttling scraper wheel slippages.

In a June 1979 profile of Carter Mining's Raw Hide mine, *Coal Age* explained how the mine would begin production using a truck/shovel/scrapper combination. With overburden ranging from 0 to 250 ft and the total thickness of the two coals seams equaling 100 ft, the stripping ration throughout the life of the property is 1:1. After the topsoil is removed with scrapers, a tuck-shovel combination would remove overburden in 50-ft benches. The 25-yd Bucyrus-Erie 295B works in conjunction with 170-ton Unit Rig Lectra Haul Mark 36 haul tucks. The scrapers are also used to build ramps into the pit.

Coal Preparation Benefits from CAA

In 1971, the EPA enacted the Standard of Performance for SO₂ Emissions, the standard being 1.2 lb of SO₂ per million Btu. In 1979, the EPA introduced its New Source Performance Standards for SO₂ Emissions, requiring 70% to 90% SO₂ reduction, depending upon sulfur levels. These two acts had a significant impact on coal preparation because the principal consumers of steam coal now had compelling reasons to demand the cleanest possible fuel.

In 1976, the editors wrote about the coming surge in coal preparation. They discuss the influence of the CAA on future demand and discuss how low-sulfur coal and flue-gas scrubbers will not be able to meet the need. They see coal preparation as the only way to meet the industry's needs.

The sectors experiment with several different equipment in an effort to improve the quality of coal. In the early 1970s, two high-capacity, small-floor-space thickeners were introduced. They were the Enviroclear thickener, first on-line in 1973, and the Lamella thickener, first on-line in 1975. Another interesting improvement in dewatering, the Vorsiv, came from Poland and was first installed in 1973. It gave a high primary dewatering capacity and was considered to be an improvement on the sieve bend. The first modular preparation plant, with a 100-tph capacity, was built by the Childress Corp. and went on line in 1976.

While some things were becoming more compact, others were boosting capacity. Most significant among these were the large flotation cells, 300 to 500 cu ft, introduced in the early 1970s. Almost all new preparation plants were using froth flotation cells, although not all were for coal recovery so much as for blackwater treatment. Other events in U.S. coal preparation include the introduction of the Batac jig for fine coal in 1975 and the 1977 at opening of the Homer City coal preparation plant, an operation producing super-clean coal, low sulfur, with a very low ash content.

Mired in Regulations

Despite the obvious need for low-cost energy, the coal industry struggled with increasing regulation and government bureaucracy. At an event organized by *Coal Age*, under the theme "Strategies for 1976—and Beyond," Bagge called for candor—and clear eyesight. "The fact is there are few people in Congress capable of counseling on a strategy for coal," Bagge said. "We have our friends in Congress, to be sure, but they are too few in number to be able to give us any assurance that they can carry the day in the crucial contests which affects coal's future... We need to

have other policies which will encourage investment in coal and lead to the development of mines for the long-term. We need to convince the public that coal cannot be the 'Red Cross' of the energy industries, called out only in emergencies and kept in standby condition the rest of the time."

Jimmy Carter won the presidential election in 1976. In a January 1977 editorial, Paul Merritt, managing editor, summed up the situation: A new year. A new administration. A new Congress. But it looked as though we would continue dealing with the same old problems that have plagued the industry for years and which our representatives in Washington have either ineffectually handled or faced up to. He pointed out that President Carter is standing at the threshold of a potentially energy-independent America and that America should invest money in a domestic energy policy.

In October 1977, the new Department of Energy (DoE) formally sets up shop. It is a relatively small agency by Washington standards, according to *Coal Age*. "From the first batch of nominations, it was apparent that dealing with the nation's energy difficulties will be placed largely in the hands of economists and system analysts," the magazine reported. The new DoE absorbed the Federal Energy Agency (FEA), the Energy Research and Development Administration and the Federal Power Commission.

In 1977, *Coal Age* Editor Joseph F. Wilkinson takes President Carter to task over a statement he made regarding slow gains in productivity. "The President implies that American industry has lost its old innovativeness, that American workers don't want to work. Actually, the problem is that Congress and the White House and the regulatory agencies have shown too much innovativeness. They are going to innovate American industry in general and coal mining in particular right out of existence with their regulations."

The decade closes similar to how it opened. Coal operators were worried about complying with even more new regulations and labor. A weak met market, environmental regulations and increased costs for utilities are causing high unemployment in the coal industry and long-term outlook is not good. The jobless numbers are high: Kentucky (3,900), West Virginia (5,000) and Ohio (4,000). The coal industry has about 100 million tons of idled capacity. A geographic shift in coal production is taking place, from deep mines in the East to western surface mines.



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1980s: The Massive Build Out Begins

1980-1989



The 1980s opened with the coal industry grappling with increased regulations and recovering from fierce labor battles. President Jimmy Carter was trying to convert utilities, steel mills, and industrial boilers from oil and natural gas to coal. He and his successor President Ronald Reagan were both big proponents of building a domestic energy plan. A larger slice of the energy pie was up for grabs if the coal industry could only get its act together. It eventually would, but no before the landscape changes dramatically.

A major build out was about to take place in the 1980s. The coal industry would add 151 million tons and most of the expansion would be in the West. After a 10-year moratorium, the Department of Interior (DoI) resumed coal leasing on fed-

erals lands. With the passage of the Staggers Rail Act of 1980, many regulatory restraints on the railroads were removed. The Interstate Commerce Commission would subsequently approve several rail mergers and coal consumers in the Midwest and Southeast began to see coal from the West moving their way.

While regulation was freeing up some sectors, the opposite was taking place with coal mining and utilization. Surface coal operators were learning to contend with the Surface Mining Control & Reclamation Act of 1977 (SMCRA) and the Office of Surface Mining (OSM), which administered the regulations. Underground miners were coping with dust sampling and black lung issues. Utilities were dealing with amendments to the Clean Air Act and by the end of the decade concerns about acid rain would lead to even more regulations.

As far as mining and processing, computers were beginning to play a larger role as technology shifted from mainframes to PCs. Similar to everyday life, technology and computers began to improve all aspects of mining. In the mid-1980s, Autocad drafting software operating on IBM 386s replaced hand-drawn mine maps and the Leroy lettering guide. By the end of the decade, the squeal of the Hayes dial-up modems could be heard in mine offices as email began to supplant facsimiles. The increased use of computers begins to influence every aspect of mining from pass matching on the surface, to ventilation surveys underground, even train loading systems at the prep plant.

Safety performance and productivity take huge strides. Most of the coal produced underground is cut with continuous miners working room-and-pillar sections. Longwall technology has arrived and throughout the decade American coal miners would improve a system devel-

oped by Europeans. On the surface, loading and hauling equipment continued to grow in size and speed. Traditional area strip mines with draglines moving overburden begin to incorporate truck-shovel techniques for pre-stripping and mining; and they also experiment with bucketwheel excavators (BWEs) and cross-pit spreaders for moving overburden. Coal processing would evolve from a way to improve the environment by reducing black water and pyritic sulfur to a way to capture more fine coal.

Coal Age remains under the leadership of Joseph F. Wilkinson, editor, and Paul C. Merritt, managing editor, for most of the decade. At the time, Wilkinson was also editing *Engineering & Mining Journal (E&MJ)*. During 1980 and 1981, regular editorial columns appear without photos facing the inside back cover. Most are written by Wilkinson, some are penned by junior editorial staffers and a few guest commentators weigh in occasionally. That is the only glimpse the readers get of the editorial team.

In true McGraw-Hill fashion *Coal Age* reports the news about the coal business and tries to remain unbiased. Throughout the decade, the editorial staff experiments with articles reporting on specific forms of equipment or areas of mining and processing. Two great examples are the U.S. Longwall Census and the U.S. Prep Plant Census, which *Coal Age* still publishes today. For several years, readers selected certain leaders for the *Coal Age* Award. Many of the covers were illustrations, which were trendy at the time, and the magazines routinely contained more than 100 pages, sometimes as many as 200 pages or more.

Coal Age also had competition. Maclean Hunter's *Coal Mining & Processing*, which later became *Coal Mining*, was competing for readership and advertising dollars. Maclean Hunter

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Coal Statistics: 1980-1989

Year	Employment	Fatalities	UG (tons)	Surface (tons)	East	West	Total
1980	253,007	133	337,508,000	492,192,000	578,688,000	251,012,000	829,700,000
1981	249,738	153	316,496,000	507,279,000	553,862,000	269,914,000	823,775,000
1982	241,454	122	339,152,000	498,960,000	564,259,000	273,853,000	838,112,000
1983	200,199	70	300,379,000	481,713,000	507,395,000	274,696,000	782,091,000
1984	208,160	125	352,050,000	543,870,000	587,620,000	308,301,000	895,920,767
1985	197,049	68	350,800,000	532,838,000	558,730,000	324,908,000	883,638,117
1986	185,167	89	360,438,000	529,877,000	564,427,000	325,887,000	890,314,708
1987	172,780	63	372,874,000	545,888,000	581,929,000	336,833,000	918,762,162
1988	166,278	53	382,156,000	568,109,000	579,565,000	370,700,000	950,265,278
1989	164,929	68	393,835,000	586,893,000	599,015,000	381,714,000	980,728,790

had also successfully launched two trade shows, Coal Prep and Longwall USA. By the end of the decade, *Coal Mining* would take over *Coal Age*, and the magazine would never be the same again.

General Market Overview

The Department of Energy (DoE) estimates that about 300 million tons of coal will be needed annually by the late 1980s to supply 100 new power plants and 1,600 projected coal-fired industrial coal-units. This prediction is based on the fact that, during most of the 1970s, annual electrical demand growth rates were about 7% and promised to run even higher in the 1980s, even though in 1982 there was a negative 2% per year growth rate. This prompted utilities to enter into numerous long-term contracts to ensure adequate supplies.

At the onset of the 1980s, it seemed coal was in for a rough period because of a drop in crude oil prices, which peaked at the mid-\$30 per barrel level. But coal enjoyed a cushion of sorts, because almost all of the conversions of oil-fired electrical plants to coal-fired had been completed and federal law forbid the construction of large new oil-fired generating stations.

Oil companies, many of which owned coal mining operations, made lots of money from coal when oil prices soared in the 1970s. Several of the oil firms began dumping their coal interests after coal prices fell in the early 1980s and the returns on their coal investments began to erode.

In February 1980, Wilkinson frames the situation. "Coal enters 1980 burdened with over capacity, a soft spot market, and unemployment and mine closings in the eastern half of the country," Wilkinson wrote. "Yet 1980 and the new decade promise increased consumption of coal, relaxations of stifling environmental regulations, greater political power working in support of coal from the White House. Despite an ill-defined national energy policy, circumstances—the steady increase in the cost of oil and the incident at Three Mile Island nuclear generating plant for instance—steadily draw the U.S. toward exploitation of its abundant power source—coal."

By that time, it was already clear that Western coal production was going to grow significantly. The Energy Information Administration (EIA) estimated that western production would expand further. Utah would be the underground leader followed by Colorado, and Wyoming will dominate the surface mining scene followed by Montana.

By the mid-1980s, however, the news reads remarkably like the coal news of the 1920s, the 1930s and the 1950s. Over-capacity brings about cut-throat pricing, layoffs and mine closings. Coal markets are being squeezed by the arrival of more nuclear generating capacity. Coal loses market share to nuclear with 9.9 gigawatts coming online in 1987. The 31 new nuclear plants under construction in the U.S. will supply future demands and

displace 7.5 million tons per year (tpy) of current coal capacity. Coal employment is down 7.4%. Production is steady and stocks are down 10%. The spot market rekindles competition.

Coal successfully weathered the tough period. The price collapse in oil, a soft economy, and the growth in nuclear power took their toll. The National Coal Association (NCA) predicts record production in 1987 of 914 million tons, up 30 million tons from 1986. The run-up, however, is not due to demand. Utilities were preparing for potential strikes related to collective bargaining with the United Mine Workers of America (UMWA). To the surprise of many, the UMWA works out an agreement with the Bituminous Coal Operators Association before the contract expires.

The decade ends with coal in over capacity. U.S. utilities, which are now planning fewer electric power plants than they have in decades, continue to delay plans for new plants of any kind until they better understand future power demands, the direction of acid rain legislation, and emerging generation technologies.

Underground Productivity Improves

Room-and-pillar mining with continuous miners and tethered shuttle cars is the predominant form of underground coal extraction. In an ad in the May 1980 edition, Joy Mining Machinery documents a one shift 2,594-ton record for its Joy 12 continuous miner at Western Mingo mines.



In a one-section mine, Leckie works two production shifts daily and assigns a full crew to maintenance and clean up on the third shift. The ratio of maintenance to production may seem high, but the productivity speaks for the efficiency of the operations. **Coal Age*, September 1984

Diesel-powered equipment slowly but surely gains a foothold in America's underground coal mines. Long rejected by the UMWA and still illegal in West Virginia, diesel haulage and supply vehicles nevertheless have proven themselves sufficiently productive for mine operators to bring them into the mines in greater numbers.

Thin-seam mines in the East are using continuous haulage systems. A 10-miner crew using a continuous haulage system at GM&W Coal Co.'s Grove No. 3 mine in Pennsylvania sets a company record by mining 1,793 tons of raw coal in one shift in a region where 800 tons per shift is considered good. The crew was using a Long-Airtox continuous haulage system and a Lee Norse HH106 continuous miner advanced 210 ft in 11.5 cuts in 8-ft coal.

In 1980, longwall production accounted for approximately 5% of the coal mined in the U.S. The first U.S. Longwall Census appears in the December 1980 edition. By mid-1985, the number of longwalls climbs to 118 faces, of which nearly 110 were equipped with shield roof supports.

Longwall mining continues to advance. Westmoreland Coal's Holton mine in Virginia programs the shearer to initiate shield movement as it travels along the face. In 1986, Joy and Dowty report that Mapco's (now Alliance Resource Partners) Mettiki mine in Maryland has set a longwall production of 322,403 tons in 22 days.

"Consol's underground productivity increased 75%, compared with 60% increase for the coal industry," Ralph Bailey, chairman of Conoco, the subsidiary through which Consolidation Coal Co. reports to du Pont. By the end of the decade, continuous miner sections are routinely reporting cut rates of more than 1,000 tons per shift.

Surface Mining Scales Up

The coal industry purchased and assembled a lot of draglines during the 1970s. In the 1980s, some of those surface mines encountered higher overburden and dragline re-handling was becoming an issue. Surface mines began using truck-shovel mining in pre-benching applications, while lignite mines with soft, sandy overburdens were successfully using BWEs and cross-pit spreaders.

In September 1986, Arch Minerals installed a BWE at the Captain mine in Illinois. The 700-ft machine was built on the revolving frame of an older BE stripping shovel. It works in tandem with the Marion 6360 supper shovel. Texas Utilities installed a massive cross-pit spreading system that became operational in 1986. Spanning 1,000 ft, the huge XPS system strips 4,000 cu yd per hour of overburden to access Texas lignite. The unit was built by Mannesmann Demag Corp. in Germany.

Most electric shovels have a 40-yd dipper capacity or less, but some have been

built with 60-yd dippers. Hydraulic excavators are becoming more prevalent. By 1987, the Dresser 301-M, a new electric shovel, can load 170-ton trucks. It is available with a 65-yd dipper.

Still other types of machines have been developed that employ the continuous cutting concept. Most of these have a transverse cutting drum, usually under the machine, that can cut and load coal within inches of the bottom and then top load it into haulers. Examples include the Easi-Miner, distributed by Bucyrus-Erie, and the surface miner manufactured by the German firm, Wirtgen GmbH.

Caterpillar Tractor Co., which was marketing the D11N dozer, became Caterpillar. The size and strength of dozers increase. Ripping mechanisms for dozers also improved. Hydraulic systems that impart a series of impulses to the dozer's ripper shank to make it function somewhat like a jack hammer were developed and thus enhancing the dozer's ability to fracture rock.

The size of the rolling stock continued to grow throughout the 1980s. A front-end loader survey in 1980 included names such as Caterpillar, Clark (Michigan), Dart, International and Marathon LeTourneau. Bucket capacities on the mining class loaders ranged from a 12.5-yd Cat 992C to a 24-yd Clark 675. Marathon LeTourneau had the 22-yd buckets for the L-800 and L-1200.

A report on haul trucks in the early 1980s lists, among others, the 100-ton Cat 777, 170-ton Euclid R-170E, a 3,500-hp, 350-ton Terex Titan (the caption explained it could haul uphill), a 200-ton Mark 200, a 200-ton Rimpull CW 200, and a 250-ton Wabco 3200 (2,475 hp).

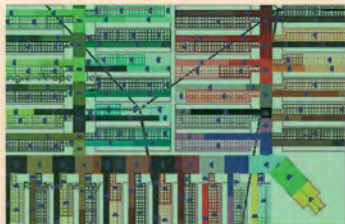
Blasting crews at the mines begin honing their skills. Mixtures of ANFO and emulsions of ANFO take the place of dynamite. In addition to improvements in blasting agents, the use of sequential blasting gained in popularity. Such blasting, timed to go off sequentially milliseconds apart, was used for casting overburden into the previous pit and on to spoil piles, as well as to improve fragmentation.

Drilling equipment also took advantage of new technology. To improve blast-hole drilling, drills acquire on-board control systems that consist of a micro-processor-based drill monitor that automatically zeros each new hole, provides the drill operator with a display of the depth and rate of penetration, prints an

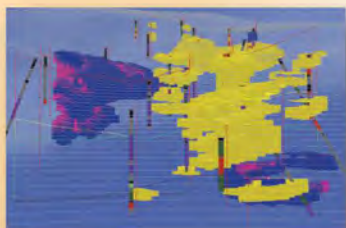
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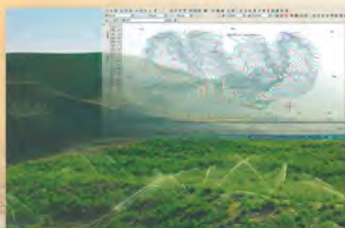
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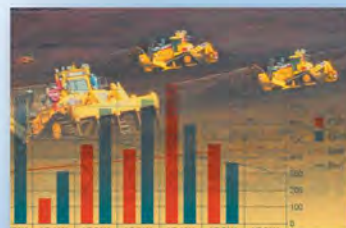


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on-board detailed log of operations, and a graph of penetration rate versus depth.

Due to the simple fact that surface mining is a far more productive method for coal extraction, it grows to more than 61% of total U.S. production by the end of the decade.

Prep Plants Invest in Fine Coal Recovery

The increase use of continuous miners and the need to liberate sulfur were creating more fines. Prep plant operators investigate more techniques, such as heavy-media cyclones and froth flotation to recover the finer coal sizes that were once discarded but are now salable.

Prep plants also begin to experiment with other forms of fine coal recovering, including filter presses, multi-deck screens (including Banana screens) and primitive spirals. In 1986, United Coal Co.'s research division, working with Diester Concentrator and Clint Hollingsworth (inventor), develop a production version of his new froth flotation concept, the Floataire cell. Column flotation becomes a reality. The first 8-ft dia x 15-ft high commercial cell capable of processing 20 ton per hour (tph) commenced operation June 23, 1986.

Traditional technologies improve as well. KHD Humboldt Wedag offers a 350 tph Romjg for separating coarse coals. Online analysis enters the coal prep lexicon and begins to assist blending operations to better meet specifications. By the end of the decade, more than 500 prep plants are listed in the *Coal Age* Prep Plant Census.

The UMWA Becomes More Organized

At the beginning of the decade, employment stands at roughly 250,000. Underground coal miners are the best paid industrial workers in the country, with an average hourly wage in 1985 of \$15.25. Steel workers made \$13.35 an hour and construction workers averaged \$12.26 an hour that year. Much of those gains came through collective bargaining.

As the decade begins, the coal industry is still recovering from the 111-day strike in 1978 when the UMWA and BCOA last negotiated terms of their agreement. In early 1980, Wildcat strikes are still occurring frequently in Appalachia. Sam Church Jr. has replaced Arnold Miller as head of the UMWA. Church moves quickly, according to *Coal Age*, to put the flagging union's house in order as it prepares for March 1981 negotiations when the current UMWA-

BCOA contract expires. Consol, which had withdrawn from the BCOA in May 1979, returns to the BCOA when Church describes a selective strike strategy.

Coalfield politics and bungled communications inside the UMWA helped turn 1981's critical coal negotiations into a long strike. The impact of the strike is not expected to be as bad as 1978, but it damages the UMWA's bargaining power. Despite promising signs in 1980 and 1981 of better UMWA leadership under Church, he ultimately fails. The result of this strike would

lead to selective bargaining by 1984. From a high of 70% in 1974, the UMWA grip on eastern coalfields slips to 49% in 1978 and 44% in 1981, and many believe it will slip further. The BCOA, according to *Coal Age*, had its act together much more so than during the 1978 collective bargaining session.

On March 31, 1981, UMWA rank-and-file votes down the proposed contract by a 2:1 margin. Consol's B.R. Brown warns that the UMWA rejection reflects a disturbing lack of bargaining discipline in the UMWA, which puts the integrity of the

Coal in the News

Negotiators Take a Determined Stand



It could be a long, hot summer for B.R. (Bobby) Brown and Richard L. Trumka.

Brown, chief negotiator for the Bituminous Coal Operators Association (BCOA), and Trumka, who heads the United Mine Workers of America's (UMW) negotiating team, will spend the next four months trying to iron out an agreement before the current labor contract expires Sept. 30.

Both the BCOA and the UMW come to the bargaining table in a weakened state that is much at odds with the strong, forceful rhetoric coming from their chief negotiators.

Trumka, president of the UMW, represents an organization saddled

with a 30% unemployment rate. Brown, chairman and chief executive officer of Consolidation Coal Co., represents an industry that is coming out of its worst year in 30 years and represents an organization, the BCOA, that is losing membership among coal companies that find it unresponsive to their needs.

Yet Trumka has vowed to accept "no backward steps, no take away contracts" and Brown is adamant about winning concessions in one form or another.

At the formal opening of negotiations, Trumka said there is a chance a strike will not be called this year because talks are beginning well before the contract expires and because the leadership of both the UMW and the BCOA has a better idea of what its membership wants than it did in past negotiations.

Yet both sides seem to be gearing up for a walkout. "We are in a situation now where if one side wants a strike, the other will give it," says one coal company official. Some coal producers have stepped up production

We cannot underwrite extravagant demands simply to buy labor peace.
— Brown

schedules to mine in nine months what they normally would mine in a year. Steam coal users are beginning to stockpile coal. And the UMW, with a membership that has a reputation for being strike-happy, is raising \$70 million to be used to support striking miners if a selective strike is called.

A veteran oil industry negotiator now negotiating his third coal pact, Brown has already conceded the possibility of a strike. "We cannot underwrite extravagant demands simply to buy labor peace," he says. "In order to compete in our domestic and world markets, the cost of labor must relate directly and unwaveringly to productivity."

continued on page 13

No rational arguments have been put forth that justify concessionary demands upon the union.
— Trumka

* *Coal Age*, June 1984

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Cecil Roberts, vice president of the United Mine Workers of America International (left) joins with Rev. Jessie Jackson (middle) and UMWA International President Richard Trumka during a rally supporting union miners striking the Pittston Coal Co. *Coal Age, June 1989

bargaining process in serious jeopardy. More than 160,000 UMWA miners are out of work.

In a sense, the strike is timely. The domestic economy is easing into a sluggish spell, with only modest gains expected in U.S. industrial production. Steel production is edging up, but electrical power generation is receding. The strike

continues into June and utilities, steel companies and manufacturers begin to feel the pinch.

The strike ends after 72 days when the UMWA ratifies a new contract. Church regains some credibility. B.R. Brown simply says the contract was good for the union. A \$3.60 per hour increase for all miners over the course of the contract

would increase wages for the highest paid miners to \$113.32 per day by 1984. The new contract restored the royalty on non-union coal and increased the payment from \$1.90 to \$2.23 per ton. The 45-day probationary period for red hats was eliminated and the miners received \$150 for returning to work.

The October 1981 agreement was a 40-month deal instead of the usual three-year contract. The next expiration date was October 1, 1984. Before the ink is dry, speculation begins to focus on Richard Trumka of District 4 as a potential candidate to replace Church.

Trumka does replace Church. In 1984, B.R. Brown is again directing the BCOA and Trumka is imposing new order within the UMWA. During September 1984, the two sides were able to reach agreement on a 40-month contract without a strike—an event that had not happened in 20 years.

The UMWA decides to selectively strike independent coal producers. A.T. Massey and National Mines Corp. are among some of the larger independents not covered under the agreement the UMWA signed with the BCOA. The contract dispute between Massey and the UMWA con-

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tinues for two years. One of A.T. Massey's subsidiaries (Omar Mining) signed with the union and raises the question as to whether that also binds the other subsidiaries.

In the meantime, women miners who had entered the workforce during the 1970s were seeking equal rights and more benefits, such as maternity leave. In an August 1986 article, "They Fought to Move In, Now They are Fighting to Move Up—Women Miners Dig Away at Discrimination," *Coal Age* talks about how coal companies were reluctant to hire women in the 1970s and in

contract negotiations in 1984, rank-and-file rebuffs concession and pushes for more opportunities. It's estimated that a strike of 75,000 workers in 1987-88 would deplete the \$47 million strike fund in less than a month. "Should we fail," said Trumka, "we will have walked away from our last best opportunity to do so. I can see a time when the union will have little if any strength at the bargaining table..."

Coal operators want the UMWA to accept more flexible hours, diesel equipment underground, and measures to contain medical costs. Trumka has expressed

reference to union members at all Island Creek operations, including leases and contractors. Roughly 75% of Island Creek's employees are UMWA members. Known as the 1987 Employment and Economic Security Pact, the agreement protects Island Creek for up to one year beyond the national deadline and reduces the royalty it paid into the UMWA pension fund by 77%, which was \$1.10 per ton to \$0.25. Many predict the BCOA will suffer because of the early agreement. Island Creek had discontinued its BCOA membership in 1984. B.R. Brown criticizes the agreement

“ Should we fail, we will have walked away from our last best opportunity to do so. I can see a time when the union will have little if any strength at the bargaining table...—Richard Trumka, president, UMWA ”

the 1980s they are even more reluctant to train and promote them.

At the end of 1986, with labor negotiations a little more than a year away from the January 31, 1988, deadline, Trumka takes a tough stance. Even though market conditions have deteriorated from the last

concerns about "double-breasting," the ownership of union and non-union mines by the same company. In a letter to rank-and-file he said the "upcoming fight could be long, arduous, and brutal."

In April, Trumka forges an agreement with Island Creek Coal that gives job pref-

signed by UMWA and Island Creek and other non-BCOA companies as "Band-Aids for serious problems."

A new National Bituminous Coal Wage Agreement was ratified by members of both the BCOA and the UMWA. The five-year agreement was approved by a 2:1

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margin by the UMWA. The agreement was reached January 30, 1988, one day before the expiration date of the old contract. The agreement contained a modest wage increase of \$1.05/hour over three years. For the first time, the new contract allowed union miners to “panel” to bituminous mines or facilities not yet covered by the UMWA contract. Another provision requires that 100% of all job openings at a signatory employer’s sub-contracted operations will go first to UMWA classified employee laid off from the signatory’s operations. The new agreement opens the door for heightened UMWA benefits.

During April 1989, UMWA pickets the Pittston Coal Group, after working without a contract for over one year. Pittston had opted out of the BCOA, and talks continue while miners remained on the job. More than 1,700 miners walk off the job. U.S. Secretary of Labor, Elizabeth Dole appoints Robert Usery as a “super-mediator” to settle the bitter strike. Both sides eventually settle on an agreement in March 1990.

After more than 40 years of separation, the UMWA rejoins the AFL-CIO. In mid-October 1989, Trumka and Lane Kirkland, president of the AFL-CIO, appeared

together in Washington, D.C., to make the announcement.

Regulations Increase

The industry is wrestling with the 1977 SMCRA laws. The DoI, under Congressional pressure, yields power to the states. Even at the middle of the decade, eight years after enactment, the National Coal Council is still challenging the legalities of SMCRA and OSM.

The Black Lung Trust Fund, set up under a 1977 federal law covering victims of coal miner’s pneumoconiosis (black lung), is \$400 million in debt. Self-insured coal companies that re-insure themselves against too many black lung cases are having policies canceled in the face of a flood of black lung cases. The Black Lung Trust Fund is financed by royalties; \$0.25/ton for surface mined coal and \$0.50/ton for underground coal, not to exceed 2% of the selling price.

Utilities are worried about complying with the New Source Performance Standard (NSPS). Scheduled to take effect in 1985, the revised NSPS established by the EPA in 1979 in accordance with the 1977 amended Clean Air Act, essentially place a priority on coal washing and

scrubbers for power plants. The regulations regarding sulfur emissions are of the most concern:

- SO₂ emissions averaging 1.2 lb SO₂ per million Btu averaged over a 30-day rolling period;
- A 90% SO₂ removal requirement for all coal down to a floor of 0.6 lb;
- A 70% SO₂ removal requirement for coal below the 0.6 lb per million Btu level; and
- Calculations include a credit for sulfur removal by coal washing or catching of the sulfur in the fly or bottom ash.

Coal Age devotes a whole section in the January 1981 edition debating coal characteristics nationally and the effectiveness of coal washing and scrubbing techniques. Reagan vetoes the \$18 billion CWA, but it becomes law in 1987.

In 1986, Henry Waxman (D-CA) proposed an acid rain bill that would reduce emissions by 5 million tons by 1993 and another 5 million tons by 1997.

In September 1987, Congress is under considerable pressure to complete action on Clean Air Act amendments by the end of the year. If the deadline is not extended, the EPA must ban new construction of sources of acid rain and halt

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UMW, Emery Dispute Over Safety at Mine Where 27 Died

The United Mine Workers of America (UMW) and Emery Mining Co. have locked horns on the relative safety of Emery's Wilberg mine, near Price, Utah, where 27 coal miners died in a fire that broke out Dec. 19, 1984.

The fire is believed to have started in the main entries, some 3,000 ft from the longwall face the section crew was mining.

The UMW, which represents Emery employees, has criticized the company for operating the mine with a poor ventilation plan and too few escapeways.

Emery has countered that the ventilation and roof control plans at the mine had been approved and the union had not complained about them until now.

The longwall face at the Wilberg mine worked off a two-entry panel development. Belt air went up the travel entry to sweep the face and the contaminated air was returned through the panel beltline.

"From what I saw, that plan should never have been approved," says UMW safety director Joe Main. "That plan should never have been submitted."

Main also complains that the two-entry system should never have been used for panel development. While the two-entry system is legal, Main says, "You shouldn't go by what the law says, go by what it takes." He points out that according to UMW figures, only nine of 2,000 underground mines use the two-entry system and fewer than 50 use the three-entry system. The only place the miners had to go, says Main, was back down the two entries.

Escape options for the section crew were limited. Cutting across to the Sixth Right section would have been impossible because two outtake entries were blocked by a fallen roof. Passage to the Eight Right section through bleedier entries also was blocked by fallen roof.

While the number of entries "is at the very top of our list of issues," says Main, "Wilberg goes a little beyond that." The UMW will be presenting evidence of other problems. Main alleges that the mine had a defective fire warning system and that a new communications network was full of

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Fireballs. In the days that followed closure of the Wilberg mine, pockets of combustible gasses ignited sending spectacular fireballs chuffing from the entrance portal.

Sole Survivor Lost Others in Smoke

Only one of the 28 workers in the Fifth Right section of Emery Coal Co.'s Wilberg mine survived the fire.

Kenneth C. Blake, a longwall general maintenance foreman, says he was in Fifth Right when he heard someone yell, "Fire in the intake!" He ran toward the fire to get a self-rescuer and to shut a power transformer as a signal to other miners of the emergency.

Some 60 miners in other areas of the mine made their way to safety.

"I only went about 300 feet from the face when I hit the smoke and couldn't see, so I felt my way," Blake recounted. He ran into two men in the smoke-filled mine and one of them handed him a self-rescuer. Blake said he worked his way to the power unit and shut down all the power in that area of the mine. "Follow me back to the belt-line," Blake told the two.

Blake told how the three of them reached the belt-line and then followed it back toward the section entrance by hanging onto the water pipeline above the conveyor. He told how when they got close enough to feel the heat from the fire, they ran into a large group of miners. He said they opened a stopping door into the

neutral section and felt intense heat so they closed the door.

"That is when I lost them [the group]," Blake said. He said they could have been close by but the visibility of less than two feet made it impossible to see them. Blake said he moved back past the next pillar and located another door in the next stopping wall. The door wasn't hot so he opened it and the lack of heat on the other side led him through the small opening and he began moving toward the section entrance again.

He said he soon reached the site of the fire. He couldn't see the flames, but he said, "I could hear the fire, feel the heat and hear the roof caving." Once again he backed out of the area.

He found another stopping door, opened it and went through. "I felt air on my face right away and started following it," he said. Soon, he said, he noticed less smoke down low and lay down on the floor and was able to see. There was a two-foot layer of clear air moving along the floor, he said.

"I could see the smoke coming around a corner up ahead," he said. "I realized I had gone around the fire and was on my way out."

* Coal Age, February 1985

the federal highway construction funds for offending cities. Congress fails to meet the deadline.

Mine Safety

In general, mine safety improved significantly in the U.S. Coal fatalities dropped below 100 to 70 in 1983. The number spikes to 125 in 1984, before falling to 68 in 1985. The U.S. Bureau of Mines works to improve safety for underground coal miners. New laws mandate self-contained self-rescuers (SCSRs) underground.

Despite the forward momentum, an April 1981 mine explosion killed 15 miners at Mid-Continent Resources in Redstone, Colo. The explosion is blamed on defective wiring on a shuttle car. Other ignitions and explosions occur taking the lives of miners. All of these tragedies are overshadowed by a fire at Emery's Wilberg mine near Price, Utah, which takes the lives of 27 miners on December 19, 1984. This would be the worst disaster in the U.S. since 26 people were killed in two methane gas explosions in 1976 at Scotia Coal Co.'s mine in Kentucky. The miners' remains were recovered in December 1985.

In April 1987, UP&L and Emery Mining were cited with 34 violations in connection with the Wilberg mine disaster. MSHA's preliminary report raised questions about the safety of using a two-entry development section for longwall panels. MSHA believed the fire resulted from a poorly maintained air compressor.

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An illustrated cover depicts online analysis and coal blending. *Coal Age June 1987

MSHA was under fire for what critics contend is the agency's inability to protect the lives of miners both in the field and through regulations. David Zegeer resigns as MSHA chief, a position he served since November 1983. UMWA welcomes the change. The affable Zegeer, according to *Coal Age*, had focused on working with mining companies where possible, trying to convert MSHA's role from adversary to counselor.

In December 1986, J. Davitt McAteer director of the Occupational Safety and Health Law Center, a private group, wrote to Labor Secretary William E. Brock proposing an advisory committee review upcoming regulations. Brock ordered MSHA Chief Alan McMillan to take whatever actions necessary. Following congressional hearings on Wilberg, MSHA continues to take heat from all sides.

Politics

In a nationwide energy address July 15, 1979, President Jimmy Carter proposed legislation that would require power plants to halve their oil and natural gas consumption by 1990 and force utilities to burn more coal. The legislation to be introduced as an amendment to the Power Plant and Industrial Fuel Use Act of 1978, is designed to reduce utility oil consumption by at least 750,000 barrels a day by 1990 and more in 1995.

Even though there were stark differences between President Carter and his opponent, presidential candidate Ronald Reagan, voters didn't see much of a difference when it came to energy matters. Ronald Reagan, like President Carter, believed the eventual deregulation of oil and natural gas prices would encourage domestic production. Similarly, the two also agreed the country would benefit from the increased use of coal and the safe use of nuclear power. The big difference was that Reagan believed the Carter

administration had gone too far with environmental regulations.

The UMWA joined forces with the NCA, BCOA and AMC offering the country a well-reasoned program aimed at increasing the use of coal to solve the national energy problems. While they claim they are working together, Wilkinson questions how long it will last. "The strike of 1977-78 certainly served little in the cause of using coal to resolve the energy crisis," Wilkinson wrote. "That strike and the rash of wildcat strikes that preceded it did much to demonstrate that coal could not be counted on, and that the leaders of the operators and unions were not businesslike or effective."

Reagan was elected and the coal industry was looking forward to him undoing a thicket of environmental regulations. The Clean Air Act, which was coming up for revision in 1981, would probably be weakened by Reagan.

Reagan took office in 1981. The Reagan administration faced many decisions affecting the coal industry following some last minute activity by the Carter administration regulators in a number of controversial areas. The EPA proposed new wastewater discharge regulations for existing and future coal mines and prep plants. The new regulations, mandated under the CWA, would strengthen discharge limits for solid material, iron and manganese.

A report to the new president by his Energy Department transition team urged him to repeal the 1978 Power Plant and Industrial Fuel Use Act, accelerate the rate of oil and natural gas price decontrol, and trim the Energy Department budget. Whether or not Reagan will make good on his campaign pledge to kill the Energy Department is called a "policy decision." After years of bureaucratic bickering between the DoE and DoI over the pace of energy development on federal lands, President Reagan is viewed as a leader capable of assembling a team to carry out a pro-production policy.

A Democratic victory in the 1986 mid-term elections gives them a solid majority in the Senate. Sen. Robert C. Byrd (D-WV) became the Senate majority leader. Byrd promotes clean coal technology and fights against acid rain legislation. Byrd urges low- and high-sulfur coal producers to remain united, opposing the acid rain issue.

Status quo best describes the outcome of the 1988 presidential elections. Coal

NCA Hotwire

Evidence impacts acid rain debate

by Richard Lawson


There is no question that acid rain will continue as a compelling and controversial issue for the coal industry in 1988. The battle lines are drawn, and control proponents are poised to make an election year assault in an attempt to achieve their agenda.

However, an important trend that began to develop in the second half of 1987

analyses of the emission data know, SO₂ emission between 1980 and 1985 declined sharply in the face of a 23% increase in coal use. Emissions between 1985 and 1986 declined by an even greater amount—448,000 tons—than the total decline between 1980 and 1985 (418,000 tons). While part of the 1986

880,000 tons.

A comparison of emissions in the first half of 1986 with the first half of 1987 shows that this continues to be the case. Over this comparison period, emissions in the border regions declined by 119,000 tons. And this reduction in both SO₂ emissions and the emission rate occurred



*Coal Age February 1988



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For six years, starting in 1984, readers nominated individuals for the Coal Age Award.

industry officials claim to be cautiously optimistic for the future of the industry under President George H.W. Bush. Bush built his platform on a strong energy policy and clean air, while backing clean coal technologies. Sen. Majority Leader Robert C. Byrd

retired from the leadership position in November and passed the gavel to George Mitchell (D-Maine).

Clean air legislation moved closer to reality when President Bush announced his own emissions reduction plans. Although perhaps a dozen other bills would be introduced, Bush's plan, which called for a 10-million ton SO₂ reduction and a 2 million ton drop in NO_x, serves as baseline for future legislation. The coal industry has two choices: it can either jump in front of it and attempt to stop momentum, while risking getting run over, or it can place guides and pathways that will steer the measure into a workable bill.

Mining Associations Roll with the Times

In the early 1980s, there were three national mining lobbies: the National Coal Association (NCA), the American Mining Congress (AMC) and the Mining and Reclamation Council of America (MARC). MARC was established in 1977 following passage of SMCRA and courts small- and medium-size operators with less expensive membership packages. Carl Bagge is still president of the NCA and companies are beginning to question the value of NCA membership. In May 1980, AMAX, the nation's third largest coal producer, withdraws citing a \$350,000 membership fee. Texas Utilities made a similar move when faced with a \$90,000 fee. MARC soon merges with the NCA.

In August 1987, representatives from the NCA and the AMC hold an exploratory session to consider a merger. Unlike the 300-member NCA, AMC's 600 members come from a broad range of industries—from all types—manufacturing to banking. Both groups were rated by the *National Journal* as among the worst trade associations on Capitol Hill because of their large size, which makes deal-making and resolution reaching far more difficult.

In 1987, the NCA announced a new president, retired four-star Air Force General Richard L. Lawson. He takes the helm at a critical point in the NCA's history. Lawson comes to the association

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with strong Congressional experience, which the group will need as it prepares to debate issues such as trade, clean air legislation and budgets.

During the 1980s, a series of annual division meetings and expositions were rationalized to form MINExpo INTERNATIONAL. The AMC Coal Division held a successful Coal Expo during May 1980 at Chicago's McCormick Place. More than 400 exhibited and attendance was strong. AMC's International Mining Show attracted 650 exhibitors in 1984. Exhibits dip back to 450 for the October 1986 AMC International Mining Show in Las Vegas, Nev. The difference was attributed to a decline in the hardrock mining business and over-capacity within the coal industry. In 1987, Cincinnati hosts the annual convention of the AMC coal division. Sen. Dan Quayle is the keynote speaker. Hugh Lucas, vice president of Mining at AEP, presents a paper on the Superwall at Mieg's No. 2 mine. The AMC eliminates the distinction between coal and hardrock mining shows and decides to sponsor international expositions in 1988, 1992, and every subsequent four years. MINExpo INTERNATIONAL begins. AMC's MINExpo 1988 is scheduled for April 24-28 in Chicago, Ill.

Who's Who

By the mid-1980s, the U.S. economy is in terrible condition. The nation's economy is stagnant. The mines are not producing coal at the level they were designed for. Many coal companies that overpaid for properties during the energy-short 1970s are being squeezed by customers and low-cost competitors. Something would have to give. Either wages would fall or com-

panies would go out of business or maybe both. The country's top coal companies were reporting flat earnings with strong performers not doing as well as previous years. Volume was low, prices were low, and the industry was ripe for rationalization or consolidation.

Peabody was already implementing productivity improvements, cutting administrative staff by 15%, and trying to improve operating costs. The company believed that low prices would continue throughout the rest of the decade.

Consol Chairman B.R. Brown believed the outlook to be brighter. He thought production would exceed 900 million tpy. He cited two important points: a growing U.S. economy and the efforts to build stockpiles in anticipation of the 1988 labor negotiations with the UMWA.

A committed Consol increased its reserve base while others left the business. Broken Hill Proprietary (BHP) sold its Sierra Coal to Consol for \$49 million. Sierra had 300 million tons in eastern Kentucky and West Virginia. Inland Steel Co. sold its three remaining mines to Consol. The deal includes the Sesser and McLeansboro mines in Illinois and a third property near Marshall, Ill.

A dramatic shakeout begins to take place in Appalachia. Peabody acquires Eastern Associated Coal Corp. (EACC). Eastern Gas & Fuel Associates swapped its coal properties for a 15% interest in Peabody Holding Co. The properties include 800 million tons of reserves in West Virginia. The second largest coal producer in West Virginia behind Consolidation Coal Co., EACC produces 8 million tpy.

Peabody made its first move into West Virginia in 1984 when it acquired Armco Steel's coal properties. The EACC assets amounted to 10 active mines in West Virginia and an inactive Powderhorn Coal near Grand Junction, Colo. Eastern becomes one of five Peabody stockholders. Prior to the deal, Newmont Mining owned 61.5%, Boeing and Bechtel (16.75% each), and Equitable Life Insurance Society (5%).



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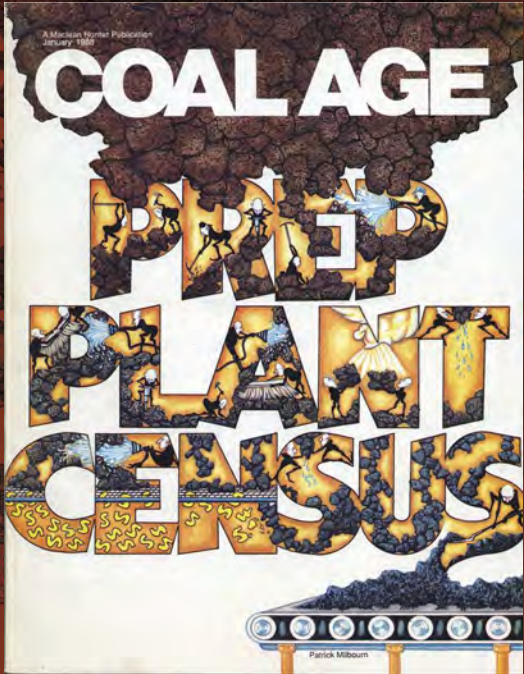
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The last *Coal Age*, January 1988 becomes...

COAL AGE and COAL MINING join forces

This issue of *COAL* represents the merger of the two premier coal publications in North America—*COAL AGE* and *COAL MINING*. Welcome into the first issue.

Business mergers have become commonplace in America, and this one offers all the opportunities and pitfalls that most do. Rest assured that the editors are striving to exploit all of the opportunities.

The merger allows us to bolster both depth and breadth of industry coverage. While this first issue primarily includes contributions from familiar *COAL AGE* and *COAL MINING* editors and contributors, you will see Art Sanda's byline in later issues. Art is now covering the Appalachian coal fields. Other planned staff additions will bring more experience and fresh ideas to *COAL*.

The unified publication offers another big plus: We will waste less of your time. Because a single editorial staff can focus more precisely on important topics, our reports will be more concise.

Objectives remain the same

Our editorial policy continues to emphasize two types of information. First, we are dedicated to keeping you up-to-date on significant changes in techniques to mine and process coal and to get your product to market. We cover most mining and processing techniques in feature articles and technical departments.

Second, we must provide information that will help you make decisions to ensure survival and profitability of your business. Such information generally falls into the news departments.

Guidelines that editors follow also remain little changed.

Editors must be objective and are encouraged to be positive in reporting. It's our job to report problems in the industry, but our emphasis should be on solutions. There most often are countless ways to do something wrong, but only a couple of ways to do something right. We are looking for the right ways.

Editors do not take a partisan approach. Government has a big impact on coal, but we won't take sides with political parties or particular bureaucrats. The editorial opinion pages do state specific views, but the views are not aligned to support political factions.

Editors should not speak solely for a segment of the industry. The coal industry consists of a diverse group of companies—big and small, eastern and western, energy conglomerate and independent coal producer. Each has vested interests and unique problems. We will promote our own vested interest—a thriving coal industry.

It's your magazine

We welcome your comments and suggestions for changing the magazine to better fit your needs, and we encourage you to call with leads on stories that you think we should cover. If you have ideas that you want to publish, we consider technical articles, and we welcome letters to be published.

We're all in this industry together. □

**COAL*, February 1988



The first *COAL*, February 1988.

Arch Minerals Corp. offered \$135 million Diamond Shamrock Coal. The deal falls through before being accepted in May of the following year. The transaction included more than 700 million tons of reserves. Many were surprised about the low price. Diamond Shamrock was selling 7 million tpy at the time. Arch Minerals was jointly owned (50:50) by the Hunt Brothers and Ashland Oil.

Shell Oil and Fluor Corp. announced plans to split A.T. Massey. The nation's fifth largest coal company has been operated as a 50:50 joint venture since 1980. Under the agreement, Shell would get Marrowbone, Wolf Creek and Pike County Resource Groups, along with Massey's Atlantic Coast coal terminals in Newport News, Va., and Charleston, S.C. Massey's Richmond headquarters and other mines (Martin County Coal, Sidney Coal, Rawl, etc.) would go to Fluor. In 1986, the mines going to Fluor produced 18.8 million tons.

Times were tough for Island Creek Coal, but the company did make some giant strides from the difficulties of 1984, when it lost \$40.3 million. "Last year's progress doesn't provide any guarantees for the future because coal prices will remain depressed and the industry will stay brutally competitive for the foreseeable future," said Bud Ogden, Island Creek's chairman.

Quintana Minerals, formerly Robertson Coal Co., bought 500,000 acres of land in West Virginia containing 1 billion tons of coal from CSX. Coal no longer fits with company's strategic plans. Virginia Power sold Laurel Run to Island Creek. Pittston acquired Paramount Coal in Wise, Va. The assets include four surface mines and four underground mines that produced 1.2 million tons.

In October 1986, U.S. Steel laid off 545 in southern West Virginia. At the end of 1986, U.S. Steel shut Alpheus Operations,

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Following presentation of the annual *Coal Age* award, recipient Sen. Robert C. Byrd (D-W.Va.) received congratulatory words. Pictured are (from left to right) COAL editor Paul C. Merritt, Byrd, National Coal Association President Richard C. Lawson and COAL publisher Robert Lick. **Coal Age*, February 1989

Worldwide Events

During the 1980s, world coal production grows to 3.1 billion mt. China sets its sights on 1.2 billion tons by 2000. It has already emerged as one of the world's leading coal producers with an annual output of about 850 million mt RoM coal, but has not yet become a factor in international coal trade.

Sir Robert Haslam took over as chairman for British Coal, which is undergoing a massive restructuring. He succeeds Sir Ian McGregor. Haslam said he expects more mine closures and voluntary layoffs. McGregor's program of layoffs and mine closures trimmed BC's losses from £485 million in 1983-84 to £50 million in 1985-86. Haslam takes over at a period when price concessions from British utilities were forcing BC to lose another £400 million in revenue.

Australia, Canada and Colombia begin to export more coal. Drummond Coal begins to invest in Colombian coal mining operations. Exxon buys Colombia's Carbocol and begins to launch El Cerejon. The Kooragang coal terminal opens in Newcastle, New South Wales, Australia. It has a 50 million mt capacity. Canada's production grows to 60 million tpy. Possible sanctions against South Africa

dismissing 1,000 workers. (Gray, W.Va.). Five underground mines and a prep plant, which it opened in 1902. The mine, which produced low vol met coal for USX

plants in Gary and Clairton, Pa., was supplanted by USX mines in Alabama.

The M&A activity would continue into the 1990s.



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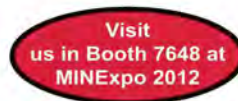


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could open European coal markets for the U.S. and other exporters. Demand for coal in Asia is expected to grow considerably through 2000.

Coal Age's Demise

During the autumn of 1987, Harold W. "Terry" McGraw, the 38-year-old heir apparent and son of the chairman emeritus, Harold W. McGraw Jr., decided to take McGraw-Hill Publishing Co. in a new direction. Except for a couple architectural, aviation and electronics publications, and *Engineering News Record*, he sells many industrial trade journals, including *Coal Age* and *E&MJ*. The McGraw-Hill mining publications group had been losing money since 1984. Advertising revenue had declined. McGraw-Hill had showed considerable patience with the mining publications before giving up on them. One of the problems was costs and the overhead for operating a business in Manhattan was high. The Maclean Hunter titles were headquartered in Chicago, which was more reasonable.

Few readers probably noticed that, in the upper left-hand corner of the magazine's January 1988 edition, the mast had changed from McGraw-Hill to Maclean

Hunter. A letter from Publishing Director Robert Lick explained that, on December 10, 1987, Maclean Hunter Publishing Co., the Chicago-based subsidiary of Canada's leading publishing company, acquired *Coal Age* from McGraw-Hill. Also included in the sale were *E&MJ* and McGraw-Hill Mining Information Services, which published the *Keystone Coal Industry Manual* and other mining-related directories.

The acquisition made Maclean Hunter's Mining & Construction Group the largest combined force for mining trade journals. The 75-year-old *Coal Age* had been acquired by its 25-year-old rival, *Coal Mining*, which was launched in 1964 as *Coal Mining & Processing*. The Maclean Hunter crowd took pride in the fact that it was reaching a different audience than *Coal Age*. It targeted middle managers with controlled circulation (free distribution) while *Coal Age* was serving the entire market. Readers paid for subscriptions to *Coal Age*. The Mining & Construction Group had already launched two successful trade shows, Coal Prep and Longwall USA. Both of which targeted niche audiences and still exist today.

Moving forward the plan would be to merge *Coal Age* with *Coal Mining*. The new

title would be called *COAL*. Combining the strengths of the two predecessor magazines, Lick believed *COAL* provided coal men and women with the information they needed to know to operate effectively and profitably. In the next edition, February 1988, Joseph F. Wilkinson was replaced by Mark Sprouls as editor. Sprouls was editor of *Coal Mining* and had recently taken over from Eugene Guccione. Prior to him, Don C. Jones served as editor. George Lindsay founded the publication in 1964 and served as the original editor. Former *Coal Age* Managing Editor Paul C. Merritt remained with the publication as a consulting editor for a few years before moving into retirement. Former Eastern Gas spokesperson Arthur P. Sanda appears on the masthead as eastern field editor. Russell A. Carter was the western field editor with *Coal Mining* and remains in that position today.

In 1989, Merritt replaces Sprouls and a *Coal Age* editor emerges to take over the title. He pens several editorial columns and the magazine continues to offer dignitaries the "Coal Age" award in 1988 and 1989. A new trade journal, *COAL*, would now cover the coal business as it entered one of its most transformative periods.



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The 1990s: Market Shifts Bring About Massive Consolidation

1990-1999



Building on the momentum of a fourth consecutive year of record coal production, the U.S. coal industry mined 1.029 billion tons in 1990, a 56 million ton increase over 1989. Most of the increase in coal production occurred east of the Mississippi, where coal production reached a record level of 635 million tons, 36 million tons more than the previous year. The West set a record as well with 401 million tons, a 20 million ton increase.

The impending implementations of the Clean Air Act Amendments of 1990 (CAAA) and utility deregulation have already created a shift in coal demand and production. Wyoming mines were ramping up production and by 1992, coal production totaled 190 million tons per year (tpy). Wyoming has been the leading coal producing state for five consecutive years, and Powder River Basin (PRB) coal has energized this climb.

Coal prices continue to decline. Electric utilities paid on average \$28.60/ton of coal in 1993, which was down from \$29.36/ton in 1992. Since 1985, when utility coal averaged \$34.53/ton, prices have pretty much edged downward every year. Coking coal prices, which averaged \$54.30/ton in 1985, now stand at \$47.44.

By the Autumn of 1994, the electric power industry is undergoing major structural changes initiated by retail wheeling in California that is reshaping traditional roles, creating opportunities for new participants, and redefining the scope and character of government regulations. Emerging from these changes is a less-tightly integrated, more diversified and above all, more competitive industry. Coal suppliers will come under growing pressure to renegotiate contracts. Utilities with long-term contracts above prevailing prices will be under strong economic pressure to either buy-down or write-down the uneconomic portion of those contracts. The transition costs are

referred to as “stranded investments.” The experience of the North American gas industry in the 1980s serves as a sobering reminder.

By mid-1995, the ILB begins to shrink. Typically, the ILB produced 130 million tpy (60 million tpy in Illinois, 40 million tpy in western Kentucky, and 30 million tpy in Indiana). Between the CAAA of 1990 and the UMWA-BCOA strike of 1993, the region took a significant hit. Nearly 13 million tons of western coal and 7 million tons of eastern coal moved into the ILB, while utility purchases as a whole declined by 2 million tons. The ILB lost 22 million tons before Phase I arrives.

Mergers and acquisitions among coal transporters create economies of scale, eliminating multi-line hauls and overhead, and extending the reach for coal transporters. Some of the rail M&A activity includes: Atchison Topeka Santa-Fe-Burlington Northern, Denver Rio Grande Western-Southern Pacific, and Union Pacific-Chicago & North Western. Eventually, the U.S. has two rail carriers, Burlington Northern-Santa Fe (BNSF) and Union Pacific (UP) moving coal east. They begin to experience delays moving massive amounts of coal from one small loca-

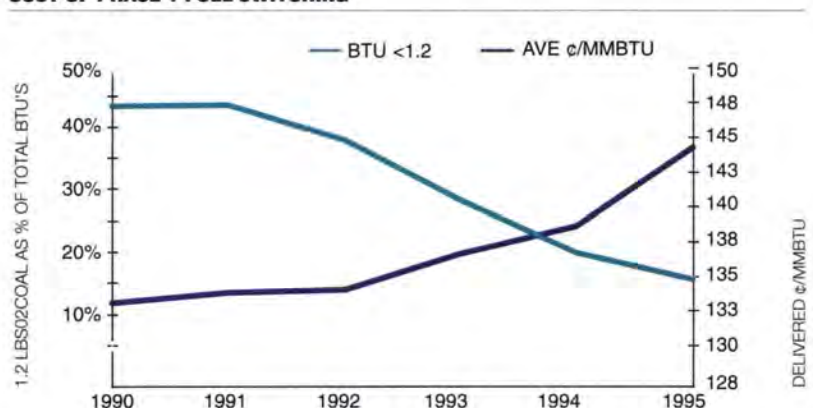
tion in the West, Campbell County, Wyoming, and it's only going to get worse.

By 1996, PRB production is expected to grow to 320 million tpy by 2000 and 360 million tpy by 2005. PRB production increases since 1990 have been startling—growing from 200 million tpy to 285 million tpy by 1995. Even more surprising is that 40 million tpy of new production can be attributed to expanded output at three mines: Powder River Coal's North Antelope and Rochelle mines, and Kerr McGee's Jacobs Ranch operation. Several other mines in the area also increased production by 3 million to 8 million tpy.

Analysts report that, contrary to the belief, environmental compliance is not the only factor driving PRB demand, price is a factor too. Utilities have found that the derate for burning an 8,800 Btu/lb coal was easily overcome by its pricing.

Toward the end of the decade, coal futures contracts are being developed for possible listing on the New York Mercantile Exchange (NYMEX). NYMEX has established a strong track record with futures and options contracts for other energy commodities including crude oil, refined petroleum products, natural gas and electric power. The planned intro-

COST OF PHASE 1 FUEL SWITCHING



*Coal Age, October 1997

Coal Statistics: 1990-1999

Year	Employment	Fatalities	UG (tons)	Surface (tons)	East	West	Total
1990	168,625	66	425	605	630	399	1,029
1991	158,677	61	407	589	591	405	996
1992	153,128	55	407	590	589	409	998
1993	144,183	47	351	594	516	429	945
1994	143,645	45	399	634	566	467	1,034
1995	132,111	47	396	637	544	489	1,033
1996	126,451	39	410	654	564	500	1,064
1997	126,429	30	421	669	579	511	1,090
1998	122,083	29	418	700	571	547	1,118
1999	114,489	35	391	709	529	571	1,100

duction of coal futures trading is a response to structural changes in coal and power markets that are expected to increase exposure to price volatility and stimulate demand for price risk management services. For coal buyers and sellers, the contracts offer protection against adverse price swings and serve as benchmarks for price indexing in term supply contracts.

By mid-1998, U.S. coal production is expected to hit record levels in each of the next three years rising to 1.14 billion tons in 2000. Coal's share of utility generation is at a high of 57.2% in 1997. That level is expected to remain flat as natural gas increases its share and nuclear pulls back.

Mine Safety Improves Dramatically in the 1990s

During July 1990, MSHA levies the largest fine to date for a single coal mining accident (\$507,996) against Pyro Mining, a subsidiary of Costain Coal, as a result of the September 13, 1989, methane explosion that killed 10 employees at its William Station mine in Kentucky. Three coal company executives would eventually be sentenced to prison for the explosion in July 1996. The longest sentence imposed (18 months) was for the general superintendent.

In an effort to attain his goal of zero fatalities by the year 2000, Assistant Secretary of Labor for Mine Safety and Health, William J. Tattersall, makes a concentrated effort to address the problem where it is most prevalent—the Appalachian region.

The U.S. Bureau of Mines has also focused its efforts on improving safety and productivity. Multiple research projects are ongoing, including pre-driven longwall recovery rooms, ground support, ventilation, detonator testing, dust control, horizon control, fine coal processing, diesel engine testing, etc.

During the spring of 1991, a wide spread dust scandal rocks the U.S. coal industry. More than 500 coal operators face nearly \$5 million in fines as a result of the Department of Labor citations for tampering with dust samples. The coal industry largely rejected the charges, which revolved around the abnormal white centers (AWC) on the filter media. At a Washington, D.C., press conference Labor Secretary Lynn Martin proposed a civil penalty of \$1,000 for each violation and said she would vigorously pursue criminal investigations related to tampering with dust samples. As Martin spoke, an assistant demonstrated three different methods for falsifying the samples. The U.S. Department of Labor requires the use of tamper-resistant sampling cassettes to help ensure the integrity of mandatory dust sampling.

On July 20, 1993, the Federal Mine Safety and Health Commission issued a decision in the AWC case. The decision concluded the Labor Secretary had failed to carry the burden of proving by preponderance of the evidence that AWC on a cited filter establishes that the mine operator intentionally altered the weight of the filter. The decision represents a major victory for the accused companies that have for

more than two years litigated and refused to acquiesce in the Secretary's allegations of tampering.

Coal-related fatalities drop to new lows during the decade. Mining fatalities in coal fall to a record low of 45 in 1994, 39 in 1996 and 29 in 1998.

Environmental Regulations

At the end of the 1980s, the Bush administration established a new concept for controlling emission rates by caps and credits, breaking away from the old command-and-control approach. Under this scheme, utilities are granted allowances or credits according to an elaborate formula that takes into account the average sulfur emissions during a three-year period from 1985 through 1987. This creates a nationwide bank of tradable credits whose value will be a function of the value of removing 1 ton of SO₂ per year.

The CAAA mandates a 10-million-ton cut in SO₂ emissions, but allows leeway for emissions trading to reach the goal. The economics of installing scrubbers against that of using low-sulfur compliance coal will largely depend on the details of the emissions trading rules.

The first phase effects 111 coal-fired power plants in 21 states, but concentrated mostly in the Midwest. They must cut their emissions by 1995. The law provides an extension for those that decide to build scrubbers. The second phase of the law mandates emissions reductions by 200 power plants by 2000. The law requires that NO_x be cut by 2 million tpy to be phased in after 1995.

In 1990, the terms global warming and carbon tax also emerge. Coal leaders applaud President Clinton's climate action plan at the end of 1993. The Clinton administration's Climate Change Action Plan relies primarily on voluntary steps to reduce greenhouse gas emissions. Instead of calling for regulatory or legislative actions, the Clinton global warming plan establishes 50 programs including supply options and demand reduction efforts by which businesses can cooperate on emission reductions.

1990 Coal Production by State (Thousand Short Tons)

Region and State	January-December
Bituminous Coal¹ and Lignite	
East of the Mississippi	631,502
Alabama	29,114
Illinois	60,321
Indiana	37,798
Kentucky	170,793
Kentucky, Eastern	125,857
Kentucky, Western	44,936
Maryland	3,305
Ohio	35,161
Pennsylvania Bituminous	70,728
Tennessee	6,644
Virginia	50,013
West Virginia	167,625
West of the Mississippi	401,232
Alaska	1,400
Arizona	11,240
Arkansas	33
California	58
Colorado	19,238
Iowa	382
Kansas	903
Louisiana	3,203
Missouri	2,682
Montana	37,023
New Mexico	23,701
North Dakota	29,844
Oklahoma	1,913
Texas	56,541
Utah	22,194
Washington	5,114
Wyoming	185,762
Bituminous¹ and Lignite Total	1,032,734
Pennsylvania Anthracite	3,121
U.S. Total	1,035,855

¹Includes subbituminous coal.

Note: Totals may not equal sum of components due to independent rounding.

Sources: Association of American Railroads, Transportation Division, Weekly Statement CS-54A; Energy Information Administration, Form EIA-6, "Coal Distribution Report"; Form EIA-7A, "Coal Production Report"; and State mining agency coal production reports.

*COAL, March 1991

During mid-1995, clashes over environmental policy take place in the context of a federal budget plan after the Republicans take control of Congress. The Congressional strategy for sweeping reductions in federal environmental programs, aimed at the bipartisan goal of balancing the federal budget, draw fire from Clinton and Interior Secretary Bruce Babbitt. Two measures supported by the mining industry include amendments to the Clean Water Act (CWA) and a 35% cut in the Office of Surface Mining (OSM) budgets.

As the decade closes a major battle erupts in Central Appalachia over mountaintop mining. A Chief U.S. District Judge prohibits the West Virginia Department of Environmental Protection from issuing permits. Having rock and dirt classified as waste changes the interpretation of Surface Mining Control and Reclamation Act (SMCRA) and the CWA.

Government & Policymakers

In November 1992, the Bush administration's National Energy Strategy and key aid to the coal industry passes Congress. Crucial sections of the bill affecting the coal industry will institute an advanced clean coal technology research, development and demonstration program. Among the most controversial sections of the bill was one that will fund healthcare benefits for some union coal miners covered by insolvent trusts. Health benefits would be paid in part by surplus trusts and from Abandoned Mine Land fees.

The bill's section on global climate change represented a victory for the coal industry. Environmental activists' effort to mandate a strict global warming policy was turned back. The bill called for a voluntary inventory of greenhouse gasses.

William J. Clinton wins the 1992 presidential election. President Clinton's running mate and now vice president, Al Gore, is an environmental activist of the first order. President Clinton appoints Carol Browner as EPA chief. She led Florida's Department of Environmental Protection and received an immediate endorsement from the Sierra Club. Clinton nominates Robert Reich as Labor Secretary. He appoints Hazel O'Leary Energy Secretary, the first and only African-American female to hold that position.

President Clinton proposes a Btu tax beginning July 1, 1994, to be phased in by

one-third increments over three years. The tax is intended to raise more than \$22 billion. The national Coal Association (NCA) estimates the tax would cost 600,000 jobs and a \$170 billion loss in gross domestic product.

President Clinton nominates Davitt McAteer as assistant secretary of labor for mine safety and health. Clinton praised McAteer saying his important work in mine safety will assist him as he works to ensure the safety of our country's mine workers. McAteer's strong feelings about mine safety and health enforcement have been manifested over the years in litigation he has brought on behalf of miners effected by black lung and other safety and health issues.

McAteer has a long record of activism stretching back to the 1970s. He worked for the UMWA from 1972 to 1976. Since then, he has been a principal in the Mining Project of the Center for Law and Social Policy and is executive director of the Occupational Safety and Health Law Center.

McAteer's perspective on mine safety law and his sometimes bitter criticism of mining companies is reflected in his articles in the West Virginia Law Review. In 1981, McAteer wrote, "the harsh fact is that many mine owners and manager still cling to the notion that accidents are caused primarily not by working conditions but by workers."

During February 1995, the American Mining Congress (AMC) and the NCA announce a merger. The NCA and the AMC officially merge to form the National Mining Association (NMA). The NMA's mission will be to create and maintain a broad base of political support in Congress, the administration and the public. In doing so, as a secondary goal, to help the country and the world realize the full promise and potential of the natural resources derived from America's mining industry, may be realized. The new association will be based in Washington, D.C., and will be headed by Richard L. Lawson, who will serve as the NMA president and CEO. He has been the president of the NCA for eight years. The 381 members of the NMA include coal and hard rock mining operators, mineral processors, transporters, equipment manufacturers, financiers and engineering firms.

During the 1994 mid-term elections, Republicans take control of both houses in Congress. Clinton's proposed initiatives become irrelevant with the congressional agenda being set by the Republican leader-

ship. Three federal agencies, the U.S. Bureau of Mines (BoM), the U.S. Geological Survey and the National Biological Survey, are targeted for elimination by the Republican "Contract with America."



The U.S. Bureau of Mines is targeted for elimination by the Republican "Contract with America." *COAL, October 1995

In mid-June, the House Interior Appropriations Subcommittee gave voice approval to a draft of the 1996 Interior Department budget appropriations bill, in which the BoM is eliminated. The subcommittee cut the current spending by \$1.4 bil-

lion bringing the appropriations down to \$11.9 billion. The subcommittee earmarked \$67 million in closing costs for BoM functions. The legislation abolishes a relatively small federal agency that played a huge role in protecting and improving the lives of the nation's miners. Certain health and safety functions of the BoM were transferred to the DoE Fossil Fuels Division, including the Pittsburgh Research Center. Roughly 1,200 mining-related scientists were released just before 1995 holiday season.

More budget battles during October 1995 hit OSM hard, MSHA and DoE survive with wounds.

U.S. Producers Consolidate as Oil Companies Exit

The 1990s open with Hanson Industries, a British industrial conglomerate, making an offer to buy interests in Peabody Holdings from Eastern, Boeing and Bechtel for \$504 million, which would give it the 45% of the company not held by Newmont Mining. Hanson already owns 49% of Newmont, so it would effectively control 70% of Peabody Holdings. Later in the year, Hanson sweet-

ens the deal to more than \$1.2 billion by purchasing Newmont's remaining stake in Peabody for \$725 million. Peabody, the largest U.S. coal producer will now be held by a foreign concern.

Hanson has a reputation for taking over companies and breaking them up profitably and the transaction stirred speculation that Peabody, which was producing 87 million tons at the time, would face an uncertain future. In November 1990, Hanson cut 275 salaried positions at Peabody.

At the same time, BP America sold Old Ben Coal Co. and other U.S. coal properties to Zeigler. In many respects, Old Ben and Zeigler were a lot alike. Both are old-line coal companies whose origins date back to the turn of the century. Both made Illinois their main base of operations. Both have mines represented by the UMWA. There were also some differences. Old Ben adopted longwall mining early and Zeigler preferred room-and-pillar mining, Zeigler was producing 4 million tpy and Old Ben was producing 12 million tpy. No purchase price was disclosed.

In August 1990, Arch Minerals made an offer to buy Blue Diamond Coal. Although



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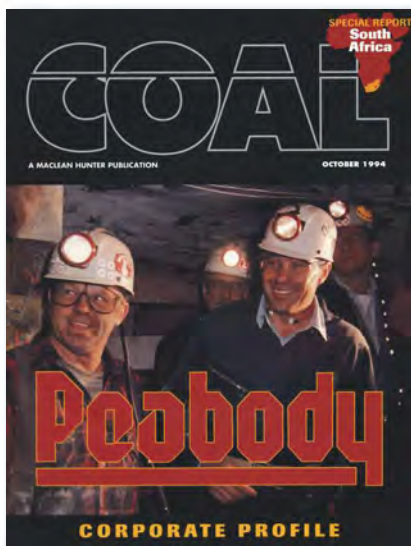


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* COAL, October 1994



* Coal Age, December 1997



* Coal Age, November 1998

the price is not disclosed, analysts estimate the deal to be worth about \$200 million. The move gives Arch Minerals access to operations and reserves in eastern Kentucky and several high-value coal export contracts.

Already a major low-sulfur coal supplier in the West, Amax Coal Industries strengthened its position as a low-sulfur supplier in the East by paying \$100 million for Cannelton Holding Co. and its sizable reserves in West Virginia. Amax is the third largest coal producer and shipped 44 million tons in 1990. Cannelton, a subsidiary of Algoma Steel, operates four divisions, which include surface and underground mines. Of its 138 million ton reserves, 100 million is believed to be low sulfur.

Ashland Coal purchases United Co.'s Dal-Tex Coal Corp., which has extensive low-sulfur reserves in West Virginia, for \$250 million.

During June 1992, Alabama's largest coal mining company, Jim Walter Resources, terminates 720 jobs. Officials cite a weak world economy and poor coal sales for the loss of one quarter of its workforce at four mines. In August of that year, Zeigler buys Shell Mining making it the fourth largest coal company.

In March 1993, Hanson Industries traded gold assets to Santa Fe Pacific Minerals Corp. for a couple of coal and quarry assets. Hanson picks up the Lee Ranch mine and 700 million tons of reserves and places the quarries under its aggregate division. The transaction is valued at \$150 million. Lee Ranch, a surface mine that began mining in 1984, produced 4.1 million tpy of coal under a long-term contract for southwestern utilities.

Kennecott Energy made two major acquisitions in March 1993. It purchases Nerco for approximately \$470 million and Sun Co.'s Cordero mining complex for \$120.5 million. Nerco operates the Antelope and Spring Creek mines, and holds a 50% interest in the Decker mine. Nerco has 639 million tons of reserves and produces 18.3 million tons. Cordero produces 17 million tons and reserves of 385 million.

In April 1993, Consolidation Coal acquired Island Creek Coal from Occidental Petroleum. In 1992, Consol produced more than 56 million tons and Island Creek produced about 16 million tons.

Amax Coal Industries merged with Cyprus Minerals in July 1993 to form Cyprus Amax, and in November 1993, Pittston acquired five Addington subsidiaries. The \$157 million deal included

four eastern Kentucky mines that were producing about 3 million tons annually.

In June 1994, Kennecott purchased Colowyo Coal from W.R. Grace & Co. for \$253 million. The move increases Kennecott's coal reserves to more than 1 billion tons. The Colowyo mine in Colorado produced 4 million tpy and would increase Kennecott's total production to more than 40 million tpy.

Peabody Holding purchased Carter Mining Co. from Exxon Coal USA in September 1994. The sales price was not disclosed. Carter Mining operated the Rawhide and Caballo mines in the PRB. Both mines produced 25 million tons in 1993.

Ashland Oil acquired a majority of the stock in Ashland Coal in January 1995 and speculation of a merger between Ashland Coal and Arch Minerals begins. Ashland Oil owns 50% of Arch Minerals.

In February 1996, Zeigler subsidiary Triton Coal launched the North Rochelle mine.

After transferring the ownership of several of its Virginia Division operations to Intrepid Coal in October 1996, Westmoreland Coal Co. and its four subsidiaries filed for Chapter 11 bankruptcy citing \$160 million in retiree benefit obligations. The company said filing Chapter 11 would protect it from demands by the UMWA pension and benefits fund.

In March 1997, Ashland planned to merge the two coal companies it controlled, Ashland Coal and Arch Minerals, in a deal that would create the nation's fifth largest coal company.

Kennecott Energy acquired the assets of Caballo Rojo Inc. for \$99 million. The Caballo Rojo mine, located adjacent to Kennecott Energy's Cordero Complex.

The Atlantic Richfield Co. (ARCO) decided to withdraw from the coal business in May 1997 disposing of its U.S. and Australian coal mining operations. In the U.S., ARCO owned the Black Thunder and Coal Creek mines in Wyoming, the West Elk mine in Colorado, and Canyon Fuel Co. in Utah, which operated three underground mines.

In September 1997, A.T. Massey purchased United Coal Co. for an undisclosed sum, giving Massey its first mines in Virginia. The purchase included two mining complexes: Wellmore, near Big Rock, and Know Creek, near Richlands.

Similar to other oil companies, Kerr-McGee announced it would exit the coal business in March 1998. Kennecott Energy bought Jacobs Ranch from Kerr McGee for \$400 million.

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Major U.S. Coal Producers, 1995 (millions of tons)

Peabody Holding	143.7
Cyprus Amax Minerals Co.	76.0
CONSOL Coal Group	71.5
Arco Coal	45.6
Kennecott Energy	38.5
Zeigler Coal Holding	35.1
Kerr-McGee Coal Group	31.1
A.T. Massey	28.7
North American Coal	27.0
Arch Mineral Corp.	26.7

During the summer of 1998, Lehman Merchant Banking Partners purchased the Peabody Group for \$2.3 billion. The transaction was part of the sale of Hanson's Energy Group to Texas Utilities. Peabody becomes an independent company again.

During August 1998, AEI Resources buys Zeigler Coal Holding in a deal valued at \$849 million. Zeigler is the second largest publicly-traded coal company with assets in the

PRB, ILB and CAPP. AEI is a private company owned by the Addington family (Addington Enterprises Inc.), with assets primarily in the East.

Chevron announced its intention to sell the Pittsburg & Midway Coal Mining Co. (P&M). P&M owned five coal mines in four states and had a one-third partnership in the Black Beauty Coal Co. in Indiana. Peabody eventually purchases P&M's share of Black Beauty for \$150 million bringing its total stake in the company to 81.7%.

In February 1999, Peabody Group merges the North Antelope and Rochelle mines creating the largest U.S. coal mining complex. The North Antelope-Rochelle complex had a combined output of 64.7 million tons in 1998. Peabody's Powder River Basin Coal, which also operated the Caballo and Rawhide mines, produces 96 million tons in 1998.

Also in February 1999, Vulcan Coal Holding bought Triton Coal from AEI Resources for \$275 million. Included in the transaction were the Buckskin and North Rochelle mines, which have a combined capacity of 30 million tpy. Vulcan Coal

Holding is headquartered in Zeigler's old office in Fairview Heights, Ill.

In mid-May, German coal and energy conglomerate Ruhrkole AG (RAG) purchased Cyprus Amax for \$1.1 billion.

CONSOL Energy goes public trading under the ticker symbol CNX.

Railroads Struggle to Keep Pace

In July 1994, railroad executives hold a summit to discuss haulage problems in the PRB. Chief executives of the three major carriers, Burlington Northern, Chicago & North Western and Union Pacific, meet in Omaha to discuss the topic of chronic delays. They agree on a comprehensive plan, which included millions of dollars in track improvements and expansions, to relieve the situation. In addition to allocating more managerial staff in the field, the railroads agree to make improvements and plan for better maintenance schedules. BN will add 20 miles of double track on the joint line and the railroads agree to share the \$24 million cost. An estimated 230 million tons of coal will be mined in the PRB this year and production is expected to increase 3% to 5% for the next few years.

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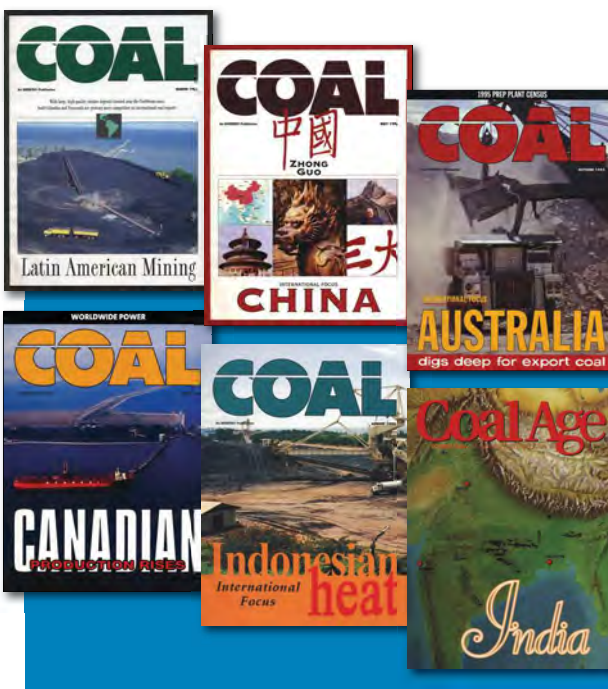
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During the 1990s, the Interstate Commerce Commission was disbanded and replaced by the Surface Transportation Board (STB). Beyond discussions with the railroads about service, the only legal recourse the shippers have is either using the STB or taking legislative action. In each of the recent merger cases, the STB has sided with the rail carriers.

Beginning in 1998, train delays in the PRB begin to have an impact on utility stockpiles. If demand for PRB coal grows as expected, the railroads on average will have to load 10 more trains per day than they are currently loading—and they were already loading trains at record levels. With NS and CSX preparing to divide the Conrail assets in mid-1999, eastern U.S. coal markets will be served primarily by two railroads and many fear the rail service issues will spread to the East.



COAL and Coal Age International Issues

- COAL Latin America, March 1995
- COAL China, May 1995
- COAL Australia, October 1995
- COAL Canada, March 1996
- COAL Indonesia, August 1995
- Coal Age India, October 1996

Coal Worldwide

With the exception of Great Britain, the world coal trade begins to recover midway through the decade. During October 1992, the British government privatizes British Coal Corp. BCC has been in almost contin-

uous decline since the year-long miners' strike in 1984. Output has fallen 15%, or 15 million mt, 83 mines (62%) have closed and employment has dropped by 121,500 (68%). Although productivity has risen proportionately, it was still only 5.31 mt per manshift in 1992. BCC is an over-manned

and unproductive organization by world standards that is holding onto its crucial power station market only through government intervention.

Indonesia emerges as a force in the world coal market. In 1994, Indonesia's total output exceeded 33 million tons, a 15-fold

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British Coal closes 10 mines on short notice

British Coal announced the imminent closure of 10 of its 50 remaining coal mines. Some 6,950 miners will lose their jobs as a result. Of the mines to be closed, most are expected to be shut down during the next five months. The remaining will be kept open, at least during the near future, to provide access to other reserves.

The underlying cause of the closures is blamed on British Coal's loss of markets in the United Kingdom power-generation sector—more gas-fired power plants are being built and coal-burning plants

are using more low-cost, imported coal. The British government has announced a relief package to finance compulsory redundancy payments and to provide readaptation and relief for the mining communities whose livelihood will be destroyed.

Some of the most famous coal-mining districts in Britain will be affected—all of the Doncaster and Derbyshire mines, five mines in the Nottingham area, and all of the northeast coalfield (Durham, Tyne and Wear) mines, except Wearmouth colliery, will be closed.

*COAL, November 1992

increase in 10 years. Over the next six years, the Indonesian Government projects production to increase by almost 9 million tpy by 2000; they are expecting to produce 88 million tons.

By 1995, Colombia has now grown to become the world's fourth largest exporter after Australia, the U.S. and South Africa.

Coal is the country's third largest export behind coffee and petroleum. Current production is 22 million mt, of which, 16 million mt is exported. Vast reserves of high-quality coal are located in relatively close proximity to the Caribbean Coast.

Production from El Cerrejón's North Mining complex rivals large North

American surface coal operations. The mine has reserves of 1.6 billion mt and is a 50:50 joint venture of Carboacol, the Colombian state company formed in 1976, and Intercor, a subsidiary of Exxon Corp.

Correjón shipped 14 million mt in 1993. Other important producers for the export market include Produce and Carbones del Caribe. All three have expansion plans that will raise total capacity to 33 million mtpy by 2000.

The world coal market staged a recovery in 1994. Hard coal production rose by 2.4% from 3.79 billion mt in 1993 to 3.88 billion mt in 1994. Since 1974, world hard coal production rose 61%, which equals an average annual growth rate of 2.1%. The leading producers are China (1.27 billion mt), U.S. (930 million mt), Russia (414 million mt), India (283 million mt), South Africa (200 million mt), Australia (195 million mt) and the European Union (144 million mt).

Longwall Production Pulls Ahead of Continuous Miners

The underground coal industry in the U.S. is about to experience an evolutionary shift in production as coal operators master longwall mining. At the beginning of the decade room-and-pillar mining still dominates the landscape. Continuous miner manufacturers are concentrating efforts on making the machines operate better and improving development methods for longwall gate roads. Four manufacturers exist: Eimco, Jeffrey (Dresser), Joy Technologies and Simmons Rand. Two of the manufacturers have developed on-board independent roof bolting systems. Joy is field testing a system that gives the continuous miner the ability to repeat the cutting cycle automatically. With a cut control system, the machine is shown where to start and stop and how far to sump into the face. The machines will repeat the sequence until it is told to change.

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Monthly Longwall Production Records

Feb. 94	Meigs 31	527,835 tons
Dec. 94	Twentymile	548,575 tons
Aug. 95	Cumberland	573,000 tons
Unclear	West Elk	601,068 tons
March 96	Twentymile	689,759 tons
July 96	West Elk	781,355 tons
Aug. 96	Twentymile	810,049 tons
June 97	Twentymile	1,001,401 tons

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Eimco model 2810 continuous miner is designed for mid-seam mining. *COAL, January 1990

Labeled by some as the most productive mine in the country, Campbells Creek Coal Co., near Bell, W.Va., a contractor for Arch Minerals' Catenary Coal, is regularly mining 3,200 tons per shift in 1991. The

single section mine cuts coal with a Joy 12CM12 continuous miner and uses two Joy 10SC shuttle cars and a battery-powered Simmons-Rand Unahauler.

In 1990, continuous miners represent 55% of underground production and longwalls are producing about 37%. Continuous miners accounted for 60% of underground production in the mid-1980s while longwalls represented only 31%. While the number of longwalls dropped below 100 for the first time in 1990, longwall productivity was at an all-time high of 2,372 clean tons per unit-shift. Productivity expressed in tons per man-shift also increased to 174.

An article detailing the Twentymile Coal Co. in Colorado (December 1992) that was operating some of the longest longwall panels in the country at the time, explained how the mine was using tripper drive technology to power the conveyor belts. At the time, a 10,000-ft longwall panel was considered long. Theoretically a tripper system, one where the conveyor trips coal back onto itself, could be de-signed for any length. Installing another tripper drive anywhere along the conveyor reduced the effective tension and recently developed load-sharing systems

based on programmable logic controllers allowed the drives to communicate with each other. This prevented excess sag or the drives from fighting against each other and tearing the belt apart.

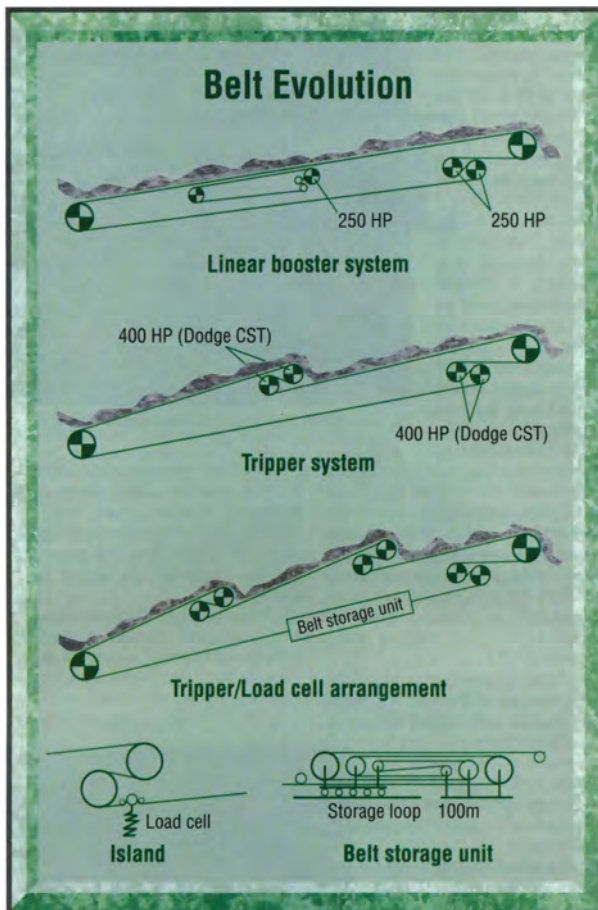
As productivity climbed the number of faces declined. The U.S. longwall population dropped to 90 in 1992, 80 in 1994, 72 in 1995, and 65 in 1997. Even though the population drop by more than 35%, production skyrocketed.

Longwall mining tonnage first overtook continuous mining tonnage marginally in 1994, and since then, has steadily moved ahead. In 1996, total U.S. longwall production reached 196 million tons and continued to pull ahead of continuous mining production, which totaled 178 million tons. In 1996, total underground production of 410 million tons was made up of longwall (48%), continuous miners (43%) and other (9%).

Surface Mining

Several advancements are made in the field of drilling and blasting during the 1990s. Drill manufacturers have automated several aspects of blasthole drilling and improved the operator interface. Several models feature new automated controls integrated with diagnostics and a hydrostatic propel system.

Surface mines are using bulk-loaded emulsion and emulsion-Anfo blends. An emulsion explosive can be made extremely fluid and pumped long distances for filling large diameter blasthole. Since they have a high velocity of detonation and high density, they have high detonation pressures. A dozen manufacturers and



*COAL, December 1992



*COAL, July 1993

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research organizations are developing electronic delay detonators.

Mine plans are adapting to electric shovels loading 240-ton haul truck in three passes. By 1990, Dresser's Haulpak Division is marketing a 240-ton 830E electric drive haul truck. Harnischfeger is promoting the P&H 4100 electric shovel, which can load a 240-ton haul truck in three passes with a 56-yd dipper in 28 seconds.

In the mid-1980s, nearly all haul trucks greater than 120 tons were diesel-electric powered. When Cat announced the 240-ton 793 haul truck in 1991, the industry realized that the mechanical drive transmission had caught the electric drives. Haul truck makers include: Cat, Dart (Unit Rig), Euclid (VME), Haulpak Dresser, Komatsu Dresser, Lectra Haul (Unit Rig), Titan (Marathon LeTourneau) and Wiseda.

Just as the industry starts to grow comfortable with three-pass loading,

truck makers begin to move toward today's ultra-class haul trucks. During June 1995, Unit Rig introduced the new 260-ton MT-4400 Lectra Haul. Its frame can support a 310-ton load without failure and will provide a basis for still larger trucks in the future. Komatsu Dresser introduced the 300-ton 930E haul truck.

Electric shovels are now four-pass loading 320-ton trucks. In the past, haul trucks chased the shovel and now the shovels were chasing the trucks. In addition to improving the capacity, shovel makers were looking to improve reliability with better electronic switching technology. They are also improving the diagnostics system to better troubleshoot maintenance. The man-machine interface continues to improve.

Hydraulic excavators have grown to the point where they can also load 320-ton trucks. At this point, almost all of the hydraulic excavators are paired with a

truck manufacturer—Komatsu now owns Demag, Terex Ming combines O&K and Unit Rig, Hitachi is paired with Euclid, and Cat and Liebherr make hydraulic excavators and trucks (Liebherr purchased Wiseda).

Hydraulic excavators offer a great deal of versatility. Although they are diesel-powered, many of them employ a similar electronic monitoring system and improved operator interface. In July 1998, Komatsu Demag unveiled the H655S hydraulic mining shovel with a 46-yd bucket. The machine weighs 1.51 million lb and is powered by a 3,714-hp 16-cylinder diesel engine. New geometry increases the shovels breakout capacity.

Michelin develops the 63-inch tire, which allowed truck makers to move to the 360-ton level. Liebherr introduced the 360-ton T282 during October 1998. Cat announced it will build the 360-ton 797 by the end of 1998, and predicts its mechanical drive will deliver 5% to 10% better fuel costs per ton as well as 10% to 15% lower operating costs.

With the exception of Cat, all of the trucks are using AC drive systems. Cat, however, stands by mechanical drive systems and says its trucks are operating 500 to 1,000 hours more than the electric drives. Electronic monitoring and control systems have become standard items on the trucks as well as machine health diagnostics.

The haul trucks are getting larger and so are the loading height and tray width. In August 1999, P&H launched the 4100 XPB electric shovel to keep pace with ultra-class haul trucks. Changes to the front-end geometry enable the 4100 XPB to attain the increase dumping height required for the new trucks. It also results in a higher suspended load rating and in quicker dipper loading.

Coal Preparation Advances

An article in the 1994 edition of *COAL* talks about "The Prep Plant of Tomorrow" detailing two DoE-funded processes that reached the commercial stage. The air-sparged hydrocyclone exploits surface property differences in a cyclonic flow field to rapidly separate coal from mineral matter. Research on the Microcel column flotation cell underscores the importance of employing a wash water spray positioned in the froth zone.

By the mid-1990s, more than one-half of the prep plants in the U.S. operate a



Black Thunder, one of the first Powder River Basin mines to test and adopt Wiseda's 240-ton hauler (shown above), now owns 11 of them. **COAL*, July 1993



Cat predicts its 360-ton-capacity 797 mining truck will deliver 5% to 10% better fuel cost per ton, as well as 10% to 15% lower overall operating cost per ton. **Coal Age*, April 1999

heavy-media cyclone (HMC) circuit. HMCs displaced concentrating tables as a means to process intermediate sizes (3/8 inch x 28 mesh).

Fine coal processing increased markedly between 1976 and 1986, and the number of froth flotation plants doubled. In the 1990s, new spirals have found favor among plant designers and operators. Similarly, the number of column installations increases as coal producers seek to recover as much minus 100 mesh coal as possible.

Another trend taking place is the simplification of prep plants. Plants built during the 1990s have fewer circuits and the operations run smoother. The most significant change is a transition from increasing throughput to improving quality and meeting target specifications.

M&A Activity Reduces the Number of Vendors

The 1990s shake-out among vendors started on the underground side of the business. One surprising move came early in the decade when Harnischfeger, an OEM serving the surface mining sector and the pulp and paper industries, acquired Joy Technologies in a \$391.6 million stock-for-stock merger.

Long-Airdox acquired Simmons Rand in September 1993. Simmons Rand's product line included continuous miners, roof bolters and battery-powered haulers. By the beginning of 1995, longwall manufacturers have consolidated into two major consortiums. The merger of American Longwall and Gullick Dobson with Meco International into International Longwall Mining in 1993 has now been duplicated in late 1994 with the combining of Halbach & Braun, Hemscheidt and Westfalia into Deutsche Bergbau Technik (German Mining Technology). Mine Technik America emerges as the U.S. subsidiary of Deutsche Bergbau Technik. These mergers reduce four major shield and armored face conveyor manufacturers into two national vendor groups: British and German. As far as shearing machines, Joy, Anderson Mavor and Eickhoff control a majority of the market.

During March 1995, Marmon Group, which owned Long-Airdox, bought National Mine Service and Anderson Group. NMS distributed mine safety supplies, while Anderson manufactured coal face machinery. The combined purchase price is \$46 million. Long-Airdox has the Anderson Mavor shearing machine and

the company bought Jeffrey Mining products in July 1999.

Harnischfeger then purchases International Longwall Mining and merges it with Joy Technologies. Joy Mining Machinery becomes the first supplier to offer and sell a complete longwall system.

Bucyrus Erie buys Marion Power Shovel from Global Industrial Technologies for \$40.1 million and then changes its name to Bucyrus International.

Labor Issues Begin to Subside

The 1988 Bituminous Coal Wage Agreement expired in January 1993. The UMWA called for a selective 30-day strike and 9,000 miners walked off the job. The standoff began February 2, 1993, and ended March 3, 1993, when the UMWA agrees to a 60-day extension. Richard Trumka is criticized for trying to coerce automatic union representation at non-union mines to save the UMWA. The UMWA walks out again May 19, 1993. The strike expands eight times throughout the year with as many as 17,500 miners on strike at the high point.

The BCOA and UMWA eventually settle on December 13, 1993. Labor Secretary Robert Reich intervened and again appoint-

ed William Usery to mediate. Usery mediated the dispute between UMWA and Pittston in the 1980s. Usery told the BCOA he would walk away from the talks if the BCOA hired replacement workers, fearing increased tension and possible violence. Among the hindrances to bargaining was further splintering of the BCOA. Another major consideration was strike violence and amnesty. A contract worker in West Virginia had been shot and hundreds of thousands of dollars' worth of conveyor equipment had been damaged. Eight union miners were indicted by a grand jury for the shooting.

Both parties got some, but certainly not all, of what they wanted. The union scored a victory against double-breasting and protected future jobs. Three out of five new job openings (60%) at any new, existing or newly acquired non-signatory bituminous operation would be filled by laid-off union workers. Improved operational flexibility would help the BCOA companies compete with non-union counterparts. Companies won the right to establish seven-day schedules for production and processing. The union also won a sizable increase in pensions.

During December 1995, Trumka is elected to the AFL-CIO and Cecil E. Roberts Jr.

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takes over as president of the UMWA. Roberts, a sixth generation coal miner from West Virginia, has served as vice president of the UMWA since 1982 and played a key role in union negotiating teams. Roberts restructures the UMWA during February 1996. The union's 16 districts are reorganized into 10 districts.

The UMWA ratified a new contract with BCOA by a record margin in December 1997, nine months before the agreement is set to expire (August 1998). Both sides pushed to complete negotiations well in advance so they could join forces to defeat the Kyoto Protocol, which was also signed in early December in Japan. The new five-year agreement spans January 1998 to January 2003.

Coal Age Returns

During September 1990, the former managing editor of *Coal Age*, Paul C. Merritt, replaces Mark Sprouls as editor of *COAL*. Merritt expresses his opinion on a commentary page facing the inside back cover.

In 1991, Steve Fiscor, a mining engineer, who worked at a longwall operation in Colorado, joins the editorial team as a technical editor for *COAL* and *Engineering & Mining Journal (E&MJ)*.

In August 1992, Merritt retires, but remains on the masthead as Editor Emeritus. Art Sanda is appointed editor of *COAL*. Sanda does not initially offer a commentary column, but he does offer the industry an opportunity to voice its opinion through a series of surveys. In June 1994, Fiscor is promoted to managing editor, *COAL*. Russ Carter is still working as the western field editor.

COAL branches out into international coverage with extended coverage in several editions. The editors are dispatched globally to document international coal activities. The first report covers Latin American coal in March 1995. Sanda dives into China with a two-part series documenting the Chinese coal industry, which at the time was producing about 1.2 billion mt. The industry is split into 626 mines controlled by the central gov-



The return of Coal Age. *Coal Age, September 1996

ernment, producing 490 million mt, and an unknown number of privately-held mines producing the remaining 700 million mt. It is the first time the Chinese coal industry is well-documented in English.

During July 1996, *COAL* is recognized for editorial excellence at the Jesse H. Neal Awards in New York. *COAL*'s Entry "International Focus," was one of five finalists in the best subject-related series of articles category for its class.

During this healthy period for the magazine, Intertec Publishing, a U.S. trade publisher with several farming and industrial titles, buys the Maclean Hunter's U.S. trade publications and associated business in March 1995. Eventually Kravitz, Kravitz, and Kohlberg (K-III Publishing), a group that specializes in leveraged buyouts, buys Intertec Publishing. The K-III name is rebranded as Primedia.

What both Sanda and Fiscor both notice at home and abroad while covering stories is that readers still refer to the magazine as *Coal Age*. Maclean Hunter changed *Coal Mining & Processing* name to *Coal Mining* because it lacked recognition. After eight years, it seemed merging the titles into *COAL* also lacked the same brand recognition. At this point all of the Maclean Hunter people had been fired or retired so Sanda and Fiscor decide to re-launch the name *Coal Age* for MINExpo 1996. The *Coal Age* mast is restored with the September 1996 edition. The magazine sports a snazzy redesign. A small retrospective documents the magazine's 85-year history. Sanda places a commentary with his photo at the beginning of the magazine and, for the first time, readers can clearly identify an editor with the title.

The Goring of America

BY ART SANDA / ASSOCIATE PUBLISHER / EDITOR

Make no mistake, the American coal industry faces the greatest threat ever to its continued existence. In December, diplomats from around the world meet in Kyoto, Japan to "negotiate" emission controls—controls which literally could sound the death knell of the very cornerstone of the most powerful economy on earth.

If the Clinton Administration—with Vice President Gore at the point—were a sovereign nation, what it is trying to accomplish would require a declaration of war against the country's coal industry. Their ultimate goal is the complete shutdown of the American coal industry, make no mistake.

It is all but a forgone conclusion that the Clinton/Gore negotiators in Kyoto will sign the treaty establishing world limitations on (fossil fuel) emissions; with the caveat that only developed nations need comply.

Accepting the inevitability of this, however, is not capitulation. It is not surrender. The National Mining Association—which sounded the alarm early, if vainly—is marshaling industry forces to do battle where there is hope for victory; in the Congress of the United States; first the Senate and then, if necessary, the House where the means of complying to the treaty must be passed should the Senate approve it.

For what contribution we can make, *Coal Age* is joining ranks with the NMA. From July through December a substantial commitment of our editorial pages will be devoted to explaining the global climate change issue and what the industry—and all those associated with it—can and must do to stop this assault on American coal and the American economy.

It is the intent of *Coal Age* to hammer on this subject, and hammer again until, as the NMA has stated, the industry realizes that the global climate change issue "is the most critical issue facing the coal industry."

We will call on scientific experts, economics experts, political experts, industry experts... anyone who can shed light on the Clinton/Gore assault on America.

As a leader of the coal industry, it's your job to grasp this issue. As a manager in the coal industry, it's your job to grasp this issue. As a worker in the coal industry, it's your job to grasp this issue. For if you fail to do so, and you fail to act, it's your job.

Coal Age will explain it and explain it again until it is understood that it is your industry—your America—your future and your children's future that is being Gored.

You can begin now. **Circle 199 on the Reader Service Card** in this issue of *Coal Age* and the NMA will begin arming you with facts you need and your company needs to appreciate the magnitude of this very real threat to American coal and American prosperity.

Circle the number before we have to circle the wagons. CA



AS A LEADER OF THE COAL INDUSTRY, IT'S YOUR JOB TO GRASP THIS ISSUE. AS A MANAGER IN THE COAL INDUSTRY, IT'S YOUR JOB TO GRASP THIS ISSUE. AS A WORKER IN THE COAL INDUSTRY, IT'S YOUR JOB TO GRASP THIS ISSUE. FOR IF YOU FAIL TO DO SO, AND YOU FAIL TO ACT, IT'S YOUR JOB.

Art Sanda / Editor

Editorial. *Coal Age, June 1997

Whatever your challenges are

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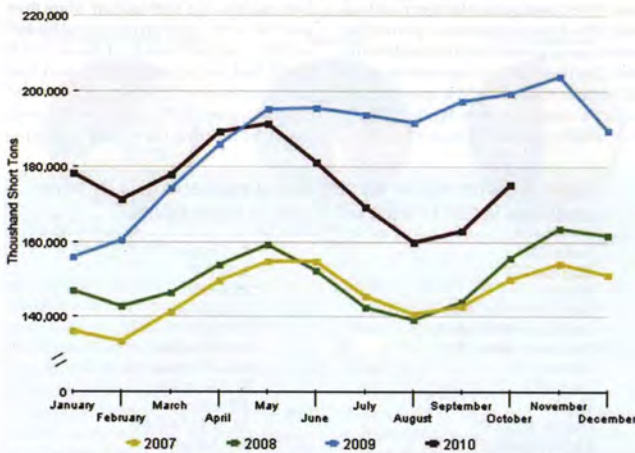
The U.S. coal industry is remarkable. Having demonstrated the resilience required to survive the turbulent 1990s, it continues to adapt and reposition itself to meet the challenges it will face in the next 10 to 20 years. For most coal operators, survival has meant chasing the market with more tons at lower prices. The only way they can free themselves from survival mode is by balancing supply with demand, adopting some form of price discipline, improving productivity, and controlling costs. Advancements in technology offer the best solution.

In a lot of ways, the U.S. coal industry has come full circle in the new millennia. Despite dramatic improvements in safety, several tragic mine disasters during the decade have tarnished the industry's image and led to costly oversight and regulation. In some cases, those regulations have improved safety and operating conditions. Similarly, several mishaps have allowed large discharges into the inland waterways. These events allow the public to form negative images of the modern coal industry that are not representative of the collective group.

The message that goes untold is how 98% of the coal companies are doing the right thing. Daily they live up to higher safety and environmental standards while providing the U.S. with a low-cost form of electrical power.

In the early part of the decade, short-term contracts prevent mines from investing in capital projects, which eventually impacts production. Costly compliance measures and low prices force more coal operators out of the marketplace. Mountaintop mining falls under increasing scrutiny putting 50 million tons of central Appalachian coal in jeopardy.

Electric Power Sector Coal Stocks (thousand short tons)



Source: U.S. Energy Information Administration, Form EIA923, "Power Plant Operations Report."

From the *Coal Age* 2011 Annual Forecast. **Coal Age*, January 2011

By 2007-2008, the tables turn and U.S. coal producers are almost giddy. They have never experienced such profits especially for metallurgical coals. Australia's mines in Queensland were flooded. The South Africans were rationing power. Asian demand for coal was peaking. The suddenness of the 2008 bust maybe remembered most because it happened when met coal was selling for more than \$300/ton. Prices have never climbed and contracted that quickly.

Even though 2010 was a difficult year for the coal business, coal companies were looking forward to 2011 and 2012 more optimistically. The U.S. had regulated itself out of business in several regions and prices were beginning to improve. As the next decade begins though, energy markets find themselves awash in inexpensive natural gas.

Domestic Market Remains Cyclic

In 2000, demand for coal slows and the railroads and river docks get a chance to catch up. The tech bubble has burst and the U.S. economy is slowing. Both the summer of 1999 and 1999-2000 winter were mild. Coal prices are at a modern-day, all-time low.

Natural gas prices recover first to \$6 per million Btu. High gas prices were prevent fuel switching (coal is roughly equivalent to \$2 per million Btu). Coal inventories begin to decline as coal operators struggle to keep pace with demand. Those with uncommitted coal are taking advantage of high spot prices. Spot prices for Powder River Basin (PRB) coal moves above double digits to \$12/ton for the first time in April 2001. California is hit by a series of rolling blackouts and energy is the lead story on the evening news.

Electric utilities begin building capacity for future demand. More than 65,000 mw of new coal-fired capacity is announced. It's estimated that more capacity was added during those few years than all of the 1990s. Almost all of that capacity, however, came in the form of gas-fired power. At the time, the coal industry warns the utilities not to place all of their eggs in one basket, but those stranded investments will pay dividends in the next decade.

	Current Spot Prices for Coal (\$/ton)						
	Btu/lb	lb SO ₂	Dec 06	Dec 07	Dec 08	Dec 09	Dec 10
Northern Appalachia	13,000	3.0	\$43.00	\$55.25	\$101.50	\$52.50	\$70.00
Central Appalachia	12,500	1.2	\$47.25	\$57.70	\$81.55	\$57.40	\$72.75
Illinois Basin	11,800	5.0	\$33.00	\$33.50	\$78.00	\$40.50	\$47.50
Powder River Basin	8,800	0.8	\$9.90	\$11.50	\$13.00	\$9.25	\$13.60
Western Bituminous	11,700	0.8	\$36.00	\$24.00	\$73.00	\$40.00	\$41.00

Source: EIA/Platts Coal Outlook Weekly Price Survey

From the *Coal Age* 2011 Annual Forecast. **Coal Age*, January 2011

Coal Statistics: 2000-2011

Year	Employment	Fatalities	UG (tons)	Surface (tons)	East	West	Total
2000	108,098	38	374	700	508	566	1,074
2001	114,458	42	381	747	529	599	1,128
2002	110,966	28	357	737	493	601	1,094
2003	104,824	30	353	719	469	603	1,072
2004	108,734	28	368	745	485	627	1,112
2005	116,436	23	369	763	494	638	1,131
2006	122,975	47	359	804	491	672	1,163
2007	122,936	34	352	795	478	668	1,147
2008	133,828	30	357	815	493	678	1,172
2009	134,089	18	332	743	450	625	1,075
2010	135,500	48	337	748	447	639	1,085
2011	143,437	21	339	755	456	639	1,094

Based on the rally, coal production breaks the 1.1-billion-ton milestone in 2001. By the end of the year, however, most of the price increases had been lost. Coal supply and demand returns to a balanced state by 2004.

Some of the major mines in the East have encountered operational problems. Permitting headaches nag operators in Appalachia. Stockpiles at mines and utilities are below normal levels. Competing power sources, such as hydroelectric and nuclear, are stretched thin and coal prices move upward again. The good news now is that the industry is starting to see some favorable changes in regulations that may improve the permitting process.

During 2008, the U.S. coal industry posts some incredible numbers. Total production reaches 1.17 billion tons, while fatalities drop to a three-year low of 29. The celebration would be short-lived as the global financial crisis sets in. The U.S. economy enters a recession and demand for electricity drops. This recession, however, was anticipated and major producers are able to moderate production to a certain degree.

More Mines Change Hands as the Industry Goes Public

At the beginning of decade, Fluor announces a Massey spin off, resulting in two companies: Fluor Corp. and Massey Energy. Massey Energy becomes the largest publicly held, pure Appalachian coal play.

Westmoreland buys Montana Power's coal business for \$138 million. The acquisition includes Western Energy, which owns and operates the Rosebud mine in the northern PRB, and Northwestern Resources, which owns and operates the Jewett mine in Texas.

Alpha Natural Resources was formed in 2002 by First Reserve Corp., a private equity firm, to acquire the majority of the Virginia coal operations of Pittston Coal Co., a subsidiary of Brinks. During 2003, Alpha acquired Coastal Coal Co., and on March 11, 2003, it

acquired the U.S. coal production and marketing operations of American Metals and Coal International (AMCI).

In February 2005, the company goes public. The company consists of eight regional business units supported by 44 underground mines, 20 surface mines and 11 prep plants, located mostly in Appalachia.

Peabody Energy purchases the Twentymile mine from RAG, which sets the stage for a major sale in February 2004. The company signed a \$975 million sales agreement with a private equity consortium that consists of First Reserve, the Blackstone Group and AMCI. The consortium would eventually form Foundation Coal Corp. and take the company public. The company, which would become the fourth largest coal producer, operates 12 mines, produces 65 million tons of coal, and employs 2,700 people.

Horizon Natural Resources files for bankruptcy twice in 2002. Six months after it exited bankruptcy under its former name, AEI Resources, Horizon Natural Resources filed for Chapter 11 reorganization. New York billionaire Wilbur Ross teamed with Massey Energy to submit the winning bid of \$786 million in mid-August 2004 for the bankrupt Horizon Natural Resources. Massey paid \$10 million to acquire the Starfire and Cannelton mines and Ross put up the rest of the funds. Ross had already acquired Anker Coal Group and other coal



*Coal Age, June 2009



"Customers are already demanding more production from this region," says Craig B. Alliance Resource Partners' president and CEO.

ALLIANCE RESOURCE PARTNERS REAPS THE BENEFITS OF IB RENEWAL

The second largest producer in the Illinois Basin, Alliance Resource Partners produced 14 million tons from five mining complexes in the Illinois Basin (IB) or approximately 15% of the total 90 million ton output from the region in 2004. One of the most impressive characteristics about Alliance is its sustained growth—a continuous profitable swing for the last four years—accomplished primarily with what would deem “marginal properties” deep mines in the Illinois Basin. At a time when many coal mining companies developed western U.S. interests, Alliance has instead played much of its resources and capital here. Although Alliance also has Appalachian mines, fully two-thirds of its production and roughly 80% of its 500 million tons of reserves are located in the IB. Of the major coal producers, none is so dependent on the viability and value of IB coal. Alliance will soon begin operations at the new Elk Creek mine in western Kentucky and the company has recently initiated the permitting process to open a new mine in Indiana—the Gibson South

Alliance's history and unique corporate structure has also contributed to its consistent profitability. MAPCO, Alliance's former parent company, was created in 1971 and began developing its own coal mines beginning with the Delta mine in Webster County, Ky. From 1971 through 1989 MAPCO continued to expand its coal operations through acquisitions of additional mines in Central Appalachia, the Illinois Basin and elsewhere.

In 1995, MAPCO elected to get out of the coal business. “From 1989–1995, natural gas was the trend of the day and it appeared that it would supplant coal as the fuel of choice for electricity generation in the future,” Craft said. “At that time coal demand and margins were under pressure and the outlook was challenging. Coincidentally, we also had several long-term, high-margin coal sales contracts that were about to expire. MAPCO made the strategic decision to discontinue its coal operations and exit the business.”

Subsequently, in 1996, MAPCO elected to sell the coal company to a private equity firm, the Beacon Group. In 1996, Beacon teamed with its management group and bought 100% of the MAPCO coal company, forming the Alliance Coal Corp. “We closed that transaction in September 1996 and never looked back,” said Craft. The company continued to grow, acquiring the Hopkins County Coal Co. in western Kentucky and opening the MC Mining operation in eastern Kentucky.

Then in 1998, the Beacon Group elected to realize the value that had been created since 1996 by taking the company public. They formed Alliance Resource Partners, L.P. (ARLP) as a master limited partnership and completed their initial public offering (IPO) in August 1999. As part of the IPO, about half of the company was sold to the public with the Beacon Group and management owning the balance. In 2002, the management team, using its own resources and private financing, purchased the remaining ownership interest held by the Beacon Group. Management continues to own a significant share, approximately 42%, of ARLP. Today, Alliance remains the only coal producing company structured as a publicly traded master limited partnership.

“Today our primary goal is to create sustainable, capital efficient growth in our cash flows and to share that growth with our investors through increased cash distributions,” said Craft.

*Coal Age, September 2005

assets. He put all of the coal assets under a new company, International Coal Group (ICG). In November 2005, they take ICG public.

Arch Coal acquires Triton Coal for \$364 million during August 2004. Triton owns and operates the North Rochelle and Buckskin mines. Arch Coal will integrate North Rochelle into Black Thunder and sells Buckskin to Kiewit Mining for \$72.9 million. North Rochelle has an estimated reserve base of 226 million tons.

In its September 2005 edition, *Coal Age* offers a special report on the resurgence of the Illinois Basin. The report covers new investments taking place in the region and also provides in-depth coverage of Alliance Resource Partners. The company, which was formed as a master limited partnership when Mapco exited the coal business during the mid-1990s, had grown organically to become one of the most successful coal companies in the nation.

In October 2007, Peabody Energy approved a spin-off of coal assets and operations in West Virginia and Kentucky. The spin-off was accomplished through a special dividend of all outstanding shares of Patriot Coal Corp. With 2006 sales of 24 million tons and reserves totaling 1.2 billion tons, Patriot becomes a leading steam and met coal producer. Peabody becomes essentially bundled all of its union mines, mostly in Appalachia, and formed a new coal company.

During August 2008, Rio Tinto announced an IPO for its subsidiary Rio Tinto Energy America (formerly known as Kennecott Energy). The new company would be known as Cloud Peak Energy and it would become the first publicly-held, pure-play PRB coal operator.

In March 2009, Arch Coal announces plans to purchase Rio Tinto's Jacobs Ranch mine for \$761 million. In 2008, it produced 42.1 million tons and the transaction includes 381 million tons of low-cost reserves that are contiguous to Arch's Black Thunder mine.

Alpha Natural Resources made a \$2 billion all-stock offer for Foundation Coal during May 2009 and merges its operations to create the third largest coal producer in the U.S. The company will now have 60 mines and 14 prep plants operating in all three major coal basins. Alpha becomes the leading eastern U.S. producer and the largest U.S. producer of met coals.

During January 2011, Alpha offers to acquire the beleaguered Massey Energy for \$8.5 billion. Massey Energy's image of a leading

Appalachian coal producers has been irreparably damaged by an explosion at the Upper Big Branch mine. In addition to a safety record that is in shambles, the company has on several occasions squared off with environmental activists. In many of those cases, it may have won the debate, but ultimately their public image suffers outside of Appalachia. Alpha acquires the company, makes amends with UBB survivors and regulators, and embarks on a retraining program to rebuild some great mines.

In May 2011, Arch Coal acquires ICG in a transaction valued at \$3.4 billion. The acquisition of ICG is a significant strategic step for Arch Coal. Most of all, it broadens Arch Coal's portfolio to now include met coals. In total, the company would have combined shipments of 151.7 million tons and the industry's second largest reserve position with 5.5 billion tons.

Met Markets Surge

A growing Chinese steel industry is creating a dramatic increase in demand for met coal and iron ore. Predictions are calling for global steel output to rise by 7.4% to a record 840 million metric tons (mt), uncharted water statistically. The seaborne metallurgical market is dominated by Australia, which supplied 92 million mt in 1999 out of a total of 174 million mt. By 2005, Australia met exports are expected to reach 118 million mtpy.

Chinese coal imports in the first quarter of 2007 exceeded exports for the first time. China becomes a net coal consumer. Fueled by a need to power a robust economy, the world's largest coal producer is expected to import more and more coal to satisfy its needs.

An active typhoon season during early 2008 takes many met coal mines offline in Queensland, Australia. Meanwhile, in the northern hemisphere, China is experiencing power and coal shortages as fierce winter storms hamper train traffic. Prices for met coal surge—\$250/mt have become acceptable and the prices sometimes spike to as much as

Top 10 Coal Producers, 2011 (millions of tons)

Peabody Energy	203.9
Arch Coal	151.7
Alpha Natural Resources	102.3
Cloud Peak Energy	97.2
CONSOL Energy	62.6
Luminant	32.3
Alliance Resource Partners	30.8
Kiewit Mining Group	30.0
Patriot Coal	28.8
North American Coal	27.9

Top 10 Coal Producing States, 2011 (millions of tons)

Wyoming	436
West Virginia	137
Kentucky	109
Pennsylvania	60
Texas	45
Montana	42
Indiana	37
Illinois	36
Colorado	28
North Dakota	27



*Coal Age, August 2011

\$305/mt. CONSOL Energy begins to talk about the Pittsburgh No. 8 seam's crossover capabilities, meaning that it would soon start exporting steam coal to China for met purposes.

After record sales and production in 2008, international met markets plummet in 2009, but Asian demand starts to tick upward again in 2010 and 2011. U.S. coal operators suffering from a weak domestic market begin to search for more ways to market coals abroad. Port capacity is maxed along the East Coast. Some operators begin using mid-stream loading in the lower Mississippi to load ships. Others use the St. Lawrence Seaway to export coal and transload coal onto ships waiting off the coast of Nova Scotia. In the meantime, some of the largest U.S. producers are looking to develop more ports along the Gulf and Pacific Coasts.

Politics & Policymakers

At the beginning of the decade, the world watched as President Clinton grappled with scandal and narrowly avoided impeachment. Fearing they might lose the White House during the 2000 Presidential Election, the Clinton administration submits an unusually large number of appropriations to the Department of Labor and the EPA in a last ditch effort to enact their agenda by back-door means.

George W. Bush defeats Al Gore in the 2000 presidential elections. President Bush's strong position in favor of domestic energy policy inspires the coal industry. Bush nominates Elaine Chao as Secretary of Labor, New Jersey Gov. Christine Todd Whitman to lead the EPA, Michigan Sen. Spencer Abraham as Secretary of Energy, and Colorado Attorney General Gale Norton as Secretary of the Interior. Whitman supported voluntary compliance with pollution control over corporate fines. Abraham, who formerly advocated for abolishing the Department of Energy (DoE), strongly opposes extreme global warming controls.

General Lawson retires from the National Mining Association (NMA) at the end of 2000. The NMA names Jack Gerard president and CEO. Raised in Idaho's silver mining district, Gerard is a lobbyist with mining roots. From the onset, he takes the NMA from an institutional-type lobbying organization to a more proactive organization. He holds annual meetings in Washington instead of resort destinations and begins marching mining executive around Capitol Hill to tell their story.

A year after President Bush flat out rejects the Kyoto Protocol, he announces a Clean Skies Initiative, which is a three-pollutant approach (NO_x, SO₂ and mercury) for power plants. It does not consider CO₂ a pollutant and ties environmental protection to economic activity where limits are measured against U.S. gross domestic product.

During early April 2007, the U.S. Supreme Court makes two decisions that have negative long-term implications for the coal business. It ruled that CO₂ was in fact a pollutant and that the EPA should look at the total output of pollutants when determining compliance. As the global warming debate heats up, the Supreme Court is essentially saying that it understands the emissions debate and that the U.S. response to climate changes was already covered 50 years ago when Congress enacted the Clean Air Act (CAA).

Harold "Hal" Quinn is appointed CEO of the NMA during September 2008. Quinn is highly regarded among his peers as a sharp attorney who has represented the mining industry well in Washington. He brings nearly 30 years of experience to the position. He served as vice president under General Lawson when he

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Hal Quinn, CEO, NMA.

merged the National Coal Association and American Mining Congress to form the NMA and as senior vice president under Jack Gerard, while he restructured the NMA. Quinn is an excellent choice because the coal industry is about to enter the fight of its lifetime as Democrats, with strong ties to environmental activism, win a land-slide victory in the 2008 presidential election.

The U.S. elects President Barack Obama and the democrats also win a majority in both houses of Congress. Obama appoints Lisa Jackson, an environmental zealot, to head the EPA. He appoints Steven Chu, who favors renewable energy, to head the DoE. The EPA begins to question mountaintop mining permits in West Virginia and also announces plans for some of the most stringent emissions policies for coal-fired power plants. The Obama administration's War on Coal begins.



Kentucky Representative Hal Rodgers took the microphone for a blistering condemnation of the Obama EPA—music to the ears of gathered supporters. *Coal Age, October 2010

In December 2009, the late Sen. Robert C. Byrd (D-WV) pens an opinion piece, *Coal Must Embrace the Future*. In it, he berates the coal industry for fear mongering and grandstanding. Coal's elder statesman, who was presented with the *Coal Age* Award 20 years early, lectures the coal industry and warns the miners not resist the changes that are inevitable as society moves to biomass and natural gas.

Controversy Erupts over Mountaintop Mining

The new decade opened with a Sen. Byrd (D-WV) leading a rally of 1,000 to 2,500 miners on the steps of the U.S. Capitol to support mountaintop mining, which is more commonly known as mountaintop removal mining, in West Virginia. Several operations had recently resumed mining after the West Virginia Department of Environmental Protection lifted an order that halted the practice based on a 1999 court ruling.

Environmental activists appealed the decision by U.S. District Court's landmark ruling on mountaintop mining.

During December 2000, a three-judge panel heard arguments for and against overturning the ruling. They ruled that they lacked jurisdiction over the state's mining laws. The environmental activists appealed that decision to the U.S. Supreme Court, but it refused to hear the case.

The same federal court in West Virginia then ruled that placement of waste from mountaintop mines in valleys (or valley-fills) violated the Clean Water Act. The ruling bars the Army Corp of Engineers from issuing the crucial 404 permits needed for mountaintop mining.

During June 2009, the Obama administration announced it was taking unprecedented steps to reduce the environmental impacts of mountaintop mining through a coordinated approach between the EPA, the Department of the Interior and the Army Corps of Engineers. The decision effectively placed 79 applications for Appalachian surface mining permits in limbo.

The EPA uses its "authority" to revoke a permit that had already been issued for Arch Coal's Spruce No. 1 mine. Tempers flare throughout Appalachia as the Obama EPA oversteps its bounds.

High Profile Disasters Tarnish a Dramatic Improvement in Safety

Dave Lauriski replaces Davitt McAteer at the Mine Safety and Health Administration (MSHA). Prior to this appointment, Lauriski served as general manager of Energy West Mining in Utah, and director of health, safety, environmental and governmental affairs for Interwest Mining. He was part of the mine safety team at the Willberg mine fire in Utah in 1984.

In September 2001, explosions rip through Jim Walter Resources' Blue Creek No. 5 mine. The mine, probably the deepest and gassiest in the nation, suffers two explosions on September 23, and a subsequent fire, killing 13 miners. The disaster is the worst to occur since the Willberg mine fire. The event is over-shadowed by the September 11 terrorist attacks and doesn't receive much media attention.

In July 2002, nine miners are rescued from an inundated Quecreek mine in Pennsylvania. In an exclusive, the engineers responsible for locating and rescuing the miners describe to *Coal Age* how they approached and solved the problem. Basically a surveyor went into a cornfield with a GPS unit and said, "If they are alive, they are here." He was correct. The rescuers brought drill rigs onto the site and dropped a rescue capsule and retrieved all nine miners—alive. The mine rescue received a lot of media attention. The happy ending, rare for coalfield tragedies, briefly changes the perspective for mine rescue operations. They would soon be sorely disappointed.

Lauriski steps down and Labor Secretary Elaine Chao appoints David G. Dye acting secretary for mine safety and health in November 2004. While there were some complaints about Lauriski's performance, especially from the UMWA, fatality rates remained low during his tenure even with the Jim Walter Resources explosion.



*Coal Age, January 2006

MINER Act Signed Into Law



President George W. Bush signs the Mine Improvement and New Emergency Response (MINER) Act into law at a White House ceremony June 15, 2006, while Sago mine survivor Randy McCloy and his wife Anna, look on. (Photo: White House)

U.S. Secretary of Labor Elaine L. Chao attended the White House ceremony on June 15 at which President George W. Bush signed the Mine Improvement and New Emergency Response (MINER) Act into law. "The Mine Improvement and New Emergency Response Act is the most significant mine safety legislation in nearly 30 years," said Secretary Chao. "It builds upon efforts by the Mine Safety and Health Administration (MSHA) to improve mine safety nationwide, and calls for the modernization of safety, health and develop-

ment of enhanced communication technology. We need to do everything we can to continue to improve safety in our nation's mines so miners can return home safely to their families at the end of their shifts."

The MINER Act represents the first revisions to federal mine safety laws since the Federal Mine Safety and Health Act became law in 1977. The provisions include:

- Requiring each underground coal mine to make available two experienced rescue teams capable of a one-hour response time;
- Requiring wireless two-way communications and electronic tracking systems within three years;
- Giving MSHA the authority to request an injunction to shut down a mine in cases where the mine operator has refused to pay a final MSHA penalty;
- Raising the criminal penalty cap to \$250,000 for first offenses and \$500,000 for second offenses, as well as establishing a maximum civil penalty of \$220,000 for flagrant violations;
- Creating a scholarship program to mitigate an anticipated shortage of trained and experienced miners and MSHA enforcement personnel; and
- Establishing the Brookwood-Sago Mine Safety Grants program to provide training grants to better identify, avoid and prevent unsafe working conditions in and around mines.

For more information on how the MINER Act will affect the coal industry, see *Legislative Update* on pg. 22.

In related news, the National Mining Association (NMA) recently announced that it would host a series of regional showcases this summer to assist

* *Coal Age*, June 2006

On January 2, 2006, an explosion at ICG's Sago mine in West Virginia kills 12 miners. Shortly after that tragic event, two more incidents in West Virginia take the lives of four more miners. West Virginia begins to pass mine safety laws in a knee-jerk reaction. *Coal Age* reports that Dye bungles a Senate mine safety hearing, which only motivates Senators to take similar actions on a federal level. President Bush nominates Richard Stickler as the new head of MSHA, but the Senate does not confirm him.

Another explosion occurs at the Darby No. 1 mine killing five more miners on May 20. Two more fatalities brought the year-to-date total to 33 by the end of May.

On June 15, 2006, President Bush signed the Mine Improvement and New Emergency Response (MINER) Act into law. It represents the first revisions to the federal mine safety laws since the Federal Mine Safety and Health Act became law in 1977. The provisions include:

- Requiring each underground coal mine to develop and continuously update a written emergency response plan;
- Requiring each underground coal mine to make available two experienced rescue teams capable of a one-hour response time;
- Requiring wireless two-way communications and electronic tracking in three years;
- Giving MSHA the authority to request an injunction to shut down a mine in cases where a mine operator has refused to pay a penalty;
- Raising the criminal penalty cap to \$250,000 for first offenses and \$500,000 for second offenses, as well as establishing a maximum civil penalty of \$220,000 for flagrant violations;
- Creating a scholarship program to mitigate an anticipated shortage of trained and experienced miners and MSHA inspectors; and
- Establishing the Brookwood-Sago mine safety grants program to provide training grants to better identify, avoid and prevent unsafe working conditions in and around mines.

President Bush uses a Senate recess to appoint Stickler to head MSHA during October 2006. He was previously director for the Pennsylvania Bureau of Deep Mine Safety. Stickler has more than 37 years of mining experience, including the management of underground and surface mining operations. Stickler will be responsible for administering the MINER Act of 2006.

On Thursday, August 16, 2007, a significant bounce killed three rescue workers, including one MSHA inspector, trying to locate six miners at the Crandall Canyon mine in Utah. The six miners were unaccounted for after the mine suffered a large cave-in on the morning of August 6. The owner settles with the survivors for an undisclosed amount. The media reports it is the largest settlement in Utah's mining history, which would be greater than the \$22 million settlement paid for the Willberg mine fire that killed 27 miners in 1984.

MSHA begins to more closely monitor compliance records and begins to issue warnings for potential patterns of violations during June 2007—a law that had been rarely used up until now. Of the seven mines that received the letters, five showed a dramatic reduction in S&S violations by the beginning of 2008.

During the two years since the MINER Act has been enacted, MSHA has published four final rules (mine seals, rescue teams, civil penalties and emergency evacuation) and during June 2008 it proposed two more (refuge alternatives and belt air).

Despite a backlog of more than 9,000 cases before the Federal Mine Safety and Health Commission, Stickler advocates a more aggressive approach on enforcement. The coal operators begin to push back and contest every violation that MSHA cites tying up the courts.

President Obama appoints Joseph A. Main, assistant secretary for Mine Safety and Health. Main worked as an advocate for miner safety under the UMWA for 22 years. Main soon finds himself in front of Congress explaining a backlog of contested citations. At the time, there are 16,000 cases before the Federal Mine Safety and Health Commission with at least \$195 million in outstanding fines. In 2006, the backlog was 2,100 cases.

On April 9, 2010, Massey Energy's Upper Big Branch mine suffers an explosion, which kills 29 miners. It would become the worst mining disaster since the 1970 Finley Coal Explosion that killed 38 miners in Kentucky. More than 2,000 people, including President Obama and Vice President Joe Biden, gathered in Beckley, W.Va., to mourn the tragedy.

In the wake of the worst mining tragedy in 40 years, both Massey Energy and MSHA prepare to defend their actions or the lack thereof. Correctly determining who or what was at fault and the chain of events that led to the explosion will have long-term



President Obama and Vice President Biden watch West Virginia Gov. Joe Manchin escort a widow as she places a hard hat on a cross. * *Coal Age*, May 2010

implications for the coal business and the fate of Massey Energy. Ultimately, the investigation determines that a poorly maintained shearing machine sparked a methane ignition that propagated through a mine with hazardous levels of coal dust accumulations.

Acting on orders from the president, Main begins a nationwide inspection blitz on underground coal mining operations. Underground coal operators are besieged with enforcement activity the likes of which they have never seen before. MSHA uses every tool at its disposal to try and find the next potential disaster and eliminate it.

An Organized UMWA Gets What it Wants

In mid-December 2001, the UMWA and the BCOA reached an agreement on a new national contract, more than year before the old five-year accord was set to expire. The new five-year agreement would run through December 31, 2006, ensuring labor peace in the coalfields for another five years. Active union miners now stand at 26,000. Overall the contract covers more than 100,000, which includes laid off miners and retirees.

The UMWA ratified the next collective bargaining agreement with the BCOA during December 2006 with an unprecedented 80% voting in favor of the agreement. CONSOL Energy is the only member of the BCOA at this point. The new five-year agreement offers a 20% increase in pay across the board, \$1,000 bonus (paid immediately), \$10 per month per year increase for future retirees and full health care for active and retired miners and dependents. Underground miners working at the top rate will now earn \$24.42/hour in the final year of the contract.

Developments in Surface Mining

The decade opens with Bucyrus International launching the 495BII electric shovel that has a 100-ton-per-pass nominal payload.

Cat launches the MineStar system, an integrated information system that links mining machines with business applications. Modules provide tracking for truck assignments, machine health, production and overall business planning. It uses several technologies, including GPS, high capacity wireless mobile communications, onboard computers and office software.

Superior Highwall Mining revives the Metec system for recovering coal from seams exposed at the highwall base.

Mounted on crawler pads, the system pushes a continuous miner cutter head into the coal seam while a set of enclosed twin screws auger the coal back to the surface. A slewing conveyor stockpiles coal on the bench. The machine can cut the full width of the cutter head to about 1,000 deep into the mountain. It leaves a fender in place to support the mountain. Some mines pumped the void full of concrete (or flyash) and then return to pull the fender.



*Coal Age, January 2006



Contour Mining's Powelton highwall miner averages more than 60,000 tons per month.
*Coal Age, August 2009

On Friday, December 17, 2004, Arch Coal's Black Thunder mine achieved the 1-billion-ton shipment milestone. During the 27-year life of the mine, it has loaded more than 71,000 trains. Stretched end-to-end, the trains would circle the equator more than three times.

Digital electronic detonators for use in blasting have been on the market for more than six years. During the early part of this decade, they have gained widespread acceptance.

During 2003-2004, BNI Coal's Center mine completes construction of America's first new dragline in more than a decade. The first sections of the Liberty dragline's tub assembly arrived during March 2003 and the machine begins operating in October 2004. An article in the March 2005 details the erection process from start to finish.

P&H launches the C-Series of electric shovels and rotary blasthole drills. According to the company, the C series deliver substantial improvements in three key areas—control, comforts and consistency—with improved performance enabled by the Centurion Control System. Centurion's monitoring and diagnostics capabilities translate into improved machine health, reliability and safety.

Cat breaks with the mechanical drive tradition and launches the 345-ton 795F electric-drive haul truck. The company says its customers want a Cat truck and it sees the addition of an electric drive as a complementary move.

Most of the haul truck manufacturers are working on improving the machine's visibility. Several object detection systems are tested. The hope is that the trucks will be able to detect smaller objects in their immediate vicinity, other equipment such as trucks on the haul roads and the electric shovels, and large stationary items, such as the truck dumps. Some of the most sophisticated systems use a combination of radar and front- and rear-view cameras to improve operator visibility.

Underground Mining Equipment

During May 2000, Fletcher debuts new roof bolting technology. The company offers the Quad Ranger, a new four-head bolter, and also discusses its new Feedback Control System. The system uses a microprocessor to perform the same tasks as a PLC in a much more reliable and cost-effective package. It incorporates manual control input with the feedback driven drill and bolt cycles.

After receiving approval from West Virginia mining authorities, Peabody Energy's Rivers Edge mine in Boone County,



Wetzel Davis operates one of Coal River's continuous miner units in Mine No. 10. **Coal Age*, February 2011

W.Va., becomes the first mine in West Virginia to deploy diesel-powered technology underground during July 2003.

In October 2003, Joy Mining Machinery announced a major breakthrough. It was applying AC variable frequency drives (VFDs) to shuttle cars, which would provide significant increases in power, speed and productivity.

In 2000, U.S. longwall population falls to 59. Throughout the decade, the total number of longwalls would hover between a low of 49 and 55. Total production and productivity continues to improve.

The Joy 7LS shearer had become very popular among longwall operators. When the system was introduced in the late 1990s, Joy hailed it as a breakthrough as far as longwall haulage. The system also relies on VFDs, which gives the operator absolute speed control with providing greater speed for cutting and flitting. When Joy acquired American Longwall it also gained the knowledge necessary to improve the hydraulic cylinders on the ranging arms. With an improved electronics package, the system provides extreme overload capability to the AC drive.

Spurred by the MINER Act of 2006, integrators and OEMs gain approval for various new communication and tracking systems for underground miners. While the range and other specifications have not yet been clearly defined, by December 31, 2007, MSHA has observed 27 communication systems at various mine sites. In general, the technologies can be divided into leaky-feeder (with a redundant backbone), self-healing mesh systems and through the earth (TTE) technologies. In less than 18 months, modern communication equipment was being installed in underground coal mines.

Coal Preparation

The advent of high-capacity processing equipment, including multi-slope screens and large diameter cyclones, has enabled plant designers to install more raw coal processing capacity per unit of plant volume than ever before. Using modern high-capacity equipment also reduces maintenance time and feed piping and chute work. Plant designers give more thought into making the area around the equipment easier to negotiate. They are more cognizant of overhead cranes and lighting.

Prep plant managers are also adopting widespread use of compound spirals to process fines. Spirals are popular because they are relatively easy to install, operate and maintain. They do not require reagents or magnetite. The biggest downfall is low capacity.

During 2008, *Coal Age* reported the business of building prep plants was brisk with a record number of orders for new plants and upgrades. Many of those projects were completed before the market softened in 2009. The total population of U.S. prep plants now stands at 283.



PrepTech bank of double-start spirals with a distributor on top. **Coal Age*, December 2005

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And Then There Were Two...

Harnischfeger emerges from bankruptcy as Joy Global. The company used bankruptcy to reorganize during mid-May 2000 and returns to the mining market as a financially and operationally healthy company. In February 2008, Joy Global acquired Continental Conveyor.

Bucyrus International announced during December 2006 it had signed a definitive agreement to acquire Deutsche Bergbau Technik (DBT), a subsidiary of RAG International in a deal valued at \$731 million. DBT had recently purchased Long-Airdox from the Marmon Group. Similar to a move made by Harnischfeger in the 1990s, a primarily surface-oriented OEM acquires a primarily underground-oriented OEM. The difference is that both of these companies have extensive business platforms abroad.

In December 2010, Bucyrus acquired Terex's Mining Division for \$1.3 billion. The transaction makes Bucyrus the largest supplier of mining equipment. In addition to the company's existing line of draglines, electric shovels, drills, conveyor systems and underground mining machinery, the transaction would add hydraulic excavators, haul trucks and highwall miners.

During October 2010, Caterpillar announces it entered into an agreement valued at \$8.6 billion to acquire Bucyrus International. It would take nearly nine months for the two companies to consummate the transaction. Cat relocates its Global Mining headquarters to South Milwaukee and begins to assimilate the Bucyrus product line. The Bucyrus name suffers the same fate as all of the brands it had acquired.

Coal Age's Path Mirrors that of the Industry

Steve Fiscor replaces Art Sanda as editor-in-chief of *Coal Age* in April 2000. While the magazine begins to offer consistent photography on the cover, the publisher (Primedia) begins to skimp on quality, printing the magazines on thin, poor quality paper and cutting back on the number pages and the number of magazines printed. For the October 2002 edition, Primedia publishes a 38-page edition of *Coal Age*. The company's mindless pursuit of numbers becomes a self-fulfilling

prophecy as the market begins to doubt the publisher's commitment.

In June 2003, Primedia decides unilaterally to close *Coal Age* and *Engineering & Mining Journal (E&MJ)*. After fighting for the magazines and the people who worked for him, Fiscor is down-sized and *E&MJ's* managing editor writes *Coal Age's* epitaph. Primedia would continue to publish *Coal Age*, even though it had already pulled the plug on *E&MJ*. Primedia published a final combined July-August edition of *Coal Age*.

A private investor (Peter K. Johnson) purchased the titles and their ancillary properties. He and Fiscor form Mining Media International and immediately begin efforts to restore the properties. In September 2003, Mining Media publishes its first edition of *Coal Age*, which reverted back to the standard minimum of 52 pages. In it, Johnson issues a publisher's statement:

"We at Mining Media are pleased to bring you, the readers, our first edition of *Coal Age*. Our entire team is committed to delivering you a quality publication each month."

Technically, the magazine never went out of print. *Coal Age* survived two world wars, and a depression, but once again desperate publishing executives made broad-brushed decisions that nearly rendered the title extinct. Many other industrial titles were not as fortunate and did close.

Under Mining Media, *Coal Age* began to flourish again. Fiscor and Johnson recruited a top-notch editorial and advertising sales team. The editorial office was relocated from Chicago to Jacksonville, Fla., further reducing overhead. Readership levels were restored. The quality and thickness of the paper were improved substantially. Once the industry saw Mining Media breathing new life into the publications, they wanted to be a part of it too.



*Coal Age, April 2000





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NAVIGATING THE WORLD'S LARGEST MINING EXPOSITION

MINExpo 2012 will offer education sessions that cover a wide range of mining topics

BY GINA TVERDAK, ASSOCIATE EDITOR

The mining industry will soon descend upon Las Vegas with one goal in mind: MINExpo INTERNATIONAL 2012. Scheduled for September 24-26 at the Las Vegas Convention Center, the show has already posted record-breaking numbers. More than 1,800 exhibitors in 12 exhibit halls in 850,000 square feet of indoor and outdoor exhibit space will display the latest technology, equipment, components, parts and services for exploration, extraction, safety, and environmental remediation of coal.

But MINExpo isn't just about the new products and services. This year's show offers two days of educational sessions that cover the entire mining business, and special award ceremonies will recognize mine safety, reclamation and historical achievements.

Monday, September 24

MINExpo INTERNATIONAL 2012 Opening Session

10:00 a.m. - 11:30 a.m./Room S223, South Building,
Las Vegas Convention Center

Mining is the beginning link in the global supply chain for the metals, minerals and energy required to sustain economic growth and security around the world. Showcasing that role is the theme of the Opening Session of MINExpo INTERNATIONAL 2012. The Opening Session is included in the registration fee and all show attendees are invited to hear chief executives of four of the world's biggest mining and mining equipment companies discuss "The global supply chain for coal and minerals, where we have been and where we are going."

Speakers

- Richard Adkerson, president and CEO, Freeport-McMoRan Copper and Gold
- Gregory Boyce, chairman and CEO, Peabody Energy Co.

- Richard O'Brien, CEO, Newmont Mining Corp.
- Mike Sutherland, president and CEO, Joy Global

Introductions

Hal Quinn, president and CEO, National Mining Association

Moderator

Dr. Jeffrey Garten, Juan Tripp Professor of International Trade, Finance and Business, Yale University School of Management.

Tuesday, September 25

Bulk Materials Handling

8:00 a.m. - 10:00 a.m./Room N257, Upper Concourse

United Manganese of Kalahari Case Study
James Harrison, managing director, Taggart JDHA Engineering Pty, Ltd.; and David J. Morris, general manager, Africa-India, Taggart Global LLC

Addressing Plugging, Wear and Spillage at Transfer Chutes

Thomas G. Troxel, vice president, and Jayant Khambekar, Ph.D., project engineer, Jenike & Johanson, Inc.

Coal #1

8:00 a.m. - 10:00 a.m./Room N259, Upper Concourse

Technology Improves Bolting in South Africa

Craig Collins, assistant R&D manager, J.H. Fletcher & Co.

Communications Systems: A Risk Management Approach to Achieving Production and Safety Goals

Denis Kent, business development manager, Mine Site Technologies Inc.

Improved Polymer Coating for Inflatable Bolting Products used in Corrosive Environments and

Modernized Advancements in Technology for Underground Coal Mining Rock Dusting Activities
Renn Oler, engineering director; and Jim Pinkley, president and general manager, DSI Underground Systems, Inc.

Increased Safety through Collaborative and Comprehensive Design of a New Longwall Entry Development Machine

Steve Bessinger, manager engineering/production planning, BHP Billiton San Juan Mine 1; and, J.J. Leeming, global product director miner bolters, Joy Global

Exploration

8:00 a.m. - 10:00 a.m./Room N255, Upper Concourse

To be announced.

Markets

8:00 a.m. - 10:00 a.m./Room N261, Upper Concourse

The Global Iron Ore Market

Donald J. Gallagher, executive vice president, president—global commercial, Cliffs Natural Resources

The 2012 Uranium Market

Treva Klingbiel, president, Trade Tech

Safety #1

8:00 a.m. - 10:00 a.m./Room N253, Upper Concourse

Research Products to Improve Mineworker Safety and Health

Jeffrey L. Kohler, Ph.D., director, Office of Mine Safety and Health Research, National Institute of Occupational Health and Safety

Safety Management Systems: CORESafety® a Model to Drive Continuous Improvement
Tom Hethmon, western mining presidential chair in mine safety and associate professor, University of Utah

Filling the Leadership Pipeline/Developing In-house Leadership Training Case Review: Alliance Resource Partners/Hopkins County Coal (Kentucky)

Philip Van Hooser, founder/president, Leaders Ought to Know

Automation

10:15 a.m. - 12:15 p.m./Room N253, Upper Concourse

Deployment of Autonomous Haulage Systems

James Humphrey, P.E., senior market professional—Mining Autonomy, Global Mining Division, Caterpillar, Inc.

Changing the Face of a Mine Company

10:15 a.m. - 12:15 p.m./Room N261, Upper Concourse

Prairie State Energy Campus: Next Generation of Coal-fueled Power

Peter DeQuattro, president and CEO, Prairie State Generating Co., LLC

Financing Alternatives for Mine Construction or Project Development

Nick Carter, president and COO, Natural Resource Partners, L.P.

Scalable Renewable Power Solutions for Remote and Integrated Mining Projects

Ron MacDonald, executive chairman, American Vanadium Corp.

Surface Mining #1

10:15 a.m. - 12:15 p.m./Room N259, Upper Concourse

The Effects of Inaccurate Drilling on D&B Costs and Blast Performance

Neal Lee, senior technical representative, and Jeremy Short, technical representative, Nelson Brother, LLC

Condition Monitoring of Shovel Equipment Impacts Profitability

George Kredel, project manager for Timken Services Group, The Timken Company; and Justin Pope, senior reliability maintenance technician, KGHM International Ltd., Robinson Nevada Mining Co.

Haulage Fatigue Management

Paul Boman, director strategic planning and regulatory compliance, Freeport-McMoRan Copper and Gold

Trailing Cable Management

Murray Duncan, account manager/applications, Mining Group; and Mark Fuller, senior technical manager, Mining Business Unit, NEXANS AmerCable

Underground Mining #1

10:15 a.m. - 12:15 p.m./Room N257, Upper Concourse

Mine Conveyance Safety Fall Arrest System for Use with Steel Shaft Guides – A Case Study

Dave Lunderstedt, Rio Tinto; Eric Boutin, P.Eng., PMP, senior mechanical engineer, product manager, Nordmin Engineering; and Andre du Preez, president, Horne Group

Short Interval Control in Today's Underground Mine: A Case Study

Charlie Forrest, business development executive and Fiona Carew, strategic account manager, Gemcom Software International, Inc.; and Rick Howes, COO, Dundee Precious Metals

New Technology Focus on Diesel Particulate Matter Reduction/Elimination

Curtis Pedwell, maintenance manager, Red Lake Gold Mines, Goldcorp, Inc.; and Stephen Rudinec, chief technology officer, heavy equipment group, Oldenburg Group Inc.

The Evolution of Thru the Earth Communications

Warren Gross, MagneLink program manager, Lockheed Martin; and Todd Moore, director of safety coal, CONSOL Energy

Water

10:15 a.m. - 12:15 p.m./Room N255, Upper Concourse

Save 25 Billion Gallons of Water and Increase Uptime

Chris Rehmann, mining business manager, AESSEAL, Inc.

Membrane Based Water and Wastewater Treatment Solutions

Paul Clayton, director, global mine water business development, Pall Corp.

Everything You Wanted to Know About Selenium, But were Afraid Someone Would Actually Tell You!

Steven P. Canton, vice president, GEI Consultants

Wednesday, September 26

Air

8:00 a.m. - 10:00 a.m./Room N261, Upper Concourse

Impact of Global GHG Regulations on the Operation of a Mining Facility

Katherine Blue, managing director, KPMG Sustainability Practice, KPMG LLP

Air Quality Modeling and Impacts on the Mining Industry: An Overview

Michael E. Long, director environmental regulatory strategy and analysis, Cliffs Natural Resources

Methane Mitigation at Underground Coal Mines—Overview of Technologies and Early Action Incentives

Raphaël Bruneau, director of carbon markets, Biothermica Technologies, Inc.; and Collon Kennedy, Esq., attorney, Ruby Canyon Engineering; and Michael Cote, president, Ruby Canyon Engineering, Inc.

Maintenance

8:00 a.m. - 10 a.m./Room N255, Upper Concourse

Bringing Maintenance & Operations Data Together

Justin Johnsen, project manager—maintenance systems, Modular Mining Systems

Isolation Verification – New Technologies

Chris Devine, director, RedbusBar

The Benefits of Using Waterless Coolant to Decrease Maintenance Costs, Save Fuel and Reduce Emissions

Mike Tourville, director of marketing, Evans Cooling Systems, Inc.

Truth, Trust & Tons—Solutions for the Hidden Cost of Reactive Cultures in the Mining Industry

Kay Sever, president, OPTIMIZ Consulting LLC

Processing

8:00 – 10:00 a.m./Room N259, Upper Concourse

Mongolian Mining Corporation's First to Build Large Scale Coal Mine in Tavan Tolgoi Basin

Andrew Little, technical director, Mongolian Mining Corp.; and John Trygstad, vice president, Norwest Corp.

Execution Excellence in Ore Processing
Lee J. Laviolette, partner and global capacities leader for operational excellence, Accenture

Safety #2

8:00 a.m. – 10:00 a.m./Room N253, Upper Concourse

Alternative Approaches to Workplace Injury and Illness Management

Peter Greaney, M.D., president and CEO, WorkCare, Inc.

Conservation in Mining Operations—Stuff You Need to Know and Why You Need to Know It

Elliott Berger, 3M

Surface Mining #2

8:00 a.m. – 10:00 a.m./Room N257, Upper Concourse

Advances in Bodies, Bins and Trays
LeRoy Hagenbuch, president, CEO and chief engineer, Philippi-Hagenbuch, Inc.

Surface Operations Improvement: How Do Mining Companies Stack Up on the Operation of Their Mining Fleets and How Can They Make Transformative Jumps in Their Performance?

Scott Blackburn, partner, McKinsey & Co.

Utilizing Technology to Reduce Mining Vehicle Incidents and Accidents

Neil Ferreira, product manager-fleet management, Modular Mining Systems

P&H LeTourneau-Series Wheel Loaders—Using EMERST Design Philosophies in Generation 2 Wheel Loaders

Mark Barr, general manager, wheel loading engineering, and Matt Collins, product manager, wheel loaders, Joy Global

Coal #2

10:15 a.m. - 12:15 p.m./Room N257, Upper Concourse

Dust Control Challenges and Technology Available for Control

Nick Fowler, global market manager mining, Quaker Chemical; and Glenn Lilly, longwall manager, Speed Mining, Patriot Coal Corp.

Dashan Coal Mine Closed-loop Industrial Park, Datong Coal Group, China

Guo Jingang, president, Datong Coal Group; Li Haumin, associate dean; Zhou Yin, vice president, Henan Polytechnic University; and Syd S. Peng, West Virginia University

Ground Control at Signal Peak Energy, Bull Mountain Mine

Brad Hanson, COO, Signal Peak Energy; and John C. Stankus, Ph.D., president, Keystone Mining Services

Highwall Mining: Design Tradeoffs—Economic Impacts

Bradley Charles Lewis, director of sales and marketing, ADDCAR

New Mine Developments

10:15 a.m. - 12:15 p.m., Room N253, Upper Concourse

To be announced.

Underground Mining #2

10:15 a.m. - 12:15 p.m., Room N253, Upper Concourse

High Capacity Continuous Haulage in Underground Mining

Brian Ziegler, product engineer, haulage systems, Joy Global

Deep Dark Secrets of Respiratory Protection for Mining Dust

Craig Colton, division scientist, Occupational Health and Environmental Safety Division, 3M

Continuous Improvement Focus on DPM Reduction at Stillwater Mining Company

Dee Bray, mine manager, Stillwater mine, Stillwater Mining Co.

Solid Waste

10:15 a.m. - 12:15 p.m., Room N259, Upper Concourse

Reframing Mine Waste Compliance Obligations Using High Quality Science

Gerald L. Kirkpartick, managing partner, Environmental Standards, Inc.

Design of the Eldorado Gold Efemçukura Filtered Tailings Facility

Dale Churcher, vice president, engineering, Eldorado Gold Corp.; and Richard Dawson, senior vice president, Norwest Corp., Calvin Boese, senior geotechnical engineer, Norwest Corp. and Karvin Kwan, senior geotechnical engineer, Norwest Corp.

Reclamation

10:15 a.m. – 12:15 p.m., Room N2261, Upper Concourse

Methodologies and Policy Framework for Establishing Post-mining Land Uses via Functional Water Features

Darryl Maunder, manager of environmental and regulatory affairs, Cloud Peak Energy

Award Luncheons

Two special luncheons will take place during MINExpo. The Sentinels of Safety Luncheon will take place Tuesday, September 25, from 12:30 - 2:00 p.m. The purpose of the annual Sentinels of Safety award program is to recognize achievement of outstanding safety records and to encourage development of more effective accident prevention programs among the nation's mineral extractive industries.

The U.S. Department of the Interior Awards Luncheon will take place Wednesday, September 26, from 12:30 - 2 p.m. These awards are the U.S. Department of the Interior's Office of Surface Mining Excellence in Surface Coal Mining Reclamation Awards and the Bureau of Land Management's Reclamation and Sustainable Mineral Development Awards. Tickets for both luncheons are required and cost \$45 each.



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HYDRAULIC TRACTION DRIVE PREVAILS AT STEEP INCLINES

Tough deposits need tough cutting machines

BY DR.-ING. ULI LANGE



A new Eickhoff CM2 is being offloaded in the box cut at Halfgewonnen.

About six years ago, Eickhoff introduced its CM2 series continuous miner into South African mines. More recently the machines have been cutting coal in low seam conditions (1.5 m) as well as high seams (4.5 m). All of them are equipped with modern hydraulic traction drives.

In South Africa, this hydrostatic transmission system faced challenging conditions and high inclinations where it could prove its great potential, toughness and reliability while propelling a cutting continuous miner uphill, which was reassuring in such undesirable geology.

The tramming and turning functions of a CM2 are shown in Table 1. The designers put a special emphasis on hydraulic functions to come up with both simple and robust solutions that are smart enough to save energy and oil, but at the same time, meet the operators' demands for more power as well as faster tramming speed and proportional sumping and cutting.

The unit's hydraulic circuit consists of two requirements. Some cylinders and

hydraulic motors need a constant volumetric flow rate and pressure, while others vary in speeds or have varying loads and therefore require a continuous adjustment of volumetric flow and pressure.

The central valve block (See Figure 1, No. 1) includes conventional on-off-valves for manipulating the conveyor, spade and stabilizer cylinders (See Figure 1, Nos. 1, 2, 3 and 4). Proportional valves in the valve block are part of sumping and shearing control loops protecting the cutter motors and cutter gearboxes. These control loops measure the cutter motor currents while the machine sumps into the face and shears down simultaneously. Once the cutter motor currents exceed the adjustable threshold, relevant proportional valves close. Accordingly the boom (See Figure 1, No. 5) decelerates its movement and the traction motors (See Figure 1, No. 6) push the machine more gently forward to relieve the cutter motors of load just until their

currents drop off peak and return to normal level.

The main hydraulic pump (See Figure 1, No. 8) is a variable displacement pump driven by a 125-kW AC motor (See Figure 1, No. 7). Both are part of the load-sensing circuit which automatically adjusts the volumetric flow according to the load on the respective cylinders and hydraulic motors. Instead of using a simple bypass system, the variable displacement pump avoids significant heat losses—saving energy which has a positive impact on the availability and lifetime of the continuous miner. The oil simply does not overheat because only the required amount of oil is pumped toward the actuator.

In addition to the main pump, an auxiliary gear wheel pump (See Figure 1, No. 9) serves those motors which require a constant volumetric flow rate and pressure as is the case with the dust scrubber unit (See Figure 1, No. 10).

Several tanks (See Figure 1, No. 11) in a serial setup with the main tank containing a pressure relief valve, a level indicator and a temperature sensor are part of the protection system. Filters (See Figure 1, No. 12) continuously clean the oil while differential pressure gauges indicate filter condition. The refilling unit (Figure 1, No. 13) consists of a filling filter and small hydraulic motor driving a pump that can easily be used by the operators to recharge the machine with new clean oil. Even though the traction motors are hydraulically driven, the entire hydraulic circuit only contains a relatively small amount of hydraulic oil (600 l).

Heat exchangers (See Figure 1, No. 14) cool the oil as long as the water supply is maintained at the required levels. In the case of tramming the machine without water, the continuous miner is designed to drive through the section for at least 20 minutes at moderate ambient temperatures. If tramming distances are

expected to be longer, an optional auxiliary heat exchanger integrated within the dust scrubber can cool the oil and extend the travel distance.

The hydraulic scrubber motor (See Figure 1, No. 10) can vary in size individually suiting the customers' requirements for volumetric air flow according to any extraction heights. This type of motor is considerably less noisy than electrical comparatives and can run in silent mode while tramming the machine.

Field Proven Facts

Just like wheel loaders, continuous miners usually move slowly requiring high pulling forces while at the same time often have to change the moving direction so that they almost permanently operate under varying working conditions [Fecht 2009, p.20]. Hydrostatic transmission drives have prevailed against hydrodynamic or mechanical systems at slow and dynamically moving mining machinery because of their productivity [Renius 2003, p.1]. Hydrostatic transmission meets the demands for maneuverability and a broad range of torque-speed conversions [Rydberg 1998, pp.1-2]. The hydraulic system provides high starting torque, which is important for sumping into hard coal or sumping uphill, as well as fast tramming speeds for quick place change operations in a room-and-pillar section.

More advantages of the hydrostatic transmission are:

- *Easy overload protection:* Protection of the hydraulic circuit against shocks is achieved by pressure relief valves.
- *Less shock on the gearboxes:* Hydraulic motors have a very low rotating inertia compared to electric motors which delivers an advantage when it comes to external blocking.
- *Easy to measure and maintain:* Measurements of wear at the hydraulic motors through optical leak oil flow meters (glasses). Generally hydraulic motors in this power class have an approximately tenfold increased power to weight ratio compared to electrical applications. In case of wear, hydraulic motors can easily be changed underground as their weight is a mere 80 kg.
- *Lower investment:* Hydraulic motors in this power class are five to 10 times less expensive than electrical motors and in addition highly priced inverters are not necessary. As long as the oil is kept

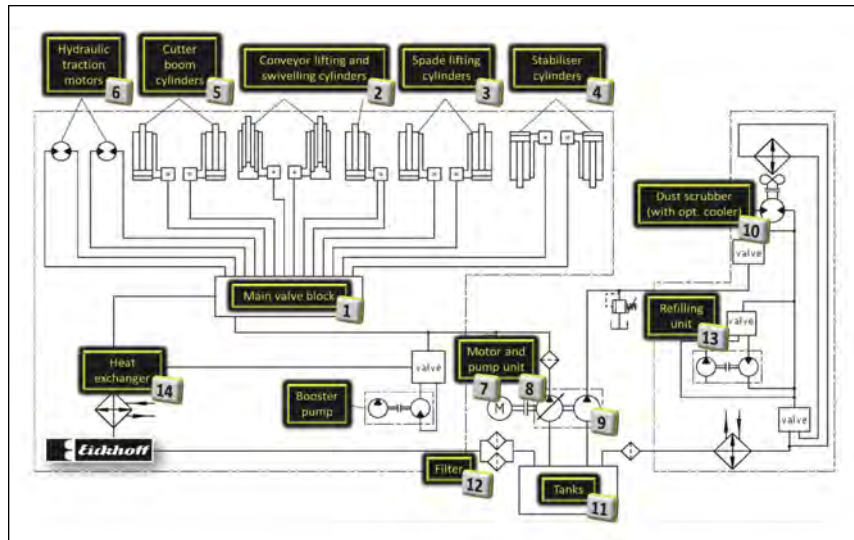


Figure 1: Hydraulic scheme of an Eickhoff continuous miner.

#	Description	Driven by	Type	CL
1	Turning the cutter drums	2 (M)	⚡ ⚡	
2	Proportionally shearing down	2 (M)	💧 💧	
3	Stabilising the machine	2 (M)	💧 💧	
4	Proportionally sumping in			
5	Slowly moving and turning the machine	2 (M)	💧 💧	
6	Fast tramming			
7	Lifting and lowering the spade	2 (M)	💧 💧	
8	Turning the CLAs and the conveyor chain (foot shaft drive)	2 (M)	⚡ ⚡	
9	Lifting the conveyor boom	2 (M)	💧 💧	
10	Swivelling the conveyor boom	(M)	💧	
11	Providing hydraulic flow and pressure	(M) (P)	⚡ 💧 💧	
12	Water circuit for cooling and dust suppression	(M)	💧 💧	
13	Ventilation with fan and dust scrubber	(M)	💧	
14	Re-filling with oil	(M)	💧 💧	

⚡=Electric, 💧=Hydraulic, CL=Control Loop

Table 1: Moving and turning functions of an Eickhoff continuous miner.

- clean, the hydraulic motors have a better Mean Time Between Failure than VFD drives.
- *Less electrical issues:* Especially when operating in water and muddy floor conditions a hydrostatic transmission is advantageous because there is no possibility of earth faults. Eickhoff continuous miners are driven by two hydraulic two-stage axial piston motors. The fast tramming mode at 25 to 30 m/min still has sufficient torque for travel-



The crew—the machine—the outcome.

ling through dips. Speed and torque can be adjusted to the individual mining conditions by setting the minimum displacement at the motors. In normal tramming mode at 10 m/min, the torque is sufficient to climb up very steep roadways as described later on.

Experts optimized hose cross sections, fittings' shapes and found best hosing for minimum bending in order to reduce energy dissipation due to inner friction down to an inevitable minimum.

Uphill Mining at Halfgewonnen

Halfgewonnen Colliery is a room-and-pillar coal mine owned by Sudor Coal and the

underground workings are operated by the STA Coal Mining Co. The mine is located 20 km north of Bethal in South Africa's Witbank-Highveld coalfield east of Johannesburg in Mpumalanga. This coalfield is characterized by flat to slightly undulating seams that are penetrated by sills and dykes up to several meters thick. In some areas tilting and vertical displacements occur [Jeffrey 2005, pp.95-97]. The coal deposit comprises four seams which form a syncline in this area. The life of the mine amounts to about 15 years according to its current mining leases.

Ever since the mine started operating in October 2006 it has successfully used

Eickhoff continuous miners. The two underground sections of the mine have an annual output of approximately 1.2 million metric tons run-of-mine (RoM) coal which is extracted by 107 underground and surface personnel operating two continuous miners.

Access to the No. 2 seam is done via a 50-m deep box cut. Initially the mine developed this 3- to 3.5-m seam along the bottom of the syncline in a north-easterly direction. To access further reserves lying to the northwest of the syncline required uphill mining at a gradient of about 9° over a length of 520 m or 34 pillars. In certain areas the Eickhoff continuous miner had to cut uphill on inclines of more than 10°. Typical room-and-pillar mines in steep seam mining applications advance in the dip direction of the seam [AUSIMM 2009, pp.325] instead of the uphill direction.

This performance is proof of the CM2's engineering and hydraulic system, and how an operator can rely on it when it comes to challenging mining conditions.

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THE GROWING POPULARITY OF SUSTAINABLE MINE RECLAMATION

BY WENDY SCHLETT



Afforestation or reforestation of a mining area are both specific types of carbon offset projects well-suited for sustainably reclaiming mined areas.

The concept of sustainability continues to gain traction in every industry, including mining. Even though mining typically brings up ideas that conflict with the tenets of sustainability, specifically extracting non-renewable resources from the earth, it is becoming more and more possible to reconcile the two.

Sustainable mine reclamation ensures that the surface of the earth is not left to rejuvenate itself, thereby mitigating potentially contaminated and unusable land that previously lay fallow for ages by past mining reclamation practices. Now, new uses for mined land are being considered before mining even commences, and more opportunities and emphases are being placed on thinking about these future uses with sustainability in mind.

Sustainable practices are growing in popularity, and not just for altruistic reasons. While these practices incorporate

the pace of a growing population that is informed and active in ensuring a thoughtful and careful approach to natural resources, they can also simply be more practical and fiscally sensible.

Simple Principle

This aspect of sustainability is often unrecognized, but in fact the definition of sustainability is much more pragmatic. The concept of sustainability is not based on uncompromising idealism that requires the land to be left untouched by humans. In fact, the United States Environmental Protection Agency describes sustainability as “based on a simple principle: Everything we need for our survival and well-being depends, either directly or indirectly, on our natural environment. Sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony, that permit fulfilling the

social, economic and other requirements of present and future generations. Sustainability is important to making sure that we have and will continue to have, the water, materials and resources to protect human health and our environment.”

A new business model, commonly known as the Triple Bottom Line, has evolved from the sustainability efforts pursued by progressive companies that focus on technology, information and new forms of value creation. The Triple Bottom Line incorporates the three pillars of sustainability—financial prosperity, environmental stewardship and social responsibility—and in this model these pillars work together to simultaneously influence business decisions.

By paying attention to the Triple Bottom Line, organizations can effect positive change that includes enhanced public support, increased profitability, reduced and better controlled risk, minimized environmental impact, increased brand value and reputation, and overall improved global standing to operate and grow. Given all of these positive outcomes, it stands to reason that sustainable business models are growing in popularity.

Once it is understood that sustainable practices work to meet several goals, it becomes easier to recommend and implement such practices. Mine reclamation can and should be re-examined from a sustainability framework. Especially given the current economic climate that has effectively narrowed the possibilities for viable mine reclamation projects, incorporating sustainable practices in mine reclamation will offer mineral producers financial, environmental and social benefits.

While not always possible, greater efficiencies can be realized if mine operators think about the reclamation process before mining even begins. This

allows for the possibilities of re-using certain materials and doubling positive outcomes. Understanding the natural footprint of the land to be mined is also helpful toward achieving sustainability goals—by being more realistic about what the land can and cannot accomplish once it is mined will help to keep costs low and overall production and post-production efforts less arduous.

Identifying Specific Needs

In this line of thought, it makes sense that there is a movement within sustainable mine reclamation to return the land to something not unlike its former self, rather than attempting to create something brand new and unrecognizable. In many cases, this can be achieved by working in concert with the local community to determine what their needs might be, and then repurposing the mined site to meet those needs.

As an example, the community surrounding a mined site may identify a new neighborhood park as a local need. By knowing this at the outset of developing and/or reclaiming the mined land, the organization and the community can work together harmoniously to determine the vision and potential limitations of the project. Other options a community might consider as helpful alternatives to a former mined site could include a water reservoir, viable industrial park, public recreational trails through a reforested area, or a similar project. For a mineral producer that can develop a positive relationship with the community in which it operates, and can identify a project that mutually benefits that community as well as the producer, more benefits abound. Good will and a reputation for social responsibility go a long way toward company growth and market advantage.

In addition to partnering with the local community, non-profit organizations should be considered, as they offer resources toward sustainable mine reclamation projects as well. Working with groups such as the Wildlife Federation, the U.S. Fish and Wildlife Service, The Nature Conservancy and other federal, state or local nongovernmental agencies can help identify the best possible end use for the

reclaimed mine—whether that be the creation of habitats that encourage biological diversity, endangered wildlife protection, or an ecosystem that fosters the growth of local but rare plant species. These organizations can offer planning and expertise, and can also help with providing volunteer labor.

Additionally, partnerships between mine operators and nongovernmental organizations can provide economically positive outcomes. These partner organizations offer grant funding and tax or impact mitigation credits and incentive knowledge that can help make a sustainable mine reclamation project that much more financially feasible.

In addition to the options already mentioned, another option for reclaiming mined land sustainably is by creating a wetland bank. This could qualify the land to generate wetlands credits. In this scenario, a pre-approved wetland bank would allow developers and/or mine operators to secure wetland mitigation credits for developments that impact wetlands in other locations. The credits finance the development and maintenance of the sustainably reclaimed mine as a wetland bank. Once established, the wetland bank could then be donated to a non-profit organization such as the U.S. Army Corps of Engineers, the EPA, or the U.S. Fish and Wildlife Service for long-term maintenance and operation.

Carbon-offset opportunities are another sustainable end-use in the reclamation of mined land. Carbon offsets reduce carbon dioxide or other greenhouse gas emissions in a balancing act to compensate for a carbon emission made elsewhere. Companies, governments and other organizations that need to comply with carbon dioxide caps make up one of the markets for carbon offsets. Companies, governments and individuals can also purchase carbon offsets to offset their own greenhouse gas emissions that result from everyday activities.

Afforestation and reforestation of a mining area are both specific types of carbon offset projects well-suited for sustainably reclaiming mined areas. In addition to the environmental benefits these projects produce—improved air and water quality, reduced soil erosion, and a generally lessened impact of global

warming through carbon storage—afforestation or reforestation projects can also offer new jobs, new streams of revenue and improved local economies.

In one example, abandoned and previously reclaimed coal mines in the Appalachian region were reforested through a project that brought together the University of Kentucky, the U.S. Forest Service and the Office of Surface Mining and Reclamation Enforcement. These sites proved excellent locales for enhanced terrestrial carbon sequestration.

Financial Rewards

Sustainably reclaiming a mine can also benefit mine producers financially through their eligibility for other tax credits (especially the Brownfields tax credit), and through an increased value of the land. In one example, by transforming the land into an ecological landscape that promotes long-term preservation through land restriction and charitable donation, the land qualifies for a tax credit that can offset corporate profits. This type of project will also positively restore the land's ecosystem, which will in turn increase the overall value of the land. If the land is then donated to the local community or a charitable organization, a higher tax credit for the land could be realized.

With the multitude of possibilities available toward reclaiming mined lands sustainably, it is no wonder that sustainable mine reclamation is growing in popularity. Sustainable mine reclamation projects allow a mine producer to develop something new and worthwhile, that supports the organization's goals and the betterment of the community in which they operate. Sustainable mine reclamation projects also create financial prosperity, environmental stewardship, and social benefits—thereby creating a positive Triple Bottom Line for the producer, the community and the environment.

Wendy Schlett is a project manager for Sustainability, Environmental Management Systems and Environmental Regulatory Compliance at GZA GeoEnvironmental, Inc. (www.gza.com). For more information, contact Ms. Schlett at 616-956-6123 or by email: wendy.schlett@gza.com.

McLANAHAN INTRODUCES FILTER PRESS TECHNOLOGY AND SERVICE



McLanahan has launched its first line of filter presses.

McLanahan Corp. recently launched its first line of filter presses which are designed, manufactured and serviced directly from the U.S. These fully automatic systems provide the most efficient, cost-effective fines dewatering solution in the industry, according to McLanahan. Using filter presses eliminates the need for slurry ponds and a full time operator. The units produce a dry cake and use less chemicals than convention tailings management systems.

This technology dewateres fines by treating the underflow of a thickener. Several different options are available in regards to the design of the machine. Both overhead beam and side beam designs are available and can feature either recessed chamber filter plates or membrane filter plates with a wide range of available pressures from 225 to 725 psi. Other options include core blow systems and automatic wash systems. McLanahan has developed a Smart Hydraulics system that keeps the press in alignment for longer seal life, better alignment and easier diagnostics.

FLSmith to Acquire Decanter Machine

FLSmith has signed an agreement to acquire Decanter Machine, a manufacturer and supplier of centrifugal technology to the global minerals industries. The transaction is subject to rezoning real estate that is expected to occur in September. The parties have not disclosed the value of the transaction.

Decanter is recognized as a leader in the manufacture of screen bowl, solid bowl and hyperbaric centrifuges for minerals applications. The company has more than 550 centrifuges installed across 11 countries. Decanter's product and service range further includes rotor unit repairs, spare parts, field service and preventative maintenance. The company is primarily active within the coal industry and in the processing of potash.

With the acquisition of Decanter, FLSmith complements the coarse particle centrifuge technology recently acquired with the Australian company Ludowici. With these two acquisitions, FLSmith will have the complete range of centrifuge technology used for coal preparation, as well as in other FLSmith priority industries, like fertilizer. Decanter's extensive experience and

strong know-how in the area of repair services, rotor unit rebuilding, field service and preventative maintenance will also enable FLSmith to further strengthen this service offering within its minerals customer base.

Ritchie Bros. Schedules Huge Unreserved Public Auction

Auctioneers Ritchie Bros. will conduct a massive mining and earthmoving equipment auction September 27, 2012, during the company's grand opening auction at its new permanent auction site in Raleigh-Durham, N.C. More than 180 pieces of mining and earthmoving equipment are already featured in the auction, including 60 Cat D11 dozers, more than 35 Cat 777 haul trucks, 30 wheel loaders and more—selections so large they're rarely seen in the heavy equipment industry in a single sale.

The September 27 unreserved public auction, which is set to take place one day after the completion of MINExpo International 2012 in Las Vegas, is a divestiture of non-strategic equipment from West Virginia-based Trinity Coal Corp. Bidders can register and bid in one of four ways: live and in person at the company's Raleigh-Durham, N.C., auction site; via simulcast and in person at the company's Las Vegas auction site; online in real time at www.rbauuction.com; or by proxy.

"We have an unprecedented number of D11s featured in our September Raleigh-Durham auction. In fact, this is more D11s than we've sold in the past four years of unreserved industrial auctions combined," said John Fairley, regional sales manager, Ritchie Bros. Auctioneers. "This large selection of mining and earthmoving equipment is sure to catch the attention of both domestic and international buyers. For those who are looking for anything from big wheel loaders and crawler tractors to massive rock trucks and motor graders."

"Trinity Coal had been using the equipment at their coking and thermal coal mining complexes in Kentucky and West Virginia," said David Stetson, chief restructuring officer, Trinity Coal. "Those in the mining industry will know D11s are primarily mass earthmoving machines. The fleet is composed of 'big rock job' type machines that we primarily used to remove overburden at our coal operations in eastern Kentucky and West Virginia. At one time, our D11 fleet was the largest fleet operating anywhere in the U.S."

After being in operation for a number of years, some of the Caterpillar units are currently undergoing a refurbishing process in preparation for the September auction. All powertrain and undercarriage updates are being conducted by authorized Cat dealers. Detailed equipment information, including high-resolution photos of the equipment, is available at the Ritchie Bros. website: www.rbauuction.com/bigiron.

CH2M Hill Receives Award for Selenium Treatment

CH2M Hill's Rangesh Srinivasan, Kar Munirathinam, Tim Harrison, Jeff Tudini and Tom Sandy have been selected as recipients of the Water Environment Federation (WEF) 2012 Rudolfs Medal for their paper, "Selenium Treatment of Mine Water Effluent in a Fluidized

Bed Reactor (FBR),” which was presented and well-received at WEFTEC 2011 by Kar Munirathinam.

The Rudolfs Medal was established in 1949 and is named after Willem Rudolfs, an active WEF member and primary force in industrial waste research. This award recognizes noteworthy accomplishments in any aspect of industrial waste management research published in WEF conference proceedings or periodicals.

Mining operations are a major anthropogenic source of selenium release in the environment. The implementation of stringent selenium standards is challenging mining companies to investigate and implement new technologies to improve mine drainage water quality. An examination of the fate of selenium through treatment at the most minute level of detail is now critical. The award-winning paper addresses a CH2M Hill-led study that focuses on activities undertaken at a U.S. Appalachian mine facility to address issues associated with meeting compliance for selenium. The paper discusses a new innovative approach to selenium removal using FBR.

Application of FBR technology in biological water treatment has been used for more than 20 years, but more recent research, pilot studies and evaluations undertaken by CH2M Hill are defining and capturing the potential of this approach toward selenium reduction. The primary components of the process include anoxic/anaerobic FBR treatment for reduction of selenium, liquid solids separation, aerobic polishing and filtration. This system successfully achieves consistent discharge compliance at a reduced cost compared to other potential technologies (e.g., reverse osmosis) as well as within a smaller treatment system footprint necessary due to limited available space in the narrow valleys.

Rail Link Wins Second Consecutive Wyoming Governor's Award

Genesee & Wyoming subsidiary Rail Link, Inc. received the Wyoming Governor's Award for Safety and Health in the Large Mine-Site Contractor category for the second consecutive year. The award is the highest honor given by the state of Wyoming for recognition of an employer's commitment to excellence in workplace safety and health.

In 2011, Rail Link loaded more than 430 million tons of Powder River Basin coal into trains for railroad companies at more than a dozen mines in Wyoming and Montana. This represents approximately 90% of Powder River Basin coal production and more than a third of all coal burned in North America. The company has 162 employees in the Powder River Basin.

At the mine sites, Rail Link employees receive empty coal trains from the railroad companies, operate them slowly through the mine's loading stations where the cars are filled with coal and then hand the loaded, mile-long trains back to the railroad companies in a non-stop cycle of as many as 80 trains daily. Rail Link's coal load-



In 2011, Rail Link loaded more than 430 million tons of PRB coal into trains for railroad companies at more than a dozen mines in Wyoming and Montana.

ing operations are part of GWI's Mountain West Region, which also includes the Utah Railway and the Arizona Eastern Railway. The region's employees are injury-free in 2012.

“We're honored to receive our second consecutive Wyoming Governor's Award,” said GWI Mountain West Region Senior Vice President Andrew T. Chunko. “Safety is the number-one priority for us and for our customers, and it's wonderful to have the state of Wyoming recognize that commitment. We are now working hard to win the award three years in a row.”

Genesee & Wyoming Inc. owns and operates short line and regional freight railroads and provides railcar switching services in the United States, Australia, Canada, the Netherlands and Belgium.

ALL Erection & Crane Acquires 17 New Cranes

ALL Erection & Crane Rental Corp. has acquired two blockbuster Manitowoc/Grove packages, adding a total of 17 machines to its industry-leading rental fleet: the first in May, including nine units anchored by the mammoth Manitowoc 18000 crawler, and the second in July, eight units including a GMK 7550 AT and a Manitowoc 2250 crawler. The total purchase of 17 new units offers a range of capacities from 40 to 825 tons.

“We are adding to our already considerable resources to handle incoming jobs in virtually all developed sectors—power plants, mills, road/bridge work and commercial construction—but also in developing sectors such as frack mining, wind farms and solar energy,” said Michael Liptak, ALL Erection & Crane Rental president. “These mid- to heavy-duty machines are in high demand and the new units helped us meet our unwavering commitment to serving customer needs. We are grateful to Manitowoc/Grove; they were very helpful through these past few months.”



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CAT 994H WHEEL LOADER OFFERS FOUR LIFT CONFIGURATIONS



The Cat 994 wheel loader is optimally matched to the 270-ton 793 haul truck.

The 994H, the largest of the Cat wheel loader line, features four loader linkage configurations and a range of buckets to tailor the machine to the job. While optimally matched to Cat 785, 789 and 793 mining trucks, the 994H has the design flexibility, capacity and durability to deliver reliable, low-cost production in any operation. Engineered to ensure operator safety, comfort and convenience, the fuel efficient 994H, with 1,463 net horsepower (1,092 kW) and an operating weight of 431,000 lb (195,500 kg), features Caterpillar's Rimpull Control System, Positive Flow Control hydraulics and Vital Information Management System.

Lift configurations for the 994H include standard, high lift, extended high lift and super high lift, providing dump clearances at maximum lift that range from 19.2 ft (5,858 mm) to 23.3 ft (7,102 mm). Bucket choices include heavy-duty rock, high-abrasion rock and coal—available in narrow and wide widths to suit the application—and ranging in capacity from 19.5 to 47 cubic yards (15 to 36 m³).

To ensure durability that will sustain multiple life cycles, the 994H uses solid-steel lift arms that work through a powerful Z-bar linkage, which features a greased

pin design and an automatic lubrication system. The 994H rear frame is a full-box-section fabrication designed to resist torsional shock and twisting forces, and the machine's cast axle-pivot mounting areas disperse stress loads for added overall durability.

For fuel efficient operation, the Cat 3516B HD engine works through a Cat planetary powershift transmission specifically designed for mining applications. An integral Impeller Clutch Torque Converter and Rimpull Control System allow the operator to precisely adjust power at the wheels to specific loading conditions by modulating rimpull from 100% to 25%, reducing potential for tire slippage without diminishing hydraulic capacity.

The 994H Positive Flow Control (PFC) implement hydraulic system uses four, electronically controlled, variable-displacement pumps, delivering up to 386 gpm (1,460 L/min) at a main relief pressure of 4,750 psi (32,800 kPa), assuring fast, consistent response as well as fuel economy and low heat generation. The PFC system also integrates concurrent valve control, providing precise, proportional command of loading functions with electro-hydraulic loader controls, electronically controlled

cylinder stops and automatic kickouts set from the cab.

The Steering and Transmission Integrated Control System combines control of travel direction, steering and gear selection in a single controller, and the spacious, pressurized cab features automatic climate control and a quiet, 71 dB(A) sound rating. The 994H also features a powered access ladder and reduced stairs angles for easy access and egress from the operator station. For enhanced operator awareness of the area around the loader, the Cat Detect Vision rear vision camera system is standard, and Cat Detect Object Detection is available. Object Detection includes radars that detect objects around the machine and notify the operator of these potential hazards.

Integral with the 994H Vital Information Management System, which allows real-time assessment of machine performance, is the Payload Control System that enables on-the-go weighing, payload recordkeeping and analysis of parameters such as utilization, cycle time and fuel usage. In addition, the available Cat MineStar System provides a suite of integrated mine operation and equipment management technologies that can enhance 994H operation and maintenance. www.cat.com

Tough Mining Gloves

The Great Grips work glove was developed specifically for internal employee use at the request of one of America's largest home improvement and construction retailers. With that challenge at hand, an extensive three-year development process began to create a glove that met the very specific stringent requirements of the retailer and other work-related industries. The glove had to look great, be incredibly comfortable, and meet specific minimum durability and Six Sigma requirements for coefficient of friction (grip), cut/puncture resistance and abrasion resistance.

To meet the challenge a three-layer design was developed: golf glove leather comfort and flexibility, double stitched micro-fiber for abrasion/puncture resistance and grid-pattern silicone for supe-

rior grip. Additional features include Spandex, whole hand padded protection including fingers and knuckles, terry brow wipe and a Velcro strap to keep out debris. After a lengthy laboratory testing process, an ASTM-tested and approved glove was developed that met or exceeded the retailer's requirements and outperformed standard work gloves. And, the advanced gripping technology provides a superior grip.

www.GlovesInc.com



Longwall Chain

The Master Profile chain was designed specifically for the harsh environments of underground mining. With a 42 mm diameter and pitch at 146 mm, the height of the vertical link is only 109 mm. This chain can replace the following DIN spec chains in any existing pan line: round link chain 34 mm, flat link chain 38 mm, also flat link chain 42 mm, assuring the same mechanical properties and bigger clearance between vertical link and deck plate, as well as lower overall profile. This chain can replace DIN spec chain 42x146 mm on every conveyor and it is compatible with all flight bars and sprockets of the system.

The protruding nodule, located in middle part of vertical link on one of the straight legs, divides the link in two parts and prevents potential contact with the horizontal surface. Solid construction of the nodule provides protection against premature wear and the shape of its surface and rounded ending, as well as chamfered side radiuses, protect against damage to the links. However its most important function is protection against jack-knifing of the chain, and added flexibility for handling underground.

Another important feature is weight—1 meter of this chain weighs only 34.3 kg. Assuming the conveyor is 820 foot long, it reduces the mass by 1 ton. Such reduction has significant impact on a conveyor's resistance, start up and overall power consumption. www.fasing.pl

Simulators for Surface Equipment

Simformotion LLC has released two new Cat Simulator Systems for mining applications: the large track type tractor and mining truck. Authentic controls combined with simulated exercises deliver a realistic training experience for operators. The tractor simulator teaches control familiarization, machine walk-around, tramming, ripping, slot dozing, highwall dozing and slope maintenance. The truck unit teaches control familiarization, machine walk-around, driving, braking, hauling, loading with a rope shovel, unloading at a crusher and a highwall, and the full production cycle. All simulator sessions are measured, reported and recorded so instructors and users can track progress.

www.catsimulators.com

Lightweight Concrete Additive

Elemix concrete additive, an engineered Lightweight Synthetic Particle that drastically and uniformly reduces the weight of concrete, was used for the 1,700-ft-long, 26-ft-wide slope at Arch Coal's Leer mine. The concrete, rendered lightweight by the Elemix additive, was used to fill the annular space between the excavated rock and the steel tunnel lining. "We used Elemix for several benefits," said Frank Stevens, construction manager, Cowin & Co. "The lightweight concrete provided a strong backfill material at about one-third the density of normal concrete. The lower density allowed for rapid and continuous placement of the backfill without overloading the forms, saving substantial labor and overhead cost. We were impressed the Elemix concrete flowed long distances without segregation or bridging, ensuring complete backfill of the tunnel lining and consistent compressive strength." Approximately 75,000 lb of Elemix was used as part of a total volume of 8,000 cubic yards of concrete. The slope has a 12% downgrade.

www.elemix.com

Underground Mine Trucks

Paus offers two versions of its diesel-powered dumpers, PMK-T and PMK-M. Available in 15- and 20-ton capacities, the PMK-Ts are only 1.9-m wide and have been developed especially for narrow tunneling work. The PMK-M has been designed for general underground use. It has a larger, more powerful engine. Flatter than the PMK-T, the truck has a height of 2.40 m. However, due to its 2.3-m width, they are able to transport the same volume as the comparable PMKT series. The cavity possesses a special tailgate avoiding that mate-

rial gets lost at up-hill rides. Equipped with high quality Posi-Stop brakes the machines can be switched safely at down-hill rides even in fully loaded condition. Additionally the PMKM possesses a retarder providing wear-free brake application at down-hill rides. www.paus.de



Rubber Door

Rytec Corporation has introduced the Powerhouse SD industrial, roll-up rubber door. Although conventional metal doors can certainly protect large doorways, they require significant time to open and close, as well as considerable upkeep. The Powerhouse is a fast, safe and practically maintenance-free alternative, suitable for a wide range of exterior doorways. The engineered styrene butadiene rubber roll-up panel is virtually indestructible. It is designed without dangerous springs, high-maintenance counterbalance systems and wear parts, saving thousands on service costs. The patent-pending design and heavy-duty construction offer speed, wind- and pressure-resistance, and the tight seals required to protect critical equipment and operations. In the case of an accidental hit, the Powerhouse SD distinguishes itself from conventional doors by releasing without damage and restoring to full operation with just the push of a button. www.rytecdors.com



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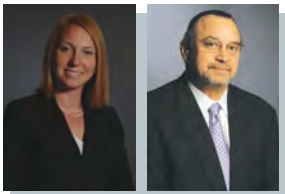
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MSHA PAPERWORK AUDITS PUSH LEGAL LIMITS

BY CAROLINE DAVIDSON-HOOD AND MARK SAVIT



The Federal Mine Safety and Health Review Commission recently issued an unprecedented decision permitting MSHA to demand the production of employment and medical records from mine operators in conjunction with an audit of the mines' injury and accident reports.

Thirty-three years ago an MSHA inspector decided that he was entitled to review the employment, personnel and medical records contained in the mine office file cabinets during a regular inspection. The next day when he tried to resume his review of mine files, the mine owner refused to let him in the office. MSHA issued a citation, it was contested and eventually vacated by a judge in *Sewell Coal Inc.* The core of the judge's decision in that case was that because sensitive information is contained in personnel files, including medical records, MSHA did not have the authority to "go rummaging around" in mine records. He articulated a rule that had come to be relied on by mine operators for the next 30-plus years—MSHA is only entitled to those documents that are required to be maintained by law.

MSHA has tested the rule from time to time, gaining limited ground to require mine operators to provide certain non-mandated information. In *BHP Copper*, the mine operator refused to give MSHA an injured employee's contact information, claiming the information was confidential and not required to be kept by law. The court disagreed and determined that, in very limited circumstances applicable to that case, the mine operator is required to furnish basic information such as the addresses of witnesses in the course of an accident investigation. MSHA has ignored the limitations of *BHP* and has attempted to rely on that decision to undergird its demand for non-mandated documents. On occasion, however, the Solicitor's office has backed-off these requests when reminded that *BHP* does not provide MSHA with the document-collecting authority it seeks. But in 2010, MSHA took its document requests to a whole new level. In the course of a paperwork audit, it issued letters to multiple large operators demanding:

All medical records, doctor's slips, worker compensation filings, sick leave requests or reports, drug testing documents, emergency medical transportation records and medical claims forms in your possession relating to accidents, injuries or illnesses that occurred at the mine or may have resulted from work at the mine for all individuals working at your mine for the period of July 1, 2009, through June 30, 2010.

The mine operators balked, refusing to comply with such a broad request for confidential information. MSHA responded by issuing citations and closure orders for failure to abate the citations and comply with the document request. The operators took the case to court claiming that MSHA only had the authority to demand those documents required to be maintained by law and that if MSHA wanted access to confidential medical records, it is required to issue a formal rule in the Federal Register requiring mine operators to

keep such records. Miners intervened in the suit to try to stop MSHA from accessing their personal information.

The Commission determined that in order for MSHA to properly conduct its audit, it required the non-mandated documents and thus had the authority to demand the specified medical and personnel records from mine operators.

The Commission found the Mine Act gives MSHA the authority to conduct investigations, which includes the right to collect "information related to health and safety conditions." Further, the Act requires a mine operator to "provide such information, as the Secretary may reasonably require from time to time to enable him to perform his functions." Based on this and other regulatory language, the Commission deferred to the Secretary's assertion that the requested documents were "reasonably required" to carry out the audit. The idea expressed by Judge Andrews and adopted by the Commission is that MSHA cannot exclusively rely on information provided by mine operators in auditing accident and injury reporting. MSHA must look at other non-mandated documentation to ensure the mine is complying with its reporting requirements. Therefore the Commission found MSHA's document request to be "reasonable."

Commissioner Duffy dissented. He agreed there are circumstances where MSHA should have access to confidential medical records, but this need must be balanced with the mine operators' right to know what its compliance responsibilities are and the rights of operators and miners in the confidential nature of the documents. Commissioner Duffy insisted the appropriate balance between these important principles could only be struck if MSHA took the time and effort to issue a published rule through the notice-and-comment process. The majority of the Commission did not agree.

The *Big Ridge Inc.* decision is not without important limitations. The opinion specifies that express, written requests tailored to a limited time period that directly relate to compliance with MSHA regulations is reasonable. With a nod to *Sewell Coal*, the Commission agreed that actual entry into a mine office to "rummage around" in file cabinets would be unreasonable.

In summary, if MSHA presents a mine operator with a document request, each of these requests should be carefully reviewed to make sure they are specific, written, limited in scope and "reasonable." This begs the question: what is "reasonable"? It is at best unclear and will have to be determined on a case-by-case basis. MSHA's authority to access documents has been debated for 33 years, and while the Commission's decision in *Big Ridge Inc.* purports to broaden MSHA's authority to demand documents during an accident and injury reporting audit—the debate will continue. In fact, Peabody has taken the issue on appeal to the Seventh Circuit, which will be the next tribunal to weigh in on MSHA's authority to demand non-mandated documents.

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