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Mining the Internet

By Bob Webster

By now, you'd have to live in a www.cave.org not to have heard about the Internet or surfed along its seemingly endless waves of information. Hailed by some as the greatest revolution in technology since the printing press, derided by others as nothing more than an electronic waste-basket, the age of the Internet is upon us, and it is changing the way we work, research, shop, and play. And the changes are coming with lightning speed.

You no longer need to wear a pocket protector to surf the Internet. It is no longer the domain of technocrats who speak in their often

bizarre mumbo jumbo of bytes, megabytes, or gigabytes. These days, you even probably know a "browser" no longer refers to a window shopper and "yahoo" is something other than a hick from the sticks.

For the cave dwellers, the Internet is a vast international network of computer networks that allow computers of all kinds to share services and communicate directly, as if they were part of one giant, seamless, global computing machine.

The Internet of today evolved from a computer system built 25 years ago by the U.S. Defense Department to allow academic and

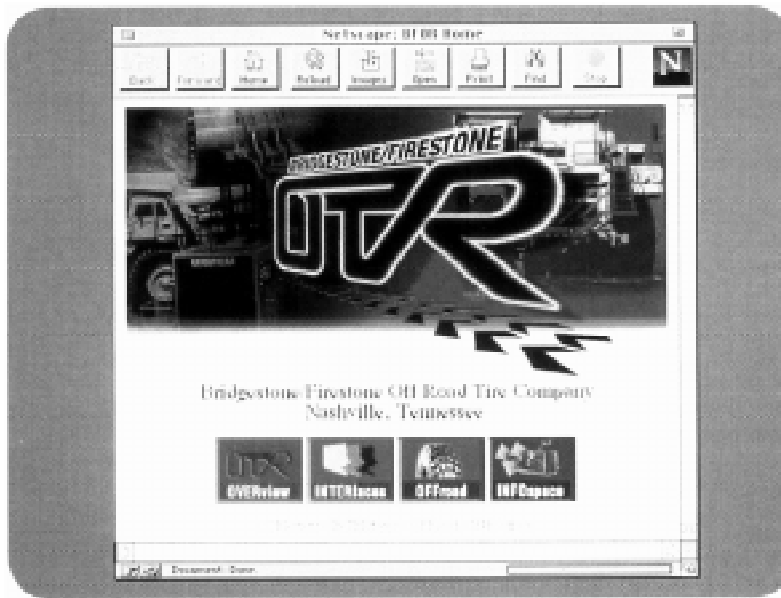
military researchers to continue to perform government work even if part of the computer network were destroyed in a nuclear attack. Eventually, the Internet linked universities, government facilities, and corporations around the

HIGHLIGHTS

- Every 30 seconds, someone somewhere is logging on to the Internet for the first time.
- A search of mining-related Internet sites last summer found just 24 "hits," or places of relevant information. One year later, the same search yields 92 matches.
- A search of environmentally-related Internet sites last year found 147 organizations. One year later, the number has mushroomed to 614.

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More and more companies are expanding their public relations efforts to include sites on the internet.



world, all sharing the costs and technical work of running the system.

The Internet's computer networks are connected through telephone, fiber optics, and other high capacity lines so that a user can tap into computer systems from Russia to Japan to the United States in a matter of seconds—all without incurring long distance dialing charges other than, at most, a call (usually local) into a computer already connected to the 'Net.

The scientists who initially used the Internet soon realized that their system was good for more than just official business—they began sending private messages (e-mail) and posting news and information on public electronic bulletin boards or news groups. But until quite recently, it was very difficult for ordinary computer users to reach the Internet. In addition to needing a passing familiarity with complex computer languages, casual computer users could only get to the Internet with the cooperation of a university or government research lab.

White-hot growth

Little more than two years ago, the Internet remained the relatively peaceful domain of university and government researchers and scien-

tists. But as publicity about the Internet became white-hot, the Internet became easier to enter, thanks in part to businesses selling access to the system, as well as computer service companies, such as America Online and CompuServe, which have made it possible for millions of subscribers to reach parts of the Internet.

This sudden rush of new users has helped spotlight the Internet in the center ring of pop culture and commerce. Today, "surfing the 'Net" has become a national pastime. Not surprisingly, the business community, including a number of mining companies, has been quick to adopt the Internet.

Now, the Internet is used for literally anything and everything. And this, some Internet experts say, has spawned an overload of information that may eventually send the whole cyberworld crashing like a house of cards.

"The Internet is a really cool thing, but people have to remember it wasn't built to do what it's doing today," high-tech guru Bob Metcalfe recently told U.S. News & World Report. "The Internet is about to collapse."

Indeed, the Internet is undergoing growing pains. And for good reason.

Every 30 seconds, someone somewhere is logging on to the Internet for the first time. Determining the actual numbers of Internet users is, at least for now, nothing more than an educated guessing game.

Over the past year, according to some experts, the number of Internet users has jumped to 26 million. Other, more conservative, estimates place the number of users at about 6 million. Typically, the number of Internet users has been inflated, with some guesses as high as 57 million people.

Expectations are that with major computer, software, cable and telephone companies offering easier access, the number of Internet users should grow substantially in coming years. Vinton Cerf, recognized by many as the "father of the Internet," estimates that as many as 160 million people will have access to the Internet by the year 2000. "I'm not at all shy about predicting that by 2005, the Internet will be as big as the telephone system is today," he recently told The Wall Street Journal.

Much of the growth of the Internet is due to the popularity of the World Wide Web, a portion of the Internet that allows users to receive graphics, audio, and even animation on their computer screens—a vast improvement over the typical text-only format of the Internet.

The World Wide Web (WWW) was begun in 1989 by scientists at a Swiss research institute who sought a better way to give researchers access to shared information. Material on the Web is arranged in "home pages," so called because photos and illustrations, text, maps and graphics can be combined on the computer screen in what looks like a page from a magazine.

One of the strengths of the Web is its ease of use and the links within WWW documents that can take users quickly to other related documents. Information is retrieved by clicking highlighted phrases on the screen to

Click here for more information

The list of mining-related Internet sites is growing at a fast clip. Here is a look at some current sites of interest. If you don't see your company or organization listed, feel free to e-mail us at www.msha.gov.

Organization (usually .org)

National Mining Association

<http://www.nma.org>

The United Mine Workers of America

<http://www.access.digex.net/~miner/index.html>

The Center for Energy & Economic Development

<http://www.conx.com/ceed>

Nevada Mining Association

<http://www.nevadamining.org>

Georgia Mining Association

<http://www.mindspring.com/gamining>

Copper Development Association

<http://www.copper.org>

American Institute of Mining, Metallurgical and Petroleum Engineers

<http://www.smenet.org>

The Northwest Mining Association

<http://www.ior.com.nwma>

Geological Society of America

<http://www.geosociety.org>

The Chamber of Mines and Energy of Western Australia

<http://www.mineralswa.asn.au>

The Chamber of Mines of South Africa

<http://www.bullion.org.za>

Companies (usually .com)

Ashland Coal Inc.

<http://invest.quest.columbus.oh.us/InvestQuest/a/aci>

Barrick Gold Corporation

<http://www.barrick.com>

Cambior Inc.

<http://www.cambior.com>

Caterpillar Inc.

<http://www.CAT.com>

Centurion Mines Corporation

<http://www.xmission.com/~centurio/centurion.html>

Detroit Diesel Corporation

at <http://www.detdiesel.com>.

Echo Bay Mines

<http://www.echobay.com>

Glamis Gold Ltd.

<http://www.glamis.com>

Hemlo Gold Mines Exploration

<http://marathon.lakeheadu.ca/~hgmexp/index.html>

Homestake Mining Company

<http://www.homestake.com>

Kaiser Aluminum Corporation

<http://www.kaiseral.com>

MAPCO

<http://www.mapcoinc.com>

Newmont Mining Company

<http://www.newmont.com>

Peabody Holding Company, Inc.

<http://www.PeabodyGroup.com/>

Pittsburg & Midway Coal Mining Co.

<http://www.chevron.com/operations/pandm/index.html>

Pittston Coal Company

<http://www.pittston.com/>

Phelps Dodge Corporation

<http://www.irin.com/pd>

Royal Silver Mines

<http://www.xmission.com/~centurio/royal.html>

Government (usually .gov)

Mine Safety and Health

Administration

<http://www.msha.gov>

Office of Surface Mining

<http://www.osmre.gov>

U.S. Geological Survey

<http://www.usgs.gov>

Environmental Protection Agency

<http://www.epa.gov>

U.S. Bureau of Mines

<http://www.usbm.gov>

The White House

<http://www.whitehouse.gov>

The Public Utilities Commission of Ohio

<http://www.puc.state.oh.gov>

Universities (usually .edu)

West Virginia University Mining

Extension Service

<http://www.wvu.edu/~minext/>

New Mexico Institute of Mining and

Technology

<http://www.nmt.edu>

Colorado School of Mines

<http://www.mines.edu>

South Dakota School of Mines and

Technology

<http://www.sdsmt.edu>

University of Missouri-Rolla School

of Mines

<http://www.umn.edu>

Others

The Northern Miner

<http://www.northernminer.com>

MineNet

<http://www.microserve.net/~doug/>

Info-Mine

<http://www.info-mine.com/>

United Mine Workers of America

<http://www.access.digex.net/~miner/index.html/>

The Illinois Coal Home Page

<http://www.cushmanpr.com/illinois-coal/>

jump immediately to another related site on a computer possibly thousands of miles away. The Web is a worldwide network of linked files from industry, government and universities which enable a user to

follow a thread of thought through all kinds of information.

Let's go surfin' now

Think of the Internet as a giant library—with all the books scattered

on the floor. No Dewey Decimal System. Nada. Zip. Zero. That's the chaos that confronted cybersurfers about two years ago. But entrepreneurs, lured by the gold-rush mentality that has permeated

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everything Internet, have been working overtime to make searching the Internet a snap.

"Search engines" now make it easy to track down any information anywhere on the Internet. Simply type in a subject or key word and, in moments, these tools will generate a complete list of "hits" on your computer screen. To view the Web sites your search engines have found, you'll need a "browser," or a program that allows you to enter Web addresses and view their contents. Among the most popular browsers currently are *Netscape Navigator* and

Microsoft's *Internet Explorer*.

Web-based search engines like Lycos (<http://www.lycos.com>) and Alta Vista (<http://altavista.digital.com>) can seek out the most obscure information and deliver it to your screen. If you are not looking for a needle in a haystack, you might try rummaging through database directories, such as Yahoo! (<http://www.yahoo.com>)

or Magellan (<http://www.mckinley.com>). Directories offer broad subject areas, such as business, economy, sports, health, entertainment, and employment and then narrow the focus into subcategories.

Sure, cyberspace is cluttered with a lot of junk—and the refuse is growing by the minute. But there are many gems out there waiting to be discovered and used. Have a passion for habañero peppers? There's a home page devoted to the fiery chilies. Want to know tomorrow's

weather in Columbus, Ohio? Check the online forecast. Want to know the incident rate for nonfatal mining injuries? Link up to the Mine Safety and Health Administration's Web site.

Mining in cyberspace

The world of commerce has been quick to grasp the marketing potential of the Internet. To date, however, the Internet has not proven to be a boon for cyber-commerce, as questions about security have dampened the willingness of shoppers to send their credit card numbers into the void. This hurdle, like everything associated with the Internet, should change in the very near future, experts say.

As a tool to educate and inform, though, the Internet has proven useful, and mining companies have joined their counterparts in other industries to use this new medium. A search of mining-related Internet sites last summer found just 24 "hits," or places of relevant information. One year later, the same search yields 92 matches, and the numbers continue to grow.

Just as mining companies have discovered the power of the Internet, so too have environmental advocates, who were even quicker to jump online.

A search of environmentally-related Internet sites last year found 147 organizations. One year later, the number has mushroomed to 614. Most of the sites serve as electronic clearinghouses of environmental news and alerts. Some are general, such as the sites for the Sierra Club, Natural Resources Defense Council and the Wilderness Society. Others offer targeted information, such as a site organized by Help Preserve the Grand Canyon.

Caterpillar Inc., a major manufacturer of mining and construction equipment, launched its Internet site (<http://www.CAT.com>) in April, 1996, to "enhance our efforts to reach current and prospective users of our products and channel them to our dealers," explains Barry Clough, Caterpillar's marketing support manager.

The Caterpillar home page, like

many industry sites, contains company information and news, financial reports, employment opportunities and a description of services and products. In addition, the Cat site allows users to find the location and phone number of their nearest Caterpillar dealer simply by typing in a zip code in the United States or a country name in other parts of the world.

"We view the Web as an important new means of interacting with the general public," Clough says. "Whether you are a customer, financial analyst, or job seeker, the Caterpillar home page enables you to quickly interact with Caterpillar."

Geophysicists at Newmont Gold Company created a home page for the Denver-based gold mining company last year. With geoscientists stationed around the world, the Internet offered an efficient way to keep in touch. "We're using it primarily as a communications tool within the company," says Bruno Nilsson, Newmont's director of geophysics, and one of the creators of the company's Internet site (<http://www.newmont.com>).

"Since Newmont has offices throughout the world from Lima to Beijing, the different time zones often make telephone and fax communications impractical. E-mail and accessing the home page are much faster, and they make it easier to work with geophysical data," Nilsson says.

Newmont's site includes electronic links to Internet sites of interests to geologists, including the Geophysics Home Page and the Geology Home Page, as well as historic illustrations from *De Re Metallica*.

Kaiser Aluminum Corporation put its home page "Kaiser Online" on the World Wide Web earlier this year. The site (<http://www.kaiseral.com>) is designed to make information about Kaiser more readily available to customers, financial analysts, shareholders, the media and other important audiences. The site "serves as a convenient resource for anyone interested in Kaiser Aluminum, its

Lost in cyberspace

In the real world, organizations open for business and sometimes go out of business. People live; people die.

Not so on the Internet, where the Timothy Leary home page is still up and running, months after the psychedelic-turned-cyber guru died. So, too, lives the Bureau of Mines (<http://www.usbm.org>), despite having been shuttered earlier this year. Among other information on the Bureau's home page are the electronic resumes of former employees.

products, services and corporate strengths," says Robert W. Irelan, Kaiser's corporate vice president of public relations.

In addition to a corporate overview and listing of Kaiser locations, the site includes recent news releases, contact information and an order form for financial reports. "This is really just the beginning, though," Irelan says. "We will continuously update the site as new information becomes available, and we will incorporate new elements that better meet the needs of those who use our home page."

The Internet is proving to serve as an important connection to potential investors and the investment community. Detroit Diesel Corporation, which makes diesel engines for mining and other equipment, has focused its Internet site (<http://det-diesel.com>) with investors in mind.

"The Internet's role as an on-line financial investment alternative is growing exponentially," says Ursel T. Dougherty, vice president of investor relations. "We initiated Detroit Diesel's presence on the World Wide Web with the initial focus on providing a new and exciting communications tool for our stockholders and the financial community at large."

The company's site contains material with an initial focus on financial and market information, as well as background material on the company. Later, Dougherty says, the site will be expanded to include specific product information.

Homestake Mining Company, of San Francisco, created its Internet site (<http://www.homestake.com>) four months ago primarily to reach the wide audience of individual investors. So far, the site has attracted an average of 400-500 "hits" each month, with a high of 900 people one month, says Michael Steeves, Homestake's director of investor relations. "We feel it is really growing," Steeves says, adding that Homestake's site has attracted investors as well as a number of reporters seeking information about the company

and its operations. "We've been very happy."

The Homestake site contains a corporate overview, recent news releases and filings with the Securities and Exchange Commission, as well as an electronic version of the most recent company annual report. Also included are the company's current environmental, health and safety report, a global map of Homestake locations and links to other mining-related sites.

The desire to keep retail investors as up-to-date as institutional investors also brought Toronto-based Barrick Gold Corporation to the Internet in November, 1995, says Sandra Scott, Barrick's director of investor relations. "Our primary audience was the retail investor. There was a lot of concern that institutional investors were getting their news about the company quicker. So this need to include the retail investor to have access was what led us to the 'Net,'" Scott says.

Although Barrick's site has proven popular among retail investors, Scott says she was surprised to find a number of European and Asian institutional investors using the site to gather financial information. "We didn't realize that they felt out of the loop as well," she says.

Peabody Holding Company, Inc., based in St. Louis, Mo., became one of the growing numbers of coal mining companies with an Internet presence when its site appeared in June, 1996. The site (<http://www.PeabodyGroup.com/>) contains news and information about Peabody and its subsidiaries. In addition to company news and overviews, Peabody's site contains electronic links to other sources of coal information, including the Electric Power Research Institute and the Energy Information Administration. The site also features links to the web sites of a host of government agencies and several coal-burning electric utilities, including American Electric Power Company.

Tulsa-based MAPCO Inc.'s home page (<http://mapcoinc.com/coal.html>)

offers a unique feature among mining home pages—a complete listing of its on-campus recruiting schedule. The site also highlights employment opportunities at MAPCO, as well as an electronic newsletter of company events, news releases, financial information, and stock prices. MAPCO also offers a fun look at Tulsa.

The Public Utilities Commission of Ohio (PUCO) has found the Internet to be a useful vehicle to distribute issue-oriented material. A portion of its Internet site (<http://www.puc.state.oh.gov>) is dedicated to detailed information about global climate change. Visitors to the site will have access to the science, chronology, acronyms and definitions associated with this issue. "The Internet and the PUCO's home page provide a great opportunity to educate the people of Ohio as well as the country and the world on this vital topic," says Jeff Logan, who designed the climate change section.

With growing numbers of people accessing the Internet, and more and more companies creating their own Internet presence, primarily on the World Wide Web, many cyber—observers believe that a home page on the Internet soon will become as common as a fax machine in today's office place.

"I feel this is the most effective tool for a company to reach people," says Homestake's Steeves, noting that a lot of his company's competitors also have taken—or are contemplating taking—the leap into cyberspace.

Barrick's Scott agrees. "We were led to the 'Net because we explore all new technologies," she says. "Not a lot of companies were on the 'Net a year ago. Now, you look at business cards and a lot of people have Internet addresses. We really believe it's going to be the wave of the future."

Reprinted from the July-August 1996 issue of the National Mining Association's MiningVoice.

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Proper preshift exam could have uncovered roof problems

An adequate preshift examination should have uncovered unstable roof where a miner was killed last October in a Kentucky mining accident.

The victim, a 25-year-old miner with seven years' experience, was tramping a Joy 21SC shuttle car to the continuous miner, located at the right pillar block in the No. 5 entry. A rock measuring approximately 50 inches by 60 inches and 2 to 4 inches thick fell from the mine roof

and struck him in the abdomen.

Nobody witnessed the accident. A continuous miner helper noticed that the victim's shuttle car was stopped in the No. 5 entry, one crosscut outby the continuous miner. He went to see if there was a problem and found him pinned in the operator's compartment by a roof fall. Three people assisted in removing the rock.

The conclusion was that the accident occurred because there was inadequate roof support in the No. 5 entry.

It was also determined that an adequate pre-shift examination was not conducted. The area had visible loose rock and roof bolts with missing plates, and the heads had been missing for some time, evidenced by rust, the report said.

Reprinted from the Feb. 21, 1997 edition of Mine Safety and Health News by Legal Publication Services.

Willingness to go under unsupported roof costly to miner

Failing to comply with the roof control plan and going under unsupported roof led to serious injuries for an Illinois miner last July.

The victim, a continuous mining operator with 24 years' mining experience, had mined a crosscut between two entries. Upon completing the crosscut, he tramped the continuous miner by remote control inby toward the face, which was mined approximately 11 feet inby the crosscut.

As the miner walked alongside the machine, he was struck and pinned by a portion of mine roof measuring 8 feet long, 8 feet wide and up to 16 inches thick that fell from the unsupported crosscut.

The section foreman, who witnessed the accident, and the continuous haulage operator tried unsuccessfully to remove some of the rock. Eventually people were able to remove the rock. The injured miner was transported and treated for a

fracture of the lower left leg, a fractured right leg, fractured pelvis, fractured right collar bone and numerous cuts and abrasions.

The mine was cited for allegedly altering the scene of the accident and for not complying with the approved roof control plan.

Reprinted from the Feb. 21, 1997 edition of Mine Safety and Health News by Legal Publication Services.

Twentymile sets world production record again

Cyprus Amax Minerals' Twentymile underground mine set a world production record for coal mined in a single month with one longwall. The new record, set in August, was

810,049 tons of clean coal. This beat the previous record, 708,689 tons, produced by ARCO Coal's West Elk mine. The August production record is the fifth world record for

Twentymile since 1994.

Reprinted with permission from the January 1997 issue of Intertec Publishing Corp's CoalAge magazine.



MSHA extends comment period, schedules public hearings on proposed rule

MSHA is extending the comment period until April 21 for the agency's proposed rule for occupational noise exposure, which was published in the Federal Register on December 17, 1996.

MSHA also announced that it intends to hold public hearings on the proposal. All requests to make

oral presentations for the record should be submitted at least 5 days prior to each hearing date. However, you do not have to give a written request to be provided an opportunity to speak. The public hearings are scheduled to be held at the following locations on the dates indicated:

Hearing date	Oral presentation request date
• May 6, Beckley, W.Va.	April 2
• May 8, St. Louis, Mo.	May 1
• May 13, Denver, Colo.	May 6
• May 15, Las Vegas, N.V.	May 8
• May 20, Atlanta, Ga.	May 13
• May 22, Washington, DC	May 15

Sixth International Mine Ventilation Congress

Achievements and challenges

May 18-22, 1997, The Doubletree Hotel—Pittsburgh, PA

The convening of the International Mine Ventilation Congress (IMVC) provides an international forum for the open exchange of information and ideas in the field of mine ventilation and air contaminant control. Since the first IMVC in Johannesburg, South Africa in 1975, Congress has provided an opportunity for ventilation professionals, mine operators, academics, consultants, labor, and government to meet, review and debate the state-of-the-art in mine ventilation, environmental control and monitoring, fires, explosions, and those allied disciplines impacting upon the health and safety of the miner. As with previous meetings, the Sixth IMVC will be augmented with pre- and post-Congress field trips to mine properties, pre-Congress informational seminars in various aspects of mine

ventilation and environmental control, and exhibits by manufacturers of ventilation and monitoring equipment.

Technical presentations will be made by authors from over 20 countries. These papers will cover a wide range of subjects including Diesels, Dust Control, Methane Control, Emergencies, Fires and Spontaneous Combustion, Heat and Humidity, Monitoring and Control, Ventilation Planning and Design, Computer/Systems Analysis, Face Ventilation, Ventilation Components, and Tunnel Ventilation. A number of case studies will also be presented.

Who are the sponsors

The Sixth IMVC is being sponsored jointly by the Mine Safety and Health Administration (U.S. Department of Labor), National Institute for Occupational Safety and Health (U.S.

Department of Health and Human Services), National Mining Association, United Mine Workers of America, United Steel Workers of America, and the Society for Mining, Metallurgy and Exploration.

Who should attend

Anyone having responsibilities or interest in the field of mine ventilation and air contaminant control should attend. These include mine operators, engineers, industrial hygienists, representatives of labor organizations and trade associations, and representatives at all levels of government.

Conference at a glance

Saturday, May 17

Pre-Congress Field Trips (By reservation)

Sunday, May 18
Pre-Congress Seminars
Reception with Exhibitors

Monday, May 19
Opening Session
Technical Session
Buffet Lunch (Included)

Tuesday, May 20
Technical Sessions
Buffet Lunch (Included)
Forum for Mine Ventilation Educators

Wednesday, May 21
Technical Sessions

Thursday, May 22
Buffet Lunch (Included)
Banquet (Included) Technical Sessions
Closing Session

Friday, May 23
Post-Congress Field Trips

For further information call Edward Miller at the Mine Safety and Health Administration (703) 235-1590 or by E-Mail at emiller@msha.gov or Pam Wagner at Courtesy Associates (202) 347-6109.

Short courses

Advantage is being taken of the presence of several experts during the Congress to present six seminars on topics of great importance to mine ventilation and health and safety professionals. Speakers for these seminars are from government, industry and academia and will present the results of recent research and new practices to address continuing and emerging problems in their respective areas. These seminars will be held on Sunday, May 18, 1997 in Pittsburgh, PA. The fee for each seminar is \$150.00 and will cover the costs of arrangements and materials.

Seminar #1 Respirable Dust Control in the Mineral Industry

Coordinator: Robert A. Jankowski, Pittsburgh Research Center, USA
The main topics to be covered in the seminar include: health concerns from mine dusts; continuous miner dust controls; longwall dust controls; surface mine dust controls; non-coal/metal-non-metal dust control; mineral processing/preparation plant dust control; dust sampling, and expert systems.

Seminar #2 Spontaneous Combustion in Coal Mines

Coordinator: A.D. Stewart Gillies, University of Queensland, Australia
Major topics to be covered in the seminar include case studies of spontaneous combustion incidents and the handling of heatings; approaches to prediction through underground measurement; laboratory testing of coals for prediction of spontaneous combustion propensity and modeling of heatings; regulation and role of the inspectorate; sealing of old working areas to prevent heatings and after incidences.

Seminar #3 Diesel Exhaust Emission Control in Underground Mines

Coordinator: Jan M. Mutmansky, The Pennsylvania State University, USA
The seminar topics include: health and safety issues with diesel-powered equipment in mining environment; ventilation requirements and ambient air quality control technology; the state-of-the-art diesel exhaust control technologies; approval and certification requirements for diesel equipment; air quality measurement—gases and particulates, and mine planning, ventilation planning and equipment deployment for exposure reduction and control.

Seminar #4 Ventilation and Cooling Requirements for Deep and Hot Mines

Coordinator: Frank H. von Glehn, Bluhm Burton Engineering (Pty), South Africa

This workshop includes brief descriptions on the following topics with general discussions around case studies: sources of heat in mines; primary ventilation issues; air cooling strategies, refrigeration systems and related issues; and future trends/novel methods.

Seminar #5 Improved Face Ventilation Practices for Underground Mines

Coordinator: Edward D. Thimons, Pittsburgh Research Center, USA
The topics to be covered include: jet fan use in metal, non-metal mines; spray fan systems; conventional extended cut coal mine ventilation; face methane monitoring; rollback problems with scrubber systems; use of curtains in continuous miner and longwall faces.

Seminar #6 Mine Fires and Explosions—Overview and Demonstrations

Coordinator: Charles P. Lazzara, Pittsburgh Research Center, USA
This workshop, to be conducted in Fairchance, PA, includes: an overview of Lake Lynn laboratory hazard recognition training; flammability of conveyor belting and ventilation ducting, mine fire detection; explosion resistant mine seals, and mine fire fighting resources. It also includes: underground mine tour, coal/belt fire detection demonstration, coal dust explosion in cannon gallery—quarry area; large-scale vertical ventilation duct fire demonstrations—quarry area; and conveyor belt fire demonstration in surface fire gallery—quarry area.

Technical program

In addition to the Opening, Keynote and Closing Sessions, Technical Sessions will be presented in the areas of Diesels, Dust Control, Methane Control, Emergencies, Fires and Spontaneous Combustion, Heat and Humidity, Monitoring and Control, Ventilation Planning and

Design, Computer/Systems Analysis, Face Ventilation, Ventilation Components, and Tunnel Ventilation. Several Case Studies will also be presented. Accepted papers in each of these areas include:

Diesels:

“Diesel Emissions Control Strategy at Inco” by Jozef S. Stachulak and Bruce R. Conrad (CANADA).

“Sampling and Analysis for Exposure in Diesel Exhaust Particulate in the Mining Workplace” by Michel Grenier, Mahendra Gangal, Keith Olson, and Bruce Cantrell (CANADA).

“Evaluation of Diesel Particulate Exposure and Control in a Nonmetal Mine” by Robert Haney, Kenneth Fields, and Scott Vail (USA).

“Results of Field Studies on Stratification of Diesel Particulate Matter in Mine Openings” by Jan M. Mutmansky, Vivek Goyal, and Wenhua Wan (USA).

“A Study on In-Situ Measurement and Evaluation of Diesel Particulate Matter” by Bok-youn Kim (KOREA).

Dust control:

“Radiation Integrated Program” by C.A. Rawlins (SOUTH AFRICA).

“Blast-Induced Dust” by J. Partyka and J. Szymanski (CANADA).

“Dust Contamination of Panel/Intake Air” by Peikun Liu and R.V. Ramani (USA).

“Dust Extraction in Headings Effected by Means of Rotodynamic Ventilation Ducts” by Walenty Frydel (POLAND).

“Status of Dust Control Technol-

ogy of U.S. Longwalls” by Jay F. Colinet, Ellsworth R. Spencer, and Robert A. Jankowski (USA).

“Relationships Between Coal Properties and Respirable Dust Generation Potential” by R. Srikanth and R.V. Ramani (USA).

“Evaluating the Relationships of Area vs. Personal Sampling Using a Computer Model” by G. Sun and R.V. Ramani (USA).

“Evaluation of a Two-Phase Spray System for Airborne Dust Suppression” by Bharath K. Belle and R.V. Ramani (USA).

“Dust Control at Koolyanobbing” by Tan Zhenxiang (WESTERN AUSTRALIA).

Methane control:

“Control and Monitoring of Gas in Blind Auger Headings” by Jon C. Volkwein (USA).

“Impact of High-Capacity Machine-Mounted, Scrubbers on Face Methane Concentrations” by C. Taylor, J. Rider, and E. Thimons (USA).

“Prevention and Suppression of Methane Ignitions at Road Headers” by R. Pollak, M. Faber, I. Gastberg, and W.E. Marx (GERMANY).

“The Computational Modeling of Methane Emission Through Adjacent Strata Around Longwall Coal Face” by Ting Xiang Ren and J.S. Edwards (UNITED KINGDOM).

“Simulation Based Degasification System Design for the Shihao and Datong Mines of the Songzao Coal Mining Administration in Sichuan China” by Daniel J. Brunner, Jeff Schwoebel, Jianliang Li, Ming Sun, Guangyan Ye, and Miao He (USA).

“Advanced Calculation of the Amount of Methane Degassing from a Longwall Based on a Mathematical-Physical Model” by Per Nicolai Martens (GERMANY).

“Modeling of Gas Circulation in the Goaf of Retreat Coalfaces” by Christian Tauziedi, Zbigniew Pokryszka, Remi Bouet, and Andre Carrau (FRANCE).

“Application of Coalbed Methane Reservoir Simulations for Estimation of Methane Emissions in Longwall Mining” by Michael D. Zuber and S.A. Golditch (USA).

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“Modeling Methane Migration in Longwall Gobs During Mining” by Dong Liu and Thomas Novak (USA).

“Drilling Oil and Gas Wells Through Gobs” by James G. Tilton (USA).

“Worldwide Methane Emissions from Underground Coal Mining” by Abou Saghaifi (AUSTRALIA).

“Methane Drainage from Gassy Mines - A Global Review” by Pramod C. Thakur (USA).

“Methane Emissions During Extended Cut Sequences in a Room-and-Pillar Coal Mine” by Steven J. Schatzel, Fred Garcia, and John K. Marshall (USA).

“Analysis and Prediction of Longwall Methane Emissions: A Case Study in the Pocahontas No. 3 Coalbed, Virginia” by William P. Diamond and Fred Garcia (USA).

Emergencies:

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Underground Orepasses of P.T. Freeport Indonesia by Malcolm J. McPherson and Nigel Pearson (USA).

“Testing of Active Ignition On-board Suppression Systems for Use in South African Collieries” by Jan Du Pleissis, Jan W. Oberholzer, and D.J. Bryden (SOUTH AFRICA).

“Control of Miner Ventilation Systems During Fire-Extinguishing” by B.A. Griaduschy, I.E. Bolbat, and P.S. Pashcovsky (UKRAINE).

“A Numerical Simulation of Spontaneous Combustion of Coal in Goaf or in Fissures” by Josef Waclawik, Dr. Marian Branny, and Dr. Janusz Cygankie (POLAND).

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“Cryogenic System for Quick Dewatering of Inundated Underground Mines - A New Concept” by B.C. Bhowmick, More Ramula, and B.B. Shar (INDIA).

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Fires and spontaneous combustion

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Heat and humidity
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Monitoring and control

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“Windows Based Computer Data Acquisition and Control System Provides Cost/Performance Benefits for Mine-Wide Monitoring” by Albert Ketler (USA).

“Results of 1994 Atmospheric Monitoring Survey in Underground Coal Mines” by William J. Francart and Mark J. Schultz (USA).

“Mine Air Distribution Control” by Liu Cheng-si (CHINA).

Ventilation planning and design

“Ventilation Planning at the Aberdeen Mine” by Archie Richardson and Laine Adair (USA).

“Ventilation Planning at the El Indio Mine” by Keith G. Wallace, Jr. (USA).

“Case Study: Experiences from Construction of a New Ventilation System for LKABs Kiruna Mine” by Lennart Mukka (SWEDEN).

“Ventilation Design Alternatives for Underground Placer Miners in the Arctic” by Sukumar Bandopadhyay, Hanguang Wu, and Michael G. Nelson (USA).

“Research on the Economical Design of a Mine Ventilation System” by R. Krishna (LUSAKA).

“Darbrook Mine—Case Study” by Dr. Roy Moreby (AUSTRALIA).

Computer/systems analysis

“Development of a Thermodynamic Based Network Analysis Program for Designing Underground Mine Ventilation Systems” by D.C. Panigrahi and M.K. Singh (INDIA).

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Face ventilation

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“Operating Fans in Parallel in View of Variable Flow Rate Output” by Eddy J. Jacques and Pierre J. Wauters (BELGIUM).

“Experimental Evaluation of the Jet Fans for Auxiliary Ventilation in Mines” by I.M. Konduri, M.J. McPherson, and E. Topuz (USA).

“A Study of Jet Fan Aerodynamics” by Allan Hall and K.R. Mutama (CANADA).

Ventilation components

“Validation Study of the Computational Fluid Dynamics Approach as a Tool for Fan Inlet Ductwork Design” by A.M. Wala, J.C. Yingling, R. Ray, and J. Zhang (USA).

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“Examinations of Bleeder

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Systems" by Jack E. Tisdale and John E. Urosek (USA).

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"Current Issues, Alternative Concepts and Design Criteria for Subway Ventilation Systems" by Paul C. Miclea (USA).

"An In-Depth Study of City of Niagara Falls Raw Water Intake Tunnel During Summer 1995 in Which the Contractor, Herbert F. Darling Inc., Encountered Large Quantities of H₂S" by Richard R. Radel and Jack Barry (USA).

"Heat Generation and Climatic Control in the Operation of Tunnel Boring Machines" by S.J. Bluhm and F.H. von Glehn (SOUTH AFRICA).

Conference Registration Information

	(Advance)	Received after
	Received by	April 15 or at
	April 15	Conference
Technical sessions	\$450.00 \$550.00
Student (valid ID) ..	\$300.00 \$300.00
Spouse program	\$150.00 \$150.00
Seminars 1,2,3,4,5 and 6	\$150.00 per..	\$150.00 per

Payment of the Technical Sessions includes admission to all technical sessions, the Wednesday night banquet, all lunches and coffee breaks, the Sunday night reception with the exhibitors and 1 copy of the conference proceedings

Student Option: Full time students at accredited institutions are eligible to register at the student rate. Identification will be required.

For advance reservations, complete the Advance Registration Form and return with remittance of the appropriate fee by April 15, 1997 to:

Registrar
Mine Ventilation Congress
6555 15th Street, NW
Suite 300
Washington, DC 20005

For Advance Registration, payment must accompany your form. Remittance should be made payable to Courtesy Associates/MVC by personal or corporate check, or by Visa or Mastercard.

Checks must be drawn on a U.S. bank and payable in U.S. dollars. You are encouraged to register for the Congress in advance. Your registration material will be held for you at the Advance Registration Desk.

Accommodations—hotel reservations

A block of rooms has been reserved for the IMVC participants at the DoubleTree Hotel Pittsburgh. The DoubleTree Hotel Pittsburgh will be the center of the IMVC activities. Your conference experience will be enhanced if you stay in the conference hotel. To make a reservation, please complete the hotel form and mail with one night's payment to: **The DoubleTree Hotel Pittsburgh 1000 Penn Avenue Pittsburgh, PA 15222-3873** Tel. (412) 227-4501 Fax. (412) 227-4500

Hotel rates:
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City and state taxes are additional.

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Sixth International Mine Ventilation Congress—Pittsburgh, PA, May 18-22, '97 (For clarity, **PLEASE PRINT OR TYPE**)

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Note: Cancellations of advance registration must be in writing and must be received by April 15, 1997. Advance payments will be refunded, less a \$25 service charge, after the conference.

JAHSA and HSA to hold National Council meeting July 8-10, 1997

Theme: "Don't gamble on safety" Tropicana Hotel, Las Vegas, NV

The Joseph A. Holmes Safety Association and the Holmes Safety Association will hold their annual business meeting at the Tropicana Hotel in Las Vegas Nevada on July 8-10,1997. Our agenda includes important safety and health topics which we feel will be of great interest to participants. Mark your calendar and make your reservations today.

Lodging at the Tropicana will be \$79. Make your reservations directly with the Tropicana by calling (702) 739-2222 or (800) 634-4000. It is recommended that all reservations be guaranteed either by advanced deposit of one night's lodging or by credit card. We have reserved a block of 200 rooms which will be held until May 1, 1997. Be sure to indicate you are attending the Holmes Safety Association Meeting.

The registration fee is \$125 which includes a luncheon and banquet. For guests or spouses not attending the meeting or workshops, the fee is \$75 for the luncheon and banquet. For an additional cost, tickets can be obtained for a dinner show at the Tropicana.

If you have any questions or would like additional information, please contact Judy Tate at (214) 767-8401, ext. 234.

Agenda

TUESDAY, July 8, 1997

- 12:00 pm Registration and Vendor
- 3:00 pm HSA and JAHSA Executive Board Meeting
- 5:00 pm Extravaganza

WEDNESDAY, July 9, 1997

- 7:30 am Registration/Refreshments
- 8:30 am Welcome
- 9:00 am Break

Time Track Title

- 9:15 am 1 Noise Conservation
- 2 Emergency planning and preparedness
- 3 Electrical arcing demonstration
- 10:45 am 1 Fall protection
- 2 Contractor health and safety compliance
- 3 HCN/Substance abuse
- 12:00 pm Lunch at hotel (included in registration)

WEDNESDAY, July 9, 1997

Time Track Title

- 1:30 pm 1 Developing video presentations
- 2 Safety awareness
- 3 Stress/Substance abuse
- 3:00 pm 1 Violence in the workplace
- 2 Hoisting and rigging safety
- 3 Mine rescue training—Year 2000

THURSDAY, July 10, 1997

Time Track Title

- 8:00 am 1 International mine health/safety standards
- 2 Your safety program
- 9:00 am 1 42 CFR—New respirator regulations
- 2 Safety wear fashion show
- 1 :00 pm Lunch (on your own)
- 3:00 pm HSA and JAHSA General Meetings
- 6:00 pm Social-Cash Bar
- 6:30 pm Banquet (awards, scholarships, prizes, and entertainment)

REGISTRATION FORM (please type or print)

Name: _____ Telephone (include area code): _____

Company: _____ Address: _____

City: _____ State: _____ Zip Code: _____

Meeting Registration Fee of \$_____ is enclosed for _____ persons (\$125.00 per person)

(LATE REGISTRATION FEE—AFTER MAY 1, 1997—\$150.00)

Guest Fee (@\$75.00 per person) of \$_____ is enclosed for (insert no. of guests): _____ persons

Mark the number of persons attending the following sessions in the appropriate box:

(1)

- Noise Conservation
- Fall Protection
- Developing Video Presentations
- Violence in the Workplace
- International Mine Health/Safety Stds
- 42 CFR New Respirator Regulations

(2)

- Emergency Planning/Preparedness
- Contractor Health and Safety Compliance
- Safety Awareness
- Hoisting and Rigging Safety
- Your Safety Program
- Safety Fashion Show

(3)

- Electrical Arc Demonstration
- HCA/Leaching
- Stress/Substance Abuse
- Mine Rescue Training—Year 2000

Return registration/payment to:
Judy Tate, MSHA, 1100 Commerce,
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Checks payable to: Holmes Safety Assoc.

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Heavy equipment

Battle of the behemoths

Manufacturers and producers focus on moving more—with less

By Russell A. Carter—Western Editor

Is bigger better? In the coal industry, the answer is usually “yes,” particularly when the question refers to mining equipment. Fewer, but larger, production machines can reduce labor costs by 15% and raise productivity by as much as 30%, according to some estimates. And, although it seems paradoxical, larger equipment may offer improved flexibility and mobility. A high-capacity wheel loader capable of loading 240-ton trucks, for example, can fill in for a downed shovel, or quickly move from one face to another when multi-pit blending is required.

There's a price to pay for increased digging, loading, and hauling capacity, however. Can lower unit costs offset the higher price and operating costs of a larger dragline, shovel, or excavator? Will a mine's load-haul-dump cycle timing be adversely affected by longer truck wait intervals as three-pass loading becomes four- or five-pass? Can haul roads survive the pounding from heavier equipment and, if a large truck breaks down, are existing service facilities able to accommodate it?

These questions have been batted back and forth between operator and manufacturer for years, and the only definitive answer still appears to be “it depends”—on many factors, ranging from a customer's production priorities, to site requirements and conditions, and even to market demand for coal.

Customers often determine that bigger isn't always better. There's strength in numbers: Production is not as severely impacted when one unit of a 20-truck fleet is taken out of service, compared with the 20% loss when one unit of a five-truck fleet goes down. Through design innovations, equipment suppliers often can provide other options for reducing operating costs, including higher machine reliability, improved maintenance, and other features. New onboard weight-monitoring and vehicle tracking systems can improve productivity by ensuring that trucks aren't over- or underloaded, and by allowing units to be deployed where and when needed. Mining plans and methods, haul road layout and maintenance, and other factors sometimes can be adjusted to maximize the effectiveness of existing

equipment.

However, sales figures indicate that many mines are opting for new, higher-capacity shovels, loaders, and trucks. Caterpillar estimates that between 1992 and 1994, sales of trucks in the 141 to 200-ton-capacity range fell an average of 25% worldwide, while truck purchases in the 201- to 240-ton category rose by 85%. This upsizing trend extends to other primary production and ancillary support equipment ranging from draglines to bulldozers and road graders.

P&H Mining Equipment has sold 50 of its 4100 series electric shovels since the first unit was commissioned in 1991, and recently began offering the 4100A series, which features an extended, beefed-up boom design. Several of Marion Power Shovel Co.'s top-of-the-line 351 M shovels have been sold to customers in the Powder River Basin and Canadian tar sands operations. LeTourneau reports that 11 of its large, electric-drive L-1800 wheel loaders are now in service after being introduced in 1994. Caterpillar says that deliveries of its 240-ton capacity, mechanical drive 793B model truck have been twice that of its 789B and 785B combined. And Australian coal operators have been placing multiple orders for new, large draglines.

In response to customer interest in larger equipment, several manufacturers recently introduced, or are in various stages of developing, even bigger or more powerful versions of their products. Some of these new units were on display at MINExpo, including Caterpillar's 24H mining road grader, Komatsu America's D575A2SD bulldozer and Komatsu

Komatsu Haulpak's 930E, the first of the 300-ton capacity haul trucks, will go into service soon at a Powder River Basin coal mine.



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Large loaders, such as the LeTourneau L-1800, combine mobility with high loading capacity. The electric-wheel drive L-1800, which can carry a 45-cu yd bucket, is the largest loader of its type in the world.

Haulpak Division's 930E haul truck. Euclid-Hitachi Heavy Equipment Co. introduced its 262-ton capacity R260 hauler, and reportedly soon will offer a 300-ton-capacity electric-drive model.

Liebherr, which acquired the U.S. truck manufacturer Wiseda in 1995, is working on a 300-ton model as it continues to refine its flagship 240-ton truck, the KL-2450. Caterpillar's 793B has been upgraded to a model C configuration that provides more horsepower, higher top speed, and other design improvements that provide quicker service and improved

reliability.

Hydraulic excavators are getting larger as well, with some of the biggest units directly competing with rope shovels in terms of bucket capacity and productivity. Demag and Komatsu, having formed an alliance to market their respective product lines, can provide a well-matched shovel/truck combination with the 1.5-million pound. Demag H485SP excavator and the 300-ton 930E Haulpak, and recently introduced the H455S, a 1.1 -million pound, 33-cu-yd-capacity model. Demag's H485SPI currently the largest excavator on the

market, has a 46-cu-yd bucket capacity. Liebherr offers a 585-ton excavator, the R996 Litronic, and O&K may introduce a 775-ton model in the future.

Hitachi upgraded its 350-ton-class EX3500 series to the -3 version, which provides 2% greater crowd force along with an elevated operator's cab for better vision when loading large trucks. The EX3500-3 is the largest excavator marketed by Hitachi and can be matched with 150- to 190-ton trucks. The company is rumored to be developing a larger model, possibly in the 1-million-pound class.



This 1,150-hp Komatsu 575A-2 Super Dozer is the largest of its type in the world.

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P&H Mining Equipment sold four of its new 9020 draglines to Australian coal producers in 1996.



Solving the problems

As with most significant product improvements, a variety of technological advances had to be achieved before these behemoths could move off the drawing board into prototype form. In the case of Haulpak's 930E truck, a General Electric Transportation Systems AC drive system, originally developed for diesel-electric locomotives, was redesigned and adapted as a motorized-wheel drive control system for off highway trucks. Haulpak settled on the GE system after looking at potential AC-drive candidates for about eight years.

Other technological breakthroughs required to develop the truck included Bridgestone's new 48/95R57 radial tire, capable of handling an 80-ton load per tire; and the MTU/Detroit Diesel joint venture's 16-cylinder engine, rated at 2,682 hp, to power the unit.

Better design tools also have contributed to product development. P&H Mining Equipment has used finite-element analysis software for years to design its products, and put its FEA software to good use in developing the

4100 series shovel design.

Harnischfeger engineers first generated a bar and beam model of the entire electric shovel assembly to determine loads on various components—which can be significant, considering the machine's working weight of 2,375,000 pound and 82.5-ton bucket payload capacity. The resulting information was then used in conjunction with more detailed models to ensure the structural integrity of the finished product. The FEA tools were particularly important in analyzing stresses on the boom and dipper components.

As part of Liebherr's move to boost design capabilities and production capacity at the former Wiseda truck factory (now known as Liebherr Mining Truck) in Kansas, it installed a new CAD/CAM system that likewise allows engineers to apply FEA techniques for stress analysis, which is of singular importance in refining the design of a new 300-ton truck model currently under development.

Wiseda claimed to be the first to offer a 2,500-hp diesel engine in its haulers; Liebherr now is studying engine options from MTU/DDC and others to power the new 300-ton model, and also is considering using an AC motorized-wheel drive system developed by Siemens.

The move to AC control systems has opened the door for trucks even larger

than the current 300-ton class. The AC drive system's ability to handle higher horsepower allows manufacturers to use more powerful diesel engines in yet-to-be-developed 320- to 350-ton haulers. Haulpak and others are looking at 3,000-plus hp. engines from a variety of sources, including marine units, to power the next generation of trucks. It's likely that new tire designs and rubber compounds will be required for these monster trucks, as they were before the current crop of 300-ton units could begin rolling.

Perhaps the most important limiting factor in the future of new, large-truck design is customer acceptance. The hefty price and operational demands of these units may largely limit potential buyers to either new mines that are buying production equipment for the first time, or existing mines that want to completely replace their current fleet.

The benefits gained by using super-large trucks and appropriately sized loading equipment might be eroded in a mixed fleet containing smaller trucks, where oversized shovels could overload and damage trucks, or simply load them too quickly and disrupt load-haul-dump cycle timing.

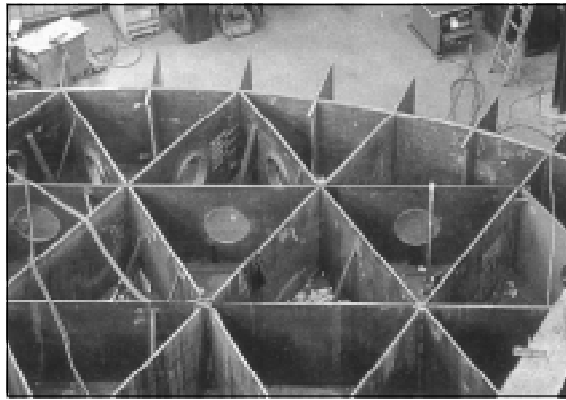
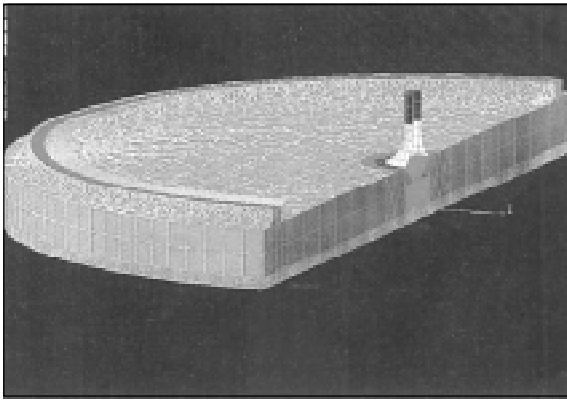
Draglines and dozers

Stripping machines other than shovels also are getting larger. P&H's 6,000-ton 9020 walking dragline began working in Australia's Hunter River Valley earlier this year, and P&H has developed an even larger machine, the 8,500-ton 9160. The 9020, to date the largest mining machine ever built by P&H, is eclipsed by the mammoth 9160.

The 9020 measures 367 ft from the end of the machinery house to the tip of the boom, and is powered by 20 DC electric motors that deliver a combined 39,500 peak horsepower. Maximum bucket capacity is 120 cu yd. In comparison, the 9160 is 514 ft from tip to tail and requires 28 electric motors producing 36,676 peak horsepower. Power consumption is 5.5 million kilowatt hours per month.

The Euclid-Hitachi Co.'s R260 has a 262-ton payload capacity.





Several new design elements were developed for the 9020 and are carried over to the larger machine, such as a patented "Gradial" tub that combines the elements of a grid-style tub with a new triangular grid pattern that provides multiple load paths for ground-induced forces encountered by the tub. P&H also used a newly developed, low-heat-low distortion welding process to join together the 84-ft-diameter tub's six intersecting plates.

P&H used CATIA software in both the 9020 and 9160 development process. CATIA, a solids-modeling and electronic-design software system, allowed engineers at the Milwaukee headquarters and at sites at Perth and Singleton, Australia, to expand the use of 3-D solids modeling in the design of the two draglines and to participate in "conference engineering." With the system, three-dimensional design models can be transmitted electronically from one site to another for review.

The ability to share detailed, up-to-the-minute design information was particularly important during the 9020's four-year development period, as only about half of the machine's components were built at the P&H plant in Milwaukee. Mine equipment suppliers are making increasing use of collaborative design tools for large projects, and the trend certainly will continue as the design, testing, and fabrication phases of new equipment become more geographically diverse.

At the opposite end of the size

spectrum for stripping machines is the new generation of jumbo-size bulldozers from Caterpillar, Komatsu, and Liebherr, which markets what it claims is the largest hydrostatic-drive dozer, the 375-hp PR751.

Leading the bigger-is-better contingent is the 314,000-pound Komatsu 575A-2 Super Dozer, which features a new blade design capable of moving 90 cubic yards per pass for overburden stripping, with even larger blades available for reclamation tasks. The blade provides a full range of backward and forward movement in dig, carry, and dump modes in order to maximize payloads and cycle times, Komatsu said.

The 1,150-hp 575A-2 is designed with a longer undercarriage than Komatsu's Super Ripper model, improving the machine's tractive effort by reducing shoe slip, and also features an X-bogie design that is claimed to provide better ground contact and drawbar pull. The dozer's final drive components have been beefed up with the inclusion of a locking torque converter and five planetary gears, rather than four.

At 239,550 pounds operating weight, Caterpillar's new Carrydozer bulldozer can't lay claim to the "world's largest" title, but the 850-fwhp D11 R CD model is the latest version of Cat's popular D11 series, modified to cut per-yard earth moving costs by a series of design refinements that include an automated dozing system, new blade design, and all electronic

engine, steering, transmission, and ripper controls.

Caterpillar's 24H road grader, recently put in service at mines in the Powder River Basin, was developed to meet the road-maintenance needs of mines operating super-large trucks. With 500 flywheel hp and weighing 131,000 lbs, the 24H is the largest mining grader available and has the heft to cut and completely remove haul-road potholes, for example, rather than just pushing dirt in to fill them. Its 24-ft blade width reduces the number of passes required to grade a road.

What's next?

It's likely that the rate of super-sized equipment introductions will abate for a while to allow manufacturers to pause and refine their new products, assess market demand for bigger models, and study the constantly evolving technological options available for the next generation of mining machines.

The pace may slow, but it certainly won't stop, as late-to-market suppliers race to match their competitors' new models, and producers continue to ask for new tools that can help them strip their production costs to bedrock.

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P&H Mining Equipment has introduced a larger model, the 9t60, that uses design elements developed for the 9020, such as Finite Element Analysis in a computer model and the "Gradial" tub design near left.

Anatomy of the healthy back

Supporting the back is the spinal column, made up of 24 bony vertebrae stacked one upon another. Separating the vertebrae are soft discs made of cartilage, which act as shock

absorbers and allow the vertebrae to move.

Most people don't realize that it's the abdominal muscles that give the back its support, with help from the muscles and ligaments that run along the spinal column. A healthy back is properly aligned with its three natural curves (cervical,

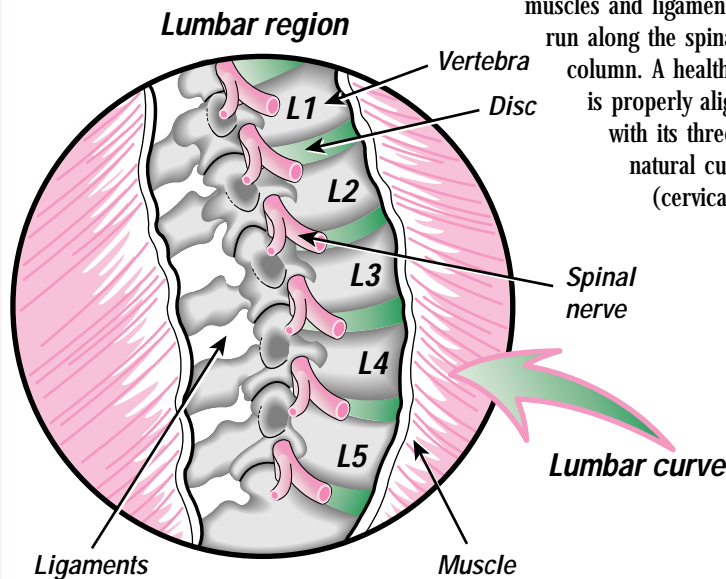
thoracic, and lumbar curves) in their normal, balanced position, and supported by strong muscles.

The lower back

Because we stand upright, most of our body weight falls squarely on the vertebrae (L1 through L5) of the lower back (the lumbar region), making it prone to injury. Abdominal and back muscles weakened from underuse or poor posture can rob the spinal column of the support it needs. A sudden twist or a careless lift can injure the lower back.

The best way to ensure a healthy back is to keep all your body's muscles strong, watch your posture, and above all, learn good lifting and material handling techniques.

Reprinted from Krames Communications' Back to Backs.



Lifting the burden of low back pain

Some people carry the weight of the world upon their shoulders. But half of the population bears that weight in their lower back. Low back pain can occur suddenly, offering few clues to its source. Sufferers describe the pain as a throbbing sensation, gnawing ache or stabbing pain in the lower mid-section of their spine. The pain can interfere with sleep, hinder a person from standing fully erect or make getting up from a chair an agonizing experience.

"In 9 out of 10 cases, low back pain resolves itself within 4 weeks, regardless of how it was treated," says David Williams, PhD, of Georgetown's Pain Management Center. "When pain persists, however, the 1-to-3 month window is an important time to seek aggressive treatment. Treatment can involve physical, medical, behavioral, and

block therapies. The Georgetown Pain Management Center is staffed to provide these types of services."

A medical mystery

Low back pain's often unexplained appearances and disappearances have made it something of a medical puzzle. Though it is the second most common reason for contacting a doctor—behind the common cold—back experts, like cold researchers, aren't any closer to identifying exact causes with certainty.

Recommended treatments for acute and chronic low back pain include 2 to 4 days of bedrest, as too much bed rest has been found to delay healing. And, experts suggest applications of heat and cold packs to the lower back as well as over-the-counter medication, such as acetaminophen, for pain relief. A gradual

return to normal activities is also advised. Avoiding movements that increase stress on the spine was found to be the speediest route to recovery.

When should you worry?

If back discomfort is accompanied by leg or foot pain, fever, bladder or urinary dysfunction or pain lasting longer than 4 weeks, experts urge a person to contact a doctor sooner rather than later. Most low back pain episodes do not put a person in an emergency situation. But, don't hesitate to get help when the pain in your back starts to feel like the weight of the world.

Reprinted from the Spring 1996 edition of Washington, DC's Georgetown University Medical Center's Healthy Decisions.