PROCEEDINGS

of the

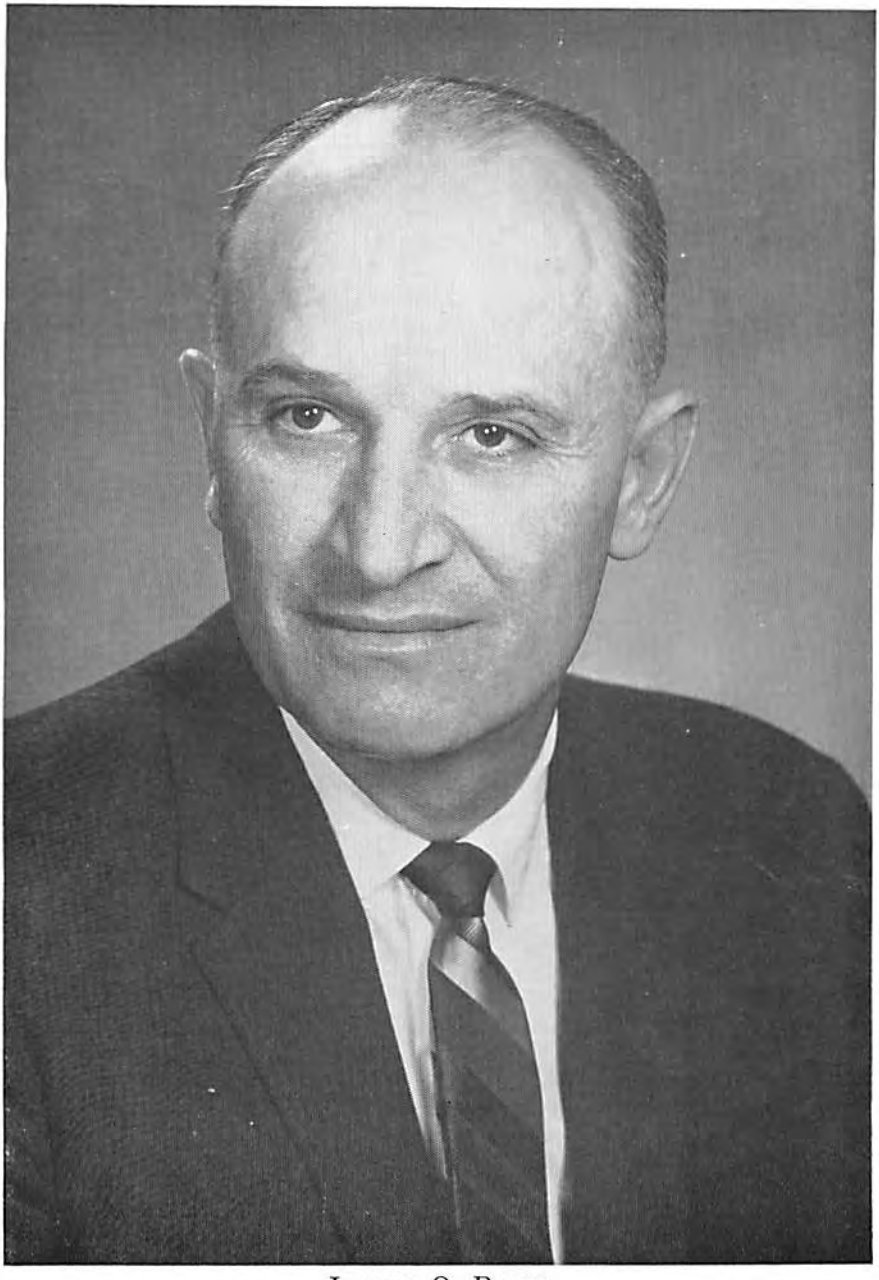
ILLINOIS MINING INSTITUTE

FOUNDED FEBRUARY, 1892

Seventy-Eighth Year

1970

Annual Meeting
SPRINGFIELD, ILLINOIS
October 22–23, 1970



JOSEPH Q. BERTA
President, 1970

THE COAL MINER

True — he plays no grandstand role in life
But his importance is vital, great and just:
For without his toil in earth's caverns deep,
Civilization would soon crumble into the dust.

AD 1964 From his poem — Vachel Davis

(Dedicated on State Capitol Lawn, Springfield, Illinois, October 16, 1964)

IN MEMORY

of

All Deceased Members

of the

ILLINOIS MINING INSTITUTE

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Gilbert H. Cady

Walter C. Gill

Donald N. Griffin

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Raymond L. Kaga

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M. M. Leighton

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PAST PRESIDENTS OF ILLINOIS MINING INSTITUTE

FOUNDED FEBRUARY, 1892

1892–93 James C. Simpson, Gen. Mgr., Consolidated Coal Co., St. Louis, Mo.
1893–94 James C. Simpson, Gen. Mgr., Consolidated Coal Co., St. Louis, Mo.
1894–95 Walton Rutledge, State Mine Inspector, Alton, Ill.
1895–1911 Institute inactive.
1912–13 John P. Reese, Gen. Supt., Superior Coal Co., Gillespie, Ill.
1913–14 Thomas Moses, Supt., Bunsen Coal Co., Georgetown, Ill.
1914–15 J. W. Starks, State Mine Inspector, Georgetown, Ill.
1915–16 William Burton, V. P., Illinois Miners, Springfield, Ill.
1916–17 Fred Pfahler, Gen. Supt., Superior Coal Co., Gillespie, Ill.
1917–18 Patrick Hogan, State Mine Inspector, Carbon, Ill.
1918–19 William Hall, Miners Examining Board, Springfield, Ill.
1919–20 William Hall, Miners Examining Board, Springfield, Ill.
1920–21 Frank F. Tirre, Supt., North Breese Coal & Mining Co., Breese, Ill.
1921–22 Prof. H. H. Stoek, Mining Dept., University of Illinois
1922–23 John G. Millhouse, State Mine Inspector, Litchfield, Ill.
1923–24 D. D. Wilcox, C. E., Superior Coal Co., Gillespie, Ill.
1924–25 H. E. Smith, Gen. Supt., Union Fuel Co., Springfield, Ill.
1925–26 E. G. Lewis, Supt., Chicago-Sandoval Coal Co., Sandoval, Ill.
1926–27 Wm. E. Kidd, State Mine Inspector, Peoria, Ill.
1927–28 James S. Anderson, Supt., Madison Coal Corp., Glen Carbon, Ill.
1928–29 John E. Jones, Safety Engineer, Old Ben Coal Corp., West Frankfort, Ill.
1929–30 Prof. A. C. Callen, University of Illinois, Urbana, Ill.
1930–31 Joseph D. Zook, Pres., Illinois Coal Operators Assn., Chicago, Ill.
1931–32 Geo. C. McFadden, Asst. Vice-Pres., Peabody Coal Co., Chicago, Ill.
1932–33 Chas. F. Hamilton, Vice-Pres., Pyramid Coal Co., Chicago, Ill.
1933–34 Harry A. Treadwell, Gen. Supt., C. W. & F. Coal Co., Benton, Ill.
1934–35 C. J. Sandoe, Vice-Pres., West Virginia Coal Co., St. Louis, Mo.
1935–36 T. J. Thomas, Pres., Valier Coal Co., Chicago, Ill.
1936–37 W. J. Jenkins, Pres., Consolidated Coal Co., St. Louis, Mo.
1937–38 H. H. Taylor, Jr., Franklin County Coal Corp., Chicago, Ill.
1938–39 Paul Weir, Consulting Mining Engineer, Chicago, Ill.
1939–40 Roy L. Adams, Old Ben Coal Corp., West Frankfort, Ill.
1940–41 Dr. M. M. Leighton, State Geological Survey, Urbana, Ill.
1941–42 J. A. Jefferis, Illinois Terminal Railroad Co., St. Louis, Mo.
1942–43 Carl T. Hayden, Sahara Coal Co., Chicago, Ill.
1943–44 Ben H. Schull, Binkley Mining Co., Chicago, Ill.
1944–45 George F. Campbell, Old Ben Coal Corp., Chicago, Ill.
1945–46 Joseph E. Hitt, Walter Bledsoe Co., St. Louis, Mo.
1946–47 Robert M. Medill, Dept. Mines & Minerals, Springfield, Ill.
1947–48 Harry M. Moses, H. C. Frick Coal Co., Pittsburgh, Pa.
1948–49 J. Roy Browning, Illinois Coal Operators Assn., Chicago, Ill.
1949–50 T. G. Gerow, Truax-Traer Coal Co., Chicago, Ill.
1950–51 G. S. Jenkins, Consolidated Coal Co., St. Louis, Mo.
1951–52 Clayton G. Ball, Paul Weir Co., Chicago, Ill.
1952–53 William W. Bolt, Pawnee, Ill.
1953–54 Harold L. Walker, University of Illinois, Urbana, Ill.
1954–55 J. W. MacDonald, Old Ben Coal Corp., Benton, Ill.
1955–56 Earl Snarr, Freeman Coal Mining Corp., Hinsdale, Ill.
1956–57 Paul Halbersleben, Sahara Coal Co., Harrisburg, Ill.
1957–58 H. C. Livingston, Truax-Traer Coal Co., Chicago, Ill.
1958–59 A. G. Gossard, Snow Hill Coal Corp., Terre Haute, Ind.
1959–60 H. C. McCollum, Peabody Coal Company, St. Louis, Mo.
1960–61 Stuart Colnon, Bell & Zoller Coal Co., Chicago, Ill.
1961–62 Robert J. Hepburn, United Electric Coal Companies, Chicago, Ill.
1962–63 John P. Weir, Weir Co., Chicago, Ill.
1963–64 E. T. Moroni, Old Ben Coal Corp., Benton, Ill.
1964–65 John W. Broadway, Bell & Zoller Coal Co., Chicago, Ill.
1965–66 B. R. Gebhart, Freeman Coal Mining Corp., Chicago, Ill.
1966–67 C. A. Broecker, Ayrshire Collieries Corp., Indianapolis, Ind.
1967–68 Joseph Craggs, Peabody Coal Co., Taylorville, Ill.
1968–69 Clayton F. Slack, Sahara Coal Co., Inc., Chicago, Ill.
1969–70 Joseph Q. Berta, Truax-Traer Coal Co., Pinckneyville, Ill.

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PROCEEDINGS OF
THE ILLINOIS MINING INSTITUTE

SEVENTY-EIGHTH ANNUAL MEETING

SPRINGFIELD, ILLINOIS

Thursday and Friday, October 22–23, 1970

OPENING SESSION

The opening session of the 78th Annual Meeting of the Illinois Mining Institute convened at 3:00 p.m. Thursday, October 22, 1970, in the Ballroom of the Hotel St. Nicholas. Joseph Q. Berta, President of the Institute, presided.

President Berta: Welcome to the Thursday Session of the 78th Annual Illinois Mining Institute Meeting. I have a few announcements I would like to make first, then we will get on with the Technical Session. In order to help the hotel in serving the luncheon tomorrow, we would appreciate it if everyone who is going to attend the luncheon would get their tickets early, particularly today if possible. They can be obtained at the registration desk in the lobby. One of the other announcements that I think most of you probably know, which is important to the group, is the 5:30 Fellowship Hour that is going to be in the Illinois Room just adjacent to this one. There will be free beer, hors d'oeuvres, and the cash bar for mixed drinks. Another thing we would like to know about; if anybody has any knowledge of an Illinois Mining Institute member who has passed away in the last year, we would appreciate it if you would tell our Secretary-Treasurer or Mrs. Conerty at the registration desk. The next business meeting for the Illinois Mining Institute will be at 9:00 tomorrow morning. I would like to have everybody attend this important meeting as the new officers for the coming year will be elected and many other very important items of business will be discussed. At this time, we will proceed with our Technical Session. I would like to introduce the Safety Director of the Freeman Coal Mining Corporation from West Frankfort, Illinois—Mr. Paul Budzak, who will chair the Technical Session this afternoon. Mr. Budzak.

Paul Budzak: Never before in the history of coal mining in the United States have operating management people been more

confused, more frustrated, and more bewildered about the interpretation of mining law than they are today. Do I hear an amen to that?

We have several men on our circuit today who have all been on the end of a No. 5 shovel. They are practical men, and they know the problems that we are all confronted with. We cannot run away from the mining law, we have to recognize it, try to live with it, and amend it and alter it where ever we can to make it compatible with our industry.

So this afternoon we have a few experts to call on to explain the law to us, to explain some of the interpretations, and to explain some of the thinking that goes on in their minds with respect to the law. The first speaker of this afternoon was born in Carbon Hill, Alabama, and he kept migrating northward. He stopped in Jenkins, Kentucky, in 1940 and started working for the biggest coal company in the United States at the Consolidation Mine in Jenkins. From there he moved farther north into Logan County with West Virginia Coal and Coke Company. From there he continued migrating northward until he got up to Morgantown, West Virginia, as an electrical inspector for the Bureau of Mines, and later he became head of that Sub-district. And today he has moved farther north to Vincennes, Indiana, as head of the District for the U.S. Bureau of Mines. It is my pleasure to present to you this afternoon, Maurice Childers.

IMPORTANT ASPECTS OF THE FEDERAL COAL MINE HEALTH AND SAFETY ACT OF 1969

MAURICE S. CHILDERS
Acting District Manager, U.S. Bureau of Mines
Washington, D.C.

INTRODUCTION

Many provisions of the Federal Coal Mine Health and Safety Act of 1969 require approval, or some other action, by the Secretary of Interior and Secretary of Health, Education, and Welfare. As most of you know, authority to grant approvals, or to take other action has for the most part been legally delegated to the Bureau of Mines, and thence redelegated to District Managers.

The first major change in the Act is the inclusion of mandatory health standards. Previously, we were concerned only with safety provisions.

The Secretary of Health, Education, and Welfare develops health standards, and tests and approves instruments for determining compliance with health standards. The Secretary of the Interior must publish in the Federal Register the proposed health rules of the Secretary of HEW, as well as safety standards.

TITLE II—INTERIM MANDATORY HEALTH STANDARDS

A new concept was added to the coal mining law on the Federal level when the legislation was enacted in December, 1969. The health of the miner, in addition to his protection from physical injuries, became the concern of Congress, and this interest was manifested in Title II of the Act.

Title II is called Interim Mandatory Health Standards, and its purpose, as Congress stated, is to provide to the greatest extent possible that the working conditions in each underground coal mine are sufficiently free of respirable dust concentrations in the mine atmosphere to permit each miner the opportunity to work underground during the period of his entire adult working life without incurring any disability from pneumoconiosis or any other occupation-related disease during or at the end of such period. These Interim Mandatory Health Standards are applicable to underground coal mines until suspended by improved mandatory health standards promulgated by the Secretary of the Interior as provided elsewhere in the Act.

Requirements of Title II

The specific requirements of Title II are quite detailed and precise, but even so, some areas have required further definition to make them workable, and some specific requirements have been left to the Secretary of the Interior and the Secretary of Health, Education, and Welfare. As a result of this law, another agency of the government, Department of Health, Education, and Welfare, now has responsibilities in regulations affecting the mining industry.

The specific requirements judged necessary to the successful application of the Act have been published in the Federal Register. In effect, we have two sources of information concerning the Health Standards; the Act itself, as worded by Congress, and the Federal Register publications.

Briefly, Title II requires that companies take accurate respirable dust samples of the mine atmosphere to which each miner in the active workings is exposed, and these samples are to be sent to the Bureau of Mines for weighing. The Bureau is required to advise the company as to the dust concentrations in the samples. The Federal Register, Part 70, published April 3, 1970, contains the details of the procedures to follow in taking the samples. These procedures are somewhat complicated, and they will be discussed later.

The Act established on June 30, 1970, a dust level of 3.0 milligrams of dust per cubic meter of air (3.0 mg/m^3) as a maximum allowable average concentration. A dust level of 2.0 mg/m^3 becomes effective December 30, 1972.

Congress allowed some leeway in the effective date of those dust levels where difficulties in compliance occurred. An Interim Compliance Panel was established that could grant a permit for noncompliance for a limited time, but Congress set a maximum value on such a permit of 4.5 mg/m^3 where the 3.0 level prevailed, and 3.0 mg/m^3 when the 2.0 level becomes effective.

Sampling of Dust Concentrations

The industry sampling regulations as outlined in Part 70 of the Federal Register are built around a high-risk concept. The basis for this concept is the assumption that if the area of greatest dust concentration on a section was below the allowable maximum, then all persons on that section would be below the limit. This concept reduced the number of samples required to achieve the requirements of the Act. For instance, on a conventional mining section it is presently assumed that the cutting machine has the high-risk environment, and consequently only the environment of

the cutting machine needs to be sampled on that section. On a continuous-mining section, samples of the environment of the continuous-mining machine are required.

The number of samples required to determine compliance has been a subject of much discussion, and in order to minimize the effect of the fluctuation of individual samples, either those unusually high or low, to the greatest practical extent the average for compliance, or noncompliance, is computed on the basis of 10 samples. So, when a section starts production, a series of 10 samples should be taken on the same shift of consecutive production days, followed each month thereafter by five samples. Older sample values are discarded as new ones are added and the average of the current 10 samples is used. Sections meeting the 3.0 mg/m^3 will be required to take five samples only on alternate months. Each time a series of high-risk samples is taken on a section, one sample of the section intake air current must also be taken.

The sampling program for other workmen in the mine is separate from the high-risk sampling, and the data are not used as a basis for determining compliance. Each workman on a section must be sampled once each 120 days, and nonsection workers must be sampled once each 180 days. Workers, who are advised that they show evidence of pneumoconiosis and exercise their option of moving from a dusty area to a less dusty area, must be sampled once each 90 days.

You can see that maintaining a sampling program at a mine will require some time and attention.

Title II also has requirements in other areas.

Spot Inspections

Spot inspections by the Bureau of Mines for the purpose of obtaining compliance with the provisions of Title II is provided.

Respiratory Equipment

Respiratory equipment is required to be made available for persons exposed to dust levels in excess of those required.

Chest X-rays

Section 203(a) requires that operators of coal mines cooperate with the Secretary of HEW in making available to each miner the opportunity to have a chest X-ray. This section requires other items related to the miner's medical condition, and is administered by the Department of HEW. Any inquiries concerning Section 203 should be directed to Bureau of Occupational Safety

and Health, Environmental Control Administration, Environmental Health Service.

Dust Collectors

Dust collectors, or other effective devices, to control dust from drilling in rock are required by Title II.

Dust Standards

The Secretary of HEW is required to prescribe dust standards when more than 5.0 percent of quartz is present in the respirable dust.

Noise Levels

A very new area of regulation is introduced by Title II, in that noise standards are prescribed. Noise level tests in the mine are required by the Act. Training of industry persons to do this required noise level survey will be conducted by District D (Vincinnes) personnel at strategic locations in the mining area of the Midwest. Plans for this training will be announced when they are completed.

TITLE III—INTERIM MANDATORY SAFETY STANDARDS FOR UNDERGROUND COAL MINES

Section 302—Roof Support

Each operator is required to carry out a continuing program to improve the roof-control system. A roof control plan was required to be submitted and approved by the Secretary by May 30, 1970. The plan must be reviewed by the Secretary at least every six months. Essentially we have been doing this on a cooperative basis for many years. We have reviewed roof-support plans at the request of the operator, the miners, and on our own, and we shall continue to do so. The requirement for review of plans every six months does not mean that plans must be *changed* every six months; if a plan is successful in preventing roof-fall accidents there will probably be no changes. At the same time, the door is open to adopt new ideas and new devices which appear to be improvements, but the revised plan must be approved by the Secretary.

"*No* person shall proceed beyond the last permanent support unless adequate temporary support is provided, or unless such temporary support is not required under the approved roof-control plan. . . ." The words "*No* person" are construed to include section foremen and examiners, as well as miners. Many needless injuries and fatalities have occurred because of disregard of this safety

rule. We can materially reduce roof-fall accidents if we *all* follow this safety rule at *all* times.

VENTILATION—SECTION 303

We will consider only changes of some consequence.

Minimum Requirements

The *minimum* quantity of air reaching the last open crosscut in any pair or set of entries and the last open crosscut in any pair or set of rooms shall be 9,000 cfm. In many mines operators think in terms of 25,000 cfm or more for each mechanical unit. Dust and methane must be kept to specified levels, and dilution by air is necessary to meet such levels. It may well be that 9,000 cfm at the last crosscut will not get the job done in many instances. If for any reason, the ventilation system is disrupted and the volume drops below the minimum 9,000 cfm, remedial action should be taken immediately.

The *minimum* quantity of air reaching each working face shall be 3,000 cfm. However, we still have the possibility that methane or dust must be diluted, and it may be necessary at times to provide more than 3,000 cfm.

The Secretary shall prescribe the minimum velocity and quantity reaching each working face in order to render harmless and carry away methane and other explosive gases and to reduce the level of respirable dust to the lowest attainable level. In the F.R. of date, Part 75, the Secretary has proposed the minimum velocity as 60 fpm; in some cases, however, presence of methane or respirable dust in excess of allowable levels may require a velocity greater than 60 fpm.

The preshift examination must begin within *three* hours immediately preceding the beginning of any shift. Previously, it was *four* hours. The procedure of examination is about as before.

Detection of Methane

Here and in other mandatory standards, there is a tendency to favor electrical methane detectors over flame safety lamps for detection of methane. The thinking is that many otherwise competent persons cannot read 1 percent methane on a lamp. Conversely, there is the argument that electrical devices can fail or give erroneous readings. A kit to check the accuracy of these detectors is available.

Methane monitors are required on cutting machines, continuous miners, longwall equipment, and loading machines, as of the

date of such machines are required to be permissible. It should be pointed out that the monitor is required to cut off power to the machine when methane reaches 2.0 percent. Considering that the allowable methane in a working place is limited to less than 1 percent, the monitor merely takes over if someone slips up on detecting gas, or if the gas liberation rises suddenly.

Bleeder entries are required for pillaring. There is nothing new here as concerns Illinois.

Splitting Air Ventilation

The requirement that each mechanized mining section shall be ventilated with a separate split of air will require more overcasts, and in some cases, a greater total volume of air.

The purpose of this standard is that in event of a fire or explosion in one working section, men in other sections will be less likely affected. In addition, if methane liberated in one section is not passed on to other sections, the chance for a methane ignition is minimized. Furthermore, by eliminating the cumulative methane concentration resulting from passing the same air through several sections, it should be possible to keep methane concentration in working places below 1 percent more easily.

The original purpose of splitting air was chiefly economic—if, instead of having the total volume of air travel throughout the mine, portions of the total volume are coursed by different paths, the velocities, resistance, and power are reduced. Suppose a fall occurs in an aircourse and seriously reduces the volume of air. Under the one-unit, one-split method, production in that one unit must be suspended. However, if several units were being ventilated with that split, then production would be suspended in those several units.

The separation of belt entries from intake entries and return entries obviously requires another line of stoppings. The purpose is to prevent a belt fire, of which there have been many, from affecting men in the mine.

The required regulation of velocity in the belt entry takes it out of the picture as an aircourse. However, in many cases, it will be found that the belt so obstructs the entry that the belt entry does not carry anything like its share of the ventilation. Therefore, while there is some loss of ventilation capacity, it is not equivalent to the loss of one full entry. If a fire can be prevented from getting out of control by segregating the belt, and reducing the velocity of air in the belt entry, the net saving can far outweigh increased cost of ventilation.

This section does not prescribe specifically that trolley haulageways must be separated from intake and return entries, but it does require that the air velocity must be limited, which obviously requires segregation. Many fires have occurred in trolley haulageways, therefore the purpose here is the same, to control the spread of a fire. If extensive fires can be prevented, the increased cost of ventilation may be in large part offset.

Combustible Materials and Rock Dusting—Sec. 304

There are three changes from the previous Act:

1. Areas within 40 feet of the face must be wetted down.
2. The incombustible content in *return aircourses* shall be no less than 80 percent. The purpose of this requirement is due to the high explosibility of the very fine float coal dust, which naturally carries into return aircourses.
3. Accumulations of float coal dust are not permitted on on top of rock dust.

Electrical Equipment—Sec. 305

All electric face equipment in all mines will be required to be permissible as of March 30, 1971, if located below water table. All electric face equipment used in mines above the water table or that were not classed gassy prior to March 30, 1970, shall be permissible on and after March 30, 1974.

If permissible equipment needed to satisfy the mandatory standards is not available by March 30, 1970, the operator may apply to the Interim Compliance Panel for a permit for noncompliance. If the Panel is satisfied that the application so justifies, the Panel shall issue such permit granting an extension of time not to exceed twelve months. No permit for noncompliance shall be issued unless the nonpermissible equipment was being used by an operator in a mine on March 30, 1970.

All power-connection points, except where permissible power connection units are used *outby* the last open crosscuts, shall be in intake air.

The requirement that "power connections" made *inby* the last open crosscut be made only at permissible "junction distribution boxes," as provided in Section 305(a)(1) of the Act, was clearly intended to eliminate the danger of an explosion or fire in areas of the mine where explosive gases were most likely to be present. Since these same explosive gases would also be present in the return airways after leaving the face areas of the mine, the permissibility requirements of Section 305(d) were obviously intended to eliminate

the same danger by requiring permissible power connection points in *all* areas of the mine where such gases might be present.

Congress, in lieu of prescribing in Section 305(d) that *all* "power connection points" *outby* the last open crosscut be permissible, provided that nonpermissible power connection units could, in the alternative, be located in intake air where the concentration of explosive gases was less likely to occur.

In view of the permissibility requirements of Section 305(d), each operator of an underground coal mine must replace all nonpermissible power connection units presently located in return air with permissible units or relocate such nonpermissible units in intake air.

Trailing Cables—Sec. 306

Short-circuit protection shall be by circuit breakers or other means approved by the Secretary.

One temporary splice is permitted in a trailing cable, and then for only 24 hours, and no temporary splice shall be made within 25 feet of the machine except cable-reel equipment.

Grounding—Sec. 307

Everything must be safety-grounded—metallic sheaths, armors, and conduits enclosing power conductors; frames, casings, and other enclosures of stationary and off-track electrical face equipment. Off-track equipment shall be frame-grounded, or otherwise maintained at safe voltage, such as by the use of diodes.

Underground High-Voltage Distribution—Sec. 308

High-voltage circuits shall be grounded through a direct neutral if the system is Y-connected, or through a derived neutral if delta-connected. A suitable resistor, or impedance, must be provided at the source transformers.

As of September 30, 1970, high-voltage resistance grounded systems must have a fail safe ground check circuit. Other no less effective methods to assure continuity of the grounding circuit may be approved by the Secretary. If the Secretary determines that such equipment is not available, he may permit an extension of time not in excess of 12 months.

Underground high-voltage cables in resistance grounded systems shall be equipped with metallic shields around each power conductor, with one or more ground conductors, and with an insulated ground check conductor, which is internal or external. Splices in such cables shall provide continuity of *all* components.

Underground Low- and Medium-Voltage Distribution—Sec. 309

All that has been said about high-voltage circuits, that is, grounding, ground check circuits, shielded cable, and continuity of all components in splices applies to medium- and low-voltage circuits. However, low-voltage trailing cables, 660 volts and less, do not require shielding and medium-voltage trailing cables, and 661 to 1000 volts, on cable-reel machines need not be shielded type if insulation is rated 2000 volts or more.

Fire Protection—Sec. 311

By March 30, 1971, fire-suppression devices shall be installed on unattended underground equipment, and suitable fire-resistant hydraulic fluids approved by the Secretary shall be used in such equipment. Such fluids shall be used in the hydraulic systems of other equipment unless approved fire-suppression devices are installed.

To recap, both fire-suppression devices and fire-resistant hydraulic fluids are required for unattended equipment; for attended equipment a choice is allowed between the two.

Deluge-type water sprays or foam generators automatically actuated by rise in temperature, or other no less effective means approved by the Secretary shall be installed at main and secondary belt-conveyor drives. Here again, cost of the equipment can be offset if an extensive fire is prevented.

Conveyor belts acquired on and after March 30, 1970, shall be of the flame-resistant type. The trend in industry has been toward such belts as replacements were made and new mines were opened; now the flame-resistant belt becomes mandatory.

Maps—Sec. 312

More detail is required on mine maps than is commonly shown. Such details are contour lines of elevation, mines above or below, and water pools above. When an operator permanently abandons a mine or temporarily closes a mine for a period of more than 90 days, he shall notify the Secretary. Within 60 days of permanent abandonment or 90 days of temporary closure, the operator shall file with the Secretary a final map to date of closure.

In addition to showing locations of producing and abandoned oil and gas wells on the mine map, this section requires that the barrier left around such wells is not less than 300 feet in diameter. The Secretary may permit a lesser barrier, or require a greater one according to conditions.

SUMMARY

In all coal mines opened on or after March 30, 1970, and new working sections in all mines in operation prior to this date, the escapeway shall be ventilated with intake air and be separated from the track and belt haulage entries.

Methane and coal dust shall not be permitted to accumulate in excessive quantities in or on surface coal-handling facilities. The Secretary is to establish the limit concentration for methane by March 30, 1971. The possibility of methane accumulations in draw-off tunnels or similar facilities is not a problem for many coal mines. However, this standard is the result of gas ignitions and explosions in which men have died.

Every mine operator shall provide a program of training and retraining of both qualified and certified persons needed to carry out functions prescribed in this Act.

No doubt the operators will call upon the Illinois Department of Mines and Minerals and the Bureau of Mines for assistance. These two agencies have cooperated for many years in safety education programs, and we are certain that this cooperation will continue. The operators, the Illinois Department, and the Bureau will need to take an imaginative approach, so that instead of being another burden as the training program may appear at first glance, it can be developed over the years into a means for continuously upgrading the abilities of mine personnel.

Paul Budzak: I want to thank you, Mr. Childers for a very complete, very thorough paper. We will give you a chance to rest and then after the last speaker completes his topic, we are going to open our session to questions. So do not hesitate to take a few notes as our speakers present their papers, and at the completion of the last speaker's topic, we will open the discussion and you can ask all the questions you want. By that time Mr. Childers will be well rested, and I think we will have a few questions to ask him.

Our next speaker was born in Washington County, Pennsylvania. He started his mining career at the end of a No. 5 shovel for Jones and Laughlin Steel Corporation. From 1943 to 1946 he served in the Armed Forces. After coming back, he joined Island Creek Coal Company and started mining underground on the conventional mining sections of Island Creek. From there he moved to Industrial Relations of Island Creek and made another move to the Industrial Relations Group of U.S. Steel. From there he moved to Bituminous Coal Operators Association, and today he is the Executive Vice-President of the Bituminous Coal Operators Association. It is my pleasure to present Mr. Steve Zanolli.

THE FEDERAL COAL MINE HEALTH AND SAFETY ACT OF 1969

S. W. ZANOLLI
Executive Vice President
Bituminous Coal Operators' Association
Washington, D.C.

INTRODUCTION

The new Federal Coal Mine Health and Safety Act is a tough law. In some of its aspects it may be virtually impossible. Nevertheless, it is the law! We—the operators, the miners and their union, and the Government—must try to understand it. We must try to make it work, and where it doesn't work, we must know why it doesn't. Once we determine that some parts of it cannot function we must attempt to get it changed. We must follow the available administrative procedures, and then the courts and ultimately, if necessary, address ourselves to the Congress.

Any effort at change will involve a careful public relations effort to explain the reasons for the precise changes. In today's America, which is concerned with social conscience and ecology—as urged strenuously by our impatient young people—communication of the need for changes will be a demanding task. In the case of safety and health legislation for coal mines, any communicating to the public must overcome the lack of understanding on the part of most America about the coal miner and about coal mining. Unfortunately, many have the opinion—and it is apparently being fostered by some who know better—that coal miners and coal operators are somehow less than human.

PARTS OF THE LAW THAT ARE SOUND

We must recognize at the outset that a good deal of the new Coal Mine Health and Safety Act is sound. Much of it is practically aimed at improving the record of over a hundred fatalities per year. Many of the safety standards in the law were carefully conceived, based on the best thinking of miners, operators, and government people who know what coal mine safety is all about. There are other sound provisions—those which deal with training and research, and the general emphasis on seeking to improve health as well as safety.

PARTS THAT ARE QUESTIONABLE

However, some parts of the new law are *questionable* in terms of practically and equitably achieving the broad health and safety objectives of the Act. These provisions include the one on civil penalties, virtually placing all enforcement and appeal authority in one person—the Secretary of the Interior; Title IV which is in the direction of federalized workmen's compensation; and those provisions which deal with work assignments of miners and rates of pay which most properly belong to the field of collective bargaining.

PARTS THAT ARE PRACTICALLY IMPOSSIBLE

Some parts of the new law appear to be practically impossible of attainment. Such impossible provisions appear to include those which deal with dust standards. It is tragic that careful study and scientific evaluation did not precede the stringent 3.0 milligram and 2.0 milligram numerical dust standards which can be the basis for closing mines and depriving citizens of livelihood and return on investment. These numbers were arrived at under highly emotional legislative circumstances and are not founded on correlation between environmental exposure to coal dust and the development of coal worker pneumoconiosis.

Additionally, some of the Interim Safety Standards, which appear in Title III of the Act, did not pay heed to over-all safety know-how. Some of these provisions admittedly address themselves to an anticipated hazard but appear to prescribe means which fail to take into account and create exposure to other hazards which are more serious. Such misdirection includes standards which restrict ventilation, which impede the bleeding of methane from gob areas, and which prescribe grossly excessive air velocities and air quantities at the working faces.

SINCERE EFFORTS TO MAKE LAW WORK

The new act is a tough law and has serious imperfections. Nonetheless, the bulk of the coal industry has been trying to make it work.

We believe that the Interior Department is trying to make it work. However, there are some problems. The primary problems involve governmental over-reacting to criticism which is social and political in nature and not based on sound technology, fairness, and equity. There is also concern that administrators are seeking easy rules of thumb or formulas for enforcing the highly technical and precise standards in individual coal mines. All coal mines by nature—and because of Mother Nature—are distinctive and dif-

ferent. There is no substitute for careful individual inspections by knowledgeable inspectors possessed of sound judgment. There are no easy formulas. General rules of thumb arbitrarily applied would result in unfair administration and might actually jeopardize safety.

We believe that the miners and the union want to be fair, and are interested in practical achievement of improved safety. Beyond this, they should be interested in there being no unwarrantable deprivation of employment because of mistaken judgment in interpreting or applying the law.

CRITERIA FOR MAKING LAW WORK

At the moment, as we make our first beginnings under the new law, there appear to be two crucial areas. Before we can make the law work, we must understand it. This means *reasonable interpretations*. Additionally, and especially in the early administration of the law, there must be *fair*, *impartial*, and *realistic enforcement*. This requires sound careful judgment by the inspectors based on technical know-how and recognition that each coal mine is different.

Reasonable Interpretations

On the matter of reasonable interpretations, work is underway now by the Interior Department on developing explanatory material in a number of areas. The coal operators, through their specialized and responsible safety and health experts, have dedicated themselves to conscientious contribution of their best thinking. We hope that their suggestions along with those of other interested parties will be objectively and carefully considered.

The areas in which such work is now underway include:

Underground Safety
Surface Safety
Underground Health
Surface Health
Procedural—Civil Penalties

Impartial Enforcement

The U.S. Bureau of Mines needs good men for its inspection force and throughout its ranks. The Bureau has been given the responsibility to enforce the law, but the real test is what it does in the process to improve health and safety. The coal industry must be understanding of its recruiting problems and do what it

can to be helpful realizing, of course, that safety and health expertise must also exist at the mine where the day to day exposure to hazards exists.

Expert knowledge in the enforcers is not enough, however. The inspectors must above all exercise sound safety judgments. They should not harass and abuse their authority. They should not carry out personal feelings in their work or be wedded to highly personal views on means to achieve the result intended by the safety standard. In inspecting peculiar conditions in a particular mine, they should be able and willing to question textbook or procedural solutions to problems where conditions warrant.

There will be technical differences between what the inspector feels is the proper means to achieve a particular standard, and what a mine operator feels he must do in the interest of his safety responsibility to his employees. Where such bona-fide differences exist, there should be discussion on the scene between the involved responsibilities. Where these cannot be worked out, there should not be hasty, arbitrary decrees. The U.S. Bureau of Mines District Manager and, if necessary, the Bureau offices in Washington should be consulted.

If this cannot be resolved, then the Act does provide for proceedings under Section 301(c) to resolve disputes where the safety standard as being applied is felt to involve a diminution of safety, or where a better method is available.

CONCLUSION

Some parts of the law may continue to be a problem to enforcers of the law and the operators and miners alike.

If interpretation to permit safe operation is not possible, and if fair, impartial administration cannot of itself solve the problem, and if administrative proceedings are not successful, then it is time for the Courts and for the Congress. But when we reach that point, let it be with "clean hands." Let us all be in a position to say that we tried—and let us have at hand the documentation of those efforts.

Paul Budzak: Thank you Steve, for your very pertinent, practical, and down-to-earth remarks. Our next speaker has been in the mining industry for the past 37 years. He is a member of the Mining Board and has been nationally publicized in Fortune Magazine. He is recognized nationwide, and he is Vice-President of the Peabody Coal Company. I give you Mr. Joseph Craggs.

THE FEDERAL COAL MINE HEALTH AND SAFETY ACT OF 1969 ITS EFFECT ON ILLINOIS MINES

JOSEPH CRAGGS
Vice President
Peabody Coal Company
Taylorville, Illinois

INTRODUCTION

First of all, I would like to state that because of my limited knowledge of the operational conditions of all of the coal mines in Illinois, my remarks are based upon conditions and results obtained at Peabody Mine No. 10 and therefore become subjective in nature. Even so, I am sure that all of you have experienced problems of similar nature which we have encountered.

With the implementation of the Federal Coal Mine Safety Act of 1969, two major effects have become very prominent in our operation. These are (1) Decrease in Production, and (2) Increase in Operational Costs. I would like to discuss these effects separately and point out a few of the underlying causes which contribute to each area.

DECREASE IN PRODUCTION

Prior to the implementation of the Act, Mine No. 10 was averaging 22,000 net tons per day. With the enforcement of the Act production has decreased to an average of 19,500 net tons per day, or an approximate 12 percent reduction. We have made studies in all areas to measure and isolate the major causes of this production decrease.

Line Curtains

The requirement of installation of line curtains at each working face has contributed heavily to production loss. The movement of shuttle cars to and from the loading area has been slowed down considerably because of the extra precaution that must be exercised in traveling through and around the curtains. Not only is haulage affected, but the movements and place changes of the other face equipment have also been more deliberate because of the apparent dangers involved. We find this especially severe when we encounter bad top and are using rail bars for supplementary support. Based on time studies, we find that we lose from 40 to 45 minutes of face production time per shift in each unit due to installation and maintenance of line curtains.

Water Sprays and Lines

The installation and maintenance of water sprays on all the face equipment plus the advancement and maintenance of water lines to the face areas have also contributed to production loss. We have found that the lax attitudes of section personnel in regard to this area is a major problem. To counteract these attitudes a constant training and re-training of people will be required.

Roof Bolting

Roof bolt testing and the setting of safety props also further decrease production. The roof bolting cycle is the slowest operation of face production and with these requirements, it is slowed down more.

Cleanup

With requirements of better cleanups, the machine operators are more deliberate in their cleanup program, thereby reducing the amount of high productivity time at the face.

Cable Splicing

The enforcement of allowing only one splice in a cable in 24 hours has also been a factor in the decrease of production. We have found that it is not possible to do this maintenance between shifts; therefore, on-shift valcanizing and cable change-outs are more predominant. Thus, this creates more on-shift down time for the production equipment and in turn reduces face time which will affect production.

Inspections

Due to the size of Mine No. 10, both in area and productivity, we have a continual Federal and State inspection program. I realize you may ask yourselves, "How does that affect production?," but let me assure you, it does. We have found by experience that section production is reduced by approximately 18 percent during the inspector's visit. We find two factors which contribute to production loss. Naturally and obviously the inspector will stop the machines from working while making his examination of the equipment, and in the course of his tour, he will take the section foreman away from his production duties. Secondly, we have noticed that the section personnel tend to become nervous during the inspector's visit and this very definitely has an effect on their productive efficiency. Sounds strange, doesn't it, but nevertheless, quite true.

INCREASE IN OPERATIONAL COSTS

I am positive there is no one here who has not experienced an increase in operational costs. Time does not permit me to discuss all of the areas in which costs have increased, therefore, I would like to touch on a few of the major factors affecting costs.

Ventilation

In the provisions on ventilation, the Safety Act states that each mechanized mining section shall be ventilated with a separate split of intake air directed by overcasts, undercasts, or the equivalent. This will be very costly, not only in material usage, but it will also require an increase in manpower hours. In order to attempt to minimize these costs, we have had to develop a portable metal overcast. This will allow us to re-use these overcasts time and time again.

While on the subject of ventilation, I would like to point out one short paragraph of the Safety Act which has a drastic effect on the system of ventilation that can be used. This particular part of the Act is in the section regarding electrical equipment. The law states, except where permissible power connecting units are used, all power connection points outby the last open crosscut shall be in intake air. Based on this requirement, I cannot see how any coal mine in the State of Illinois can possibly operate with a blowing system of ventilation. For those of us who will be required to change our ventilation system to exhaust ventilation the costs will be enormous. It seems strange to me that the law shows no regard for the blowing system of ventilation. It would appear the law was written for the coal mines in the eastern part of the United States, with no regard for the coal industry in Illinois. The blowing system of ventilation has been used in Illinois, especially the Midland Field, for close to 60 years, and no serious effects have ever been encountered.

Respirable Dust Sampling

Another provision of the law which affects costs is the requirements regarding the respirable dust sampling program to be conducted by each mine. Notwithstanding the costs of the sampling equipment, filters, and mailing, the major area of increase is trained and qualified manpower to conduct this program. At Mine No. 10 we have established a dust survey team comprised of four men. Each of these men have satisfactorily completed the Bureau of Mines course of instruction in sampling and evaluation of respirable coal mine dust. Our dust survey team operates on a full time

basis in order to comply with the requirements of the law regarding respirable dust sampling.

As I stated earlier, Mine No. 10 has a continual inspection program due to the provisions of the law. Taking into consideration all types of inspection visits—regular, spot, dust and roof control, electrical—we estimate that it will take 175 manshifts to escort the inspectors through their tours. This is practically a full time job for one company official, and consequently will affect costs.

Training Personnel

At this time, I would like to pose a question which has a serious effect on the Illinois coal industry. Where are the coal companies going to find all of the trained personnel in order to carry out the Federal Coal Mine Safety Act to the letter of the law? Because of the lack of an established industry wide training program, and into this I must inject the lack of a training program involving the Federal and State agencies, the severity and initial impact of the Safety Act will have a direct effect on trained manpower for many years to come. The industry itself has lost trained and qualified people to the Federal Government in order for the Bureau of Mines to carry out the provisions of the law. And in most cases these people are extremely difficult to replace.

Cooperation of Workers

With the provisions of the Act requiring that the coal industry institute an approved training and re-training program, we now find ourselves in a "crash" program to develop and establish these training courses and facilities. It is conceivable that the initial costs could approximate 5 to 8 cents per ton. It seems logical to me that the training of people will have to be approached through a combined and concerted effort of industry, Federal and State agencies, and labor. You notice that I included the need of union cooperation in our efforts. This we must have. Throughout the Safety Act mine operators are under orders to comply with the provisions of the law and if in violation, are subject to notices, closure orders, and severe fines. However, except for smoking violations, union personnel are not penalized for their disregard of the rules and regulations. We have all experienced the problem of line curtains being torn down by moving machinery and instead of being re-hung properly are found discarded along the ribs or tangled in belt drives and cable reels of shuttle cars. We have gone to great lengths and experimentation to find the correct water sprays for

dust control, yet it is not uncommon to walk into a section and find water not in use because someone would not make the hook-up to the water line. Yet, in all areas where labor disregards the rules and regulations, only the operator is subjct to violations and fines. The survival of the coal industry could very well depend upon the solutions to these problems.

CONCLUSION

I do not wish for anyone to take my remarks as an indictment of the Federal Coal Mine Safety Act of 1969. This was not intended to be so. My objective was to point out some of the effects which the Safety Act will have on the coal industry in Illinois.

However, I cannot stand here, and in good conscience, agree with the Safety Act in total. I do believe there are many standards incorporated in the Act which are constructive and productive towards improving safety factors and the environmental conditions of our mines. Nevertheless, there are many areas of the Act, which in my opinion, are very difficult to comply with because of the lack of present day technology.

Even so, I know that the coal operators of Illinois will do all they possibly can to comply with the Safety Act and will attain the highest degree of safety possible.

To my knowledge, there is no possible way to meet the energy requirements of the United States without the full utilization of our coal resources. There is no other fuel or combination of fuels that can do the job required. It is common knowledge that our country faces a power shortage crisis, and unless there is constructive cooperation between everyone concerned—industry, Federal and State Governments, and labor—the Nation will suffer. Illinois will suffer. The results will be felt by the coal miners, coal operators, and especially by the coal producing areas of Illinois that are so dependent upon coal for their economic existence.

I would like to close by quoting an excerpt from a speech by United States Senator Harrison A. Williams, Jr., of New Jersey, which was given at the Washington Coal Club on September 16, 1970. Senator Williams is chairman of the Subcommittee of the Senate Committee on Labor having to do with the investigation of matters in the coal industry.

I quote:

"With the commitment of resources and of people that must be made by Government, by industry, and by labor, I am convinced that we will find not just one way to solve a safety hazard, but five ways." . . . "Under strong leadership there is no reason why the Bureau of Mines cannot turn its extensive talents to both en-

forcing the safety requirements, and to helping industry solve the safety problems."

"And the relationship between the Bureau of Mines, and the coal industry must not be like the one attributed to Marshall Tito of Yugoslavia, at the end of World War II. He was asked what he was going to do with his adversary General Mikhailovitch and was quoted as saying: 'We will capture him, give him a fair trial, and then execute him!' "

Paul Budzak: In our democratic society we have a right to our own opinion; we have a right to challenge and dissent. We are opening our meeting to questions and answers, and I suggest that you stand and direct the question to whom you are speaking by naming the person to whom you are directing your question. Do not hesitate to be first. I think that there are plenty of questions to be answered, and I think there are plenty of opportunities to digress.

J. W. Conrad: Do you have any extrapolation as to what you think it is going to cost your company to carry out any per unit sampling program?

Joseph Craggs: I have no idea, all we are trying to do is to comply with the federal law.

Thomas R. Garwood: Paul, I would like to ask Joe another question. Joe, have you noticed any difference in underground face accidents due to different attitudes of the men and their work habits?

Joseph Craggs: The only thing I can say is that in the past four months we have had a better accident record than we have ever had, so I cannot change that too much.

Donald C. Jones: I would like to direct my question to Mr. Childers. One of the more troublesome points, I believe, is this matter of the single, temporary splice during a shift. Now, am I correct in understanding that we now have available a splicing device, which will still conform to the law and permit them to continue work during the shift by the application of this device? Would you elaborate without mentioning company names or anything else?

Mr. Childers: Well, this is true. The Bureau of Mines has recently approved a method of splicing cable underground. But it is not the process that we are use to—that is, vulcanizing the cable. Now this was under study for quite some time. It is available now in many areas, and it has been used, I know, in Kentucky, and I assume, in Illinois. A splice or a component is now available so you will not have to go through the elaborate procedure of vul-

canizing the cable and making a permanent splice. There is only one that, at the moment, is approved. Joe says there are two now, so he knows more about it than I do.

Mr. Budzak: It appears that there are no more questions, I'll turn the meeting back to Mr. Berta.

Mr. Berta: Thank you Paul, for chairing this Thursday afternoon session.

MORNING SESSION

The Friday morning business and technical session convened in the Ballroom of the Hotel St. Nicholas at 9:00 a.m. President Joseph Q. Berta presided at the business meeting.

President Berta: I would like to call the meeting to order. This is the 78th Annual Meeting of the Illinois Mining Institute, and at this time I would just like to again remind those of you who intend to be at the luncheon, double check on your tickets as soon as you can this morning, if you haven't already gotten them. It will give the hotel a better chance to give us good service for lunch. Also, if by any chance you are aware of any member who passed away during the last year, would you please let Dr. Hopkins or our secretary, Mrs. Conerty, down at the registration desk know the name of that individual.

The minutes of last year's meeting were published in the 1969 *Proceedings*, and if there are any corrections or revisions, I would like to have them at this time. If not, we will accept them as published in last year's *Proceedings*. Now we will have a report from our Secretary-Treasurer, Dr. Hopkins.

SECRETARY'S REPORT

M. E. Hopkins: I will try to make this as brief as possible, because we do have considerable business to get through today before the technical session starts. We are breaking all sorts of records, although it doesn't look like we are in the attendance at the business meeting. Last night, as of about 7:00 when we closed registration, we had 613 registered. This is exactly the same as our complete total last year, and we expect several people to come in this morning. I noticed a lot of people registering this morning so we will, no doubt, go over our last year's attendance, which was a record for modern time. Among us there are an additional group of students, life members, and speakers who are not included in that 613. There are 22 of them, so that makes a total of 625 now, and there are still more coming in. *(Final attendance totaled 659 counting students, life members, and speakers.)*

At this time I would like to acknowledge the assistance of several members of the Illinois Geological Survey for aiding us. Bill Smith takes care of our transcription and lots of other things. We

could not get along without Bill. Roger Nance is also in the same position with the transcription. Harold Gluskoter and David Reinertsen took care of the projection of slides. Dale Farris is the Survey's photographer. He has been helping us here for several years, I am sure you have seen Dale around at all of our meetings. We would also like to acknowledge the Springfield Association of Commerce for providing us with some of our registration supplies, typewriters and the like, and also for the State maps that you may have secured. We hope to prevent you from getting a parking ticket. If you do have any difficulty, bring your ticket to us and maybe we can do something about it. Also, we would like to acknowledge the services of Mrs. Conerty. She is our administrative secretary and is the only paid member of the organization. She has done a marvelous job. Also from the Survey is Miss Velda Millard, who is in charge of the Financial Office at the Survey. Miss Millard keeps all the IMI books, and she handles all the money at the registration desk. Our Springfield staff, ladies whom we hire each year, are Mrs. Mary Fortune, Mrs. Joseph Tabor, and Mrs. Alton Vigal.

Now, to get into the official minutes, we have a list of dates for our next six meetings. This scheduling is necessary in order to secure the hotel and to try to prevent a conflict which happened this time with the AIME Meeting in St. Louis. This was very unfortunate but neither organization was aware of the other's schedule. Our dates as we have them now are, October 21–22, 1971; October 5–6, 1972; October 11–12, 1973; October 3–4, 1974; October 2–3, 1975; and October 7–8, 1976. There are some changes from the ones previously read from this roster, but the ones that have previously been published in the *Proceedings* are proper and we simply added one more year on the list.

Now, I will give a very brief Treasurer's report before I have a few more things to say. Our total assets as of October 1, 1970, are $26,245.88. This is compared with $24,828.26 last year and an increase in assets of $1,417.16. That does not mean we made that much money, that simply means that we got back $1,580.07 from the University of Illinois from an unused fellowship. This was the fellowship that we had for the writing of the history of Illinois coal mining, but we got that money back into our regular account. There is a more detailed account, four pages long, of all our expenditures. We still have $21,000 worth of bonds at face value. There are several copies of this report here at the front desk. If you would like to pick one up, help yourself.

There are a couple more announcements I would like to make. One, we have a small replica of the statue of the Coal Miner,

which is located in the State Capitol grounds, and I believe one was also placed at the Indiana State Capitol. The sculptor, Mr. Szaton, presented this small statue to the committee which was deciding which statue was to be placed in the Capitol grounds. Of all those submitted, this statue was approved. Mr. Szaton kept the mold for the small replica. He has since passed away, and Mrs. Szaton has the mold. Several members have expressed interest in securing a copy of this small statue. Mrs. Szaton can now have replicas made for a charge of $50 plus shipping expenses. We have the address downstairs at the registration desk. I was quite impressed with this replica. I saw it for the first time yesterday. If you get a chance, take a look at it, and you may wish to order one.

Another piece of information—Mrs. Amy Gottlieb from the London School of Economics in London, England, is writing a history of the Illinois Mining Institute up to the year 1911, as a Ph.D. thesis. She is the wife of a professor at the School of Agriculture at the University of Illinois and is doing all of her work at the University of Illinois, utilizing the library and all the facilities of the History Department. Most of you remember that on the first letter we sent out to all the members, we included a list of names of mine inspectors. She is trying to run down anything on these men—when they were born, when they died, their children, anything anyone knows about them. Well, we had three names misspelled on that list. I want to compliment some of our members who caught some of these errors. Mr. Garwood informed me we had two of them misspelled. Some of our members are looking into these things. Anyway, she has asked that if we have any information, get ahold of her. Of the names that we had misspelled, we have *Buggis* listed and it should be *Burris*. We had *Fellons* listed and it should have been *Fellows*, and we had *Granam* and it should have been *Graham*. This was copied from a handwritten list and you can see how we made the mistake, so please correct your copies. If you have any information, she would certainly appreciate knowing it. Contact her at the History Department of the University of Illinois, Urbana. I think that concludes this report.

NOMINATING COMMITTEE

President Berta: At this time I would like to have the chairman of the nominating committee make the nominations for the officers for the coming year. That committee consists of Clayton Slack, Cletus Broecker, and Joe Craggs. If the chairman, Mr.

Slack, would come forward please, we will have the nominations of our new officers.

Mr. Slack: Mr. President, a lot of study has been given to the nominations for the 1971 officers by the Nominating Committee. We are proud to nominate the following: for President, R. F. Donaldson, United Electric; Vice-President, C. C. Bailie, Old Ben; Secretary-Treasurer, Dr. Hopkins of the Survey. For the four new board members, Joe Berta, Truax-Traer; M. V. Harrell, Freeman; H. C. Morton, Monterey; and H. E. Risser of the Geological Survey. Mr. President, I make a motion that these people be accepted.

President Berta: Can we have a second of that motion? All those in favor signify by saying aye. Those opposed. At this time we would like to have the report of the Auditing Committee. That committee consists of Mr. Phelps, Mr. Mullins, and Mr. Roberts.

M. E. Hopkins: The Auditing Committee's job is to examine our report and approve or disapprove. Two members of the Auditing Committee did not show up at the meeting last night so formal approval was not made. However, the approval will be sent to us in the next few days. *(Approval was sent to the Secretary-Treasurer's office later.)*

ADVERTISING COMMITTEE

President Berta: Okay Hoppy, thank you a lot. Our Advertising Committee consists of the following members: Mr. Taucher, Mr. Aten, Mr. Benedict, Mr. Boblick, Mr. Brandlein, Mr. Butts, Mr. Collins, Mr. Fielder, Mr. Hayden, Mr. Patty, Mr. Sadler, Mr. Szynal, and Mr. Waller. For the Advertising Committee, Dr. Hopkins will make the report.

M. E. Hopkins: This committee is a real working group of gentlemen. They provide us with the funds to have this meeting, that is what it amounts to, and to be able to publish the high quality *Proceedings* as we do. They write numerous letters on our behalf, trying to solicit advertising. This last year we had two additional pages over the previous year, and we have had a steady increase of the number of pages over the last few years. Last year there were 134 pages of advertising. This brought in something like 10,000 dollars, plus or minus. This year, so far, we have 93½ pages already contracted for, with six new advertisers. We always have a few drop off, but we have picked up more now than we usually do. The Secretary's office usually sends out a solicitation early in August to all of last year's advertisers and many former advertisers, then we go through several trade magazines looking for potential advertisers. Then, the Advertising

Committee does their work making more or less personal contacts. I cannot emphasize the importance of advertising. We must have it or we cannot maintain ourselves in this sound financial condition we now have. If you have any ideas, contact any of the members of the Advertising Committee, myself, or Mrs. Conerty. Thank you.

MEMBERSHIP COMMITTEE

President Berta: I would appreciate a report by the Membership Committee, which Hoppy will make. The members of that committee consist of the following: Mr. Walsh, Mr. Bottomley, Mr. Bridges, Mr. Broecker, Mr. Moroni, Mr. Phelps, and Mr. Pace.

M. E. Hopkins: These gentlemen of the committee have consented to let us use their names to solicit members on their behalf. We send out membership solicitations from the Secretary's office, to those on various coal industry lists. We send the solicitations out to people in this area or to people who are connected with companies that are active in this area, people who we think might want to join. We sent out about 150 letters, and got 31 returns. This is very good. We did notice that a lot of these people are here at the meeting.

President Berta: We are going to have a little surprise, we hope, at the Luncheon today in the presentation of an Honorary Life Membership. We will leave that as a surprise at the present time, and go on to the next committee report which is the Scholarship Committee. Would Mr. Risser please come forth and make his presentation?

SCHOLARSHIP COMMITTEE

H. E. Risser: The IMI each year, as you all know, provides scholarships to a number of schools—scholarships to students enrolled in Mining Engineering. This year we have had five scholarships of 600 dollars each. One of these is at the University of Illinois, two at the University of Missouri at Rolla, one at Southern Illinois University, and one at Wisconsin State University at Platteville. What I would like to do, Mr. President, is to introduce the representative of the school and let them introduce the students who might be here. Do we have a representative from the University of Illinois? We have one scholarship at the University of Illinois. The recipient is Kevin W. Brooks, a native of Illinois, who is enrolled in the General Engineering program, Mining Option, at the University. Apparently, neither he nor the faculty member was able to be here this morning. I would like to introduce Dr. Ronald Rollins of the University of Missouri at Rolla. Would you come

up and please introduce the students who are here with you and give us a brief report on the scholarship situation there?

Dr. Rollins: Thank you. As just mentioned, we have two students at the University of Missouri at Rolla, who are on IMI scholarships. We have both of these students here this morning. Actually we brought at least six students, that I know of and possibly a seventh. They range from freshmen to Ph.D. candidates in Graduate School. I would like to have Raphael Colombo stand. He is one of the IMI scholarship recipients. Raphael tells me he is finishing this December, and he is going to work. He hasn't made a definite decision yet. Thank you. *(Applause)* We also have Mr. William Mallicoat. Will you stand please. He is also a senior and is graduating next December. Bill tells me that he is going on to Graduate School to continue his studies. In addition, I would like to mention that at UMR, we have a cooperative program in which the students alternate between attending school one semester and working one semester. Interesting enough, at the present time, of the 500 students we have on our coop program on campus, representing 100 companies and 27 states, we have seven in the Mining Engineering Department, and all of these are with Peabody Coal Company. All seven are in school now. Next semester six will be working and one of these is graduating. Also, it might be of interest to mention briefly our enrollment statistics, since they indicate a hopeful trend. Our enrollment this fall is up nearly 33 percent from last year. Broken down, we have 14 freshmen, 15 sophomores, 16 juniors, 18 seniors, five Master's candidates, five Ph.D. candidates, and two on dual enrollment. This is an increase from 55 students last year to 73 students this fall. Thank you very much.

H. E. Risser: Thank you Dr. Rollins. Are your other students here? Would you care to name and have them stand up?

Dr. Rollins: In the audience we have Mr. Emil Teisa, Forrest Younker, and Mr. Mike Barry. Also in attendance, although I do not know if they are here this morning, we have Mr. Calvin Konya and Mr. Bjorn Litzen.

H. E. Risser: We are always very happy to have our students with us and to see this growing enrollment and interest in mining engineering. Is Professor Hesketh of Southern Illinois University here? Would you care to introduce your recipients and any other students you may have here?

Professor Hesketh: I do not have any students that were able to come with me this morning, but I can tell you about the students whom you have been supporting. The lad that you gave the scholarship to last year, named Monty Nelson, who is also part-

time employee of Truax-Traer, has now graduated and gone to work with the Ayrshire Coal Company over in Oakland City, Indiana. This year's scholarship recipient is Mark Cavender, who is a freshman in Mining Engineering in the SIU School of Engineering. You may know the name Cavender because his father is a foreman at the Old Ben Mine. Also, Mark has been working at Old Ben this past summer after he graduated from high school and before he came to SIU. All I can say is, that it looks like we have a future mining engineer here also. He is a good student, and you will probably be hearing from him in the next few years. Thank you.

H. E. Risser: Thank you. Next, Professor D. C. Dixon, who is here from Platteville.

Professor D. C. Dixon: Thank you. I would like to report that we too have an increase in enrollment. We now have 56 mining engineering students as compared to 34 for last year. I brought 8 students with me today, two of which I will introduce shortly, the other six will be introduced at the Luncheon. We divided our scholarship into six scholarships, the recipients are Pete Moffett, Bill Dixon, Terry Hird, Tom Golden of Galena, Illinois, so we have an Illinois man there, Gary Richardson, and Marvin Ward. At this time I would like to introduce Bill Dixon who also happens to be my son, and Terry Hird. *(Applause.)*

H. E. Risser: Thank you, Professor Dixon. Mr. President, that concludes the report of the Scholarship Committee.

President Berta: By any chance would there be any student, from any other part of the country, any other university or college present here this morning. If so, would you please identify yourself. We have one more order of business. We have a couple of amendments to our Constitution that we would like to present to the membership and see what your wishes are. At this time we will let Dr. Hopkins present them to you.

CONSTITUTIONAL AMENDMENTS

M. E. Hopkins: Last year, as you recall, there was an amendment voted on by the membership to change the Constitution. According to our Constitution we have to first vote on this. The membership approves, it is published in the *Proceedings*, and it has to be approved at the next meeting. So at this time, we need to take a vote on the amendment that was presented last year, and if approved, it will become part of our Constitution. The amendment dealt with the creation of the new office of Second Vice President. We have President, now we will have First Vice President and Second Vice President. As is customary the Vice

President succeeds the President if he wishes. I'll read this, and then we will call for a vote. Section 1 of article 3 would be changed to read in the first part, "the officers shall consist of a President, First Vice President, Second Vice President, Secretary-Treasurer, and 12 Executive Board members." The remainder of the section is unchanged. Section 3 of article 3 would read, "the President, First Vice President, Second Vice President, and Secretary-Treasurer shall be elected by ballot annually at the regular meeting and shall hold office for the ensuing year." The remainder of that section is unchanged. Section 3 of article 4 would be amended to read, "the First Vice President shall preside in the absence of the President and perform all the duties of the President in his absence." And a new sentence would be inserted, "the Second Vice President shall perform all the duties of the First Vice President in the absence of the First Vice President." That is the proposed amendment. I move for the adoption of that amendment to the Constitution. Do I hear a second? The second has been made, call for a vote. All those in favor say aye. All those opposed say nay. Consider that carried.

Now we have another change we would like to make in the Constitution, which may not be so popular. For years now we have had dues of 3 dollars per member. The dues pay for the *Proceedings*, the convention, including the registration at the convention, and the fellowship hour. It is everything that the member has to pay except for the luncheon ticket. So, what this amounts to, as our membership gets larger, we lose money. The more members we have, the more we lose, because it costs us more than three dollars per member. We want to be able to meet the growing costs by making it possible for the Executive Board to raise the membership fee. The Constitution states this business about the three dollars, so we really have to change the Constitution. If we do pass this, your membership fee will not be raised next year, it will take another year. Your three dollars are safe again for another year. What we would propose here, is that in article 2, section 1, a sentence which now reads, "this application shall be accompanied by one year's dues of three dollars," we would like to change to "this application shall be accompanied by the current year's dues as established by the Executive Board." And in article 2 of section 3, the first sentence now reads, "the annual dues for active members shall be three dollars and any person in arrears on August 1 of the current year after having been sent two notifications of dues shall be dropped from membership." We will change the first part of that sentence to read, "the annual dues for active members shall be determined by action of the Executive Board." And the rest of

the sentence dealing with the person in arrears will be unchanged. I move that this be adopted as an amendment to the Constitution. Do I hear a second? A second has been made. Is there any discussion? All those in favor, aye. All those opposed. This change in our Constitution is approved for publication. It will be voted upon at our next year's meeting. Thank you.

President Berta: Gentlemen, that concludes the Business Meeting this morning. Is there anything anybody would like to bring up from the floor? If not, how about just stretching a little, and we will get set up for our Technical Session. It won't take more than a few minutes. (*A recess of ten minutes was held.*)

President Berta: Would you please take your seats? We need to proceed with our Technical Session. At this time, I would like to introduce the Chairman of our Technical Session, Frank L. Dillard, who is Chief Engineer of Bell and Zoller Coal Company of Johnston City, Illinois. He will chair the Technical Session this morning.

Frank Dillard: Thank you Mr. Berta. Welcome to the Morning Session of the 78th Annual Illinois Mining Institute Meeting. We have for you today, four papers that cover a broad range of very topical subjects. I would like to thank in advance the speakers for taking time from their busy schedules to come and present these papers. The first speaker that we have today will present a paper entitled, "Engineering Systems Approach to Mine Compliance." The speaker will be Mr. James Conrad. He is a Registered Chemical Engineer, a graduate of St. John's College and Carnegie Mellon Institute. He has been in consulting practice for eleven years in the Pittsburgh area. He has experience in mine acid control, waste water recycle management and is active in solid waste materials engineering and chemical process operations. He is Vice-Chairman of the Government Advisory Committee of the American Institute of Chemical Engineers and a coordinator between the technical groups that are interested in coal technology. Without further ado I would like to present now, Mr. Conrad.

ENGINEERING SYSTEMS APPROACH TO MINE COMPLIANCE

JAMES W. CONRAD
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Pittsburgh, Pennsylvania

INTRODUCTION

We are delighted to be here at the annual meeting of the Illinois Mining Institute, having spoken on acid mine drainage at your 74th session in 1966. The program described then has since been well received and was awarded the S. A. Braley award at Bituminous Coal Research (BCR) and Ohio River Sanitary Commission's (ORSANCO) bi-annual affair last May.

We will briefly review our systems approach to dust abatement, which is the initial aspect of Federal Coal Mine Health and Safety Act. The law calls for control of dust to levels up to 3 mg/m^3 except for certain noncompliance permits allowing up to 4.5 mg/m^3. The crux of the program is to achieve 2 mg/m^3 by January, 1973.

PURPOSE OF FEDERAL COAL MINE HEALTH AND SAFETY ACT

The ultimate purpose and intent of the law is to avoid or reduce the risk of pneumoconiosis to miners and related employees of our industry. As part of the law, X-rays are to be taken by June 30 of all willing miners and studied for effects of dust in lungs.

It is hoped that over a period of years a relation between X-rays, respirable dust samples, and other health factors will establish a pattern for determining the cause of pneumoconiosis in mines. For instance, there is significant evidence to indicate that heavy smokers contract the disease more readily than non-smokers. Smoking appears to reduce the effectiveness of the lungs' clearing mechanism. Should the mining industry be responsible for compensatory claims because of factors not under their control? Historically, the disease is more common in some areas than in others.

U. S. Public Health Service records bear testimony to this fact. Does this indicate that the type of coal or the type of mining has a bearing on the amount of respirable dust generated? It probably does. But you as operators and supervisory personnel are locked into those factors and you must devise methods to keep dust levels within the legal requirements.

The need is for a rigorous program to achieve and maintain 3 mg/m^3 and provide substantial data and knowledge for two years in order to determine what is required to reach 2 mg/m^3. This knowledge together with accurate X-rays, will provide data for a new set of criteria that will enable management to select and institute mining methods to comply with the law.

THE SYSTEMS APPROACH

It is all well and good to say "We want the lowest dust number for our mines," but the cost might drive us out of mining. Assuming we can devise a system, are we not going to need to interface other factors of safety and health in order to design a mine safety system model? This is the place where use of the systems approach makes sense.

Let us review what systems means. From the Greek word *systema*, "being whole or organized," the word is over-used in military contracts and in other areas. We simply infer that the systems approach is the study and application to mines of technical and economic inputs or tools which provide a better process and operational unit than a revamp of existing processes.

We began studies using systems techniques borrowed from other industries. The first diagram (Fig. 1) shows a matrix model for the mine and dust interaction. Figure 2 is a basic system description and figure 3 illustrates a flow or path of interaction to fulfillment of the hazards program. The diagrams show the problem matrix and allow us and our client to begin other data bank work on factors for cost control and cost/benefit analysis. These tools applied for dust control can be enlarged for inclusion of all mine process factors. We feel dust management and resultant values can be classified as a significant quality control checkpoint for managed coal operations.

The ultimate system resulting from a useful critical path applied to coal will require a better dust test and sampling instrumentation which continuously audits certain key factors integrating these with a system mine control model. It is one which avoids the excessive use of men as test modes and required burdensome samplers. We do not as yet have an elaborate model, but feel it is needed by the time one enters the 2 mg/m^3 level, which requires very precise tools and measuring factors. In effect, we are trying to ascertain through rigorous efforts, whether a 2 mg/m^3 level is viable as to health factors and whether one can capably measure dust levels below 2 mg/m^3 with real accuracy and control dust generation.

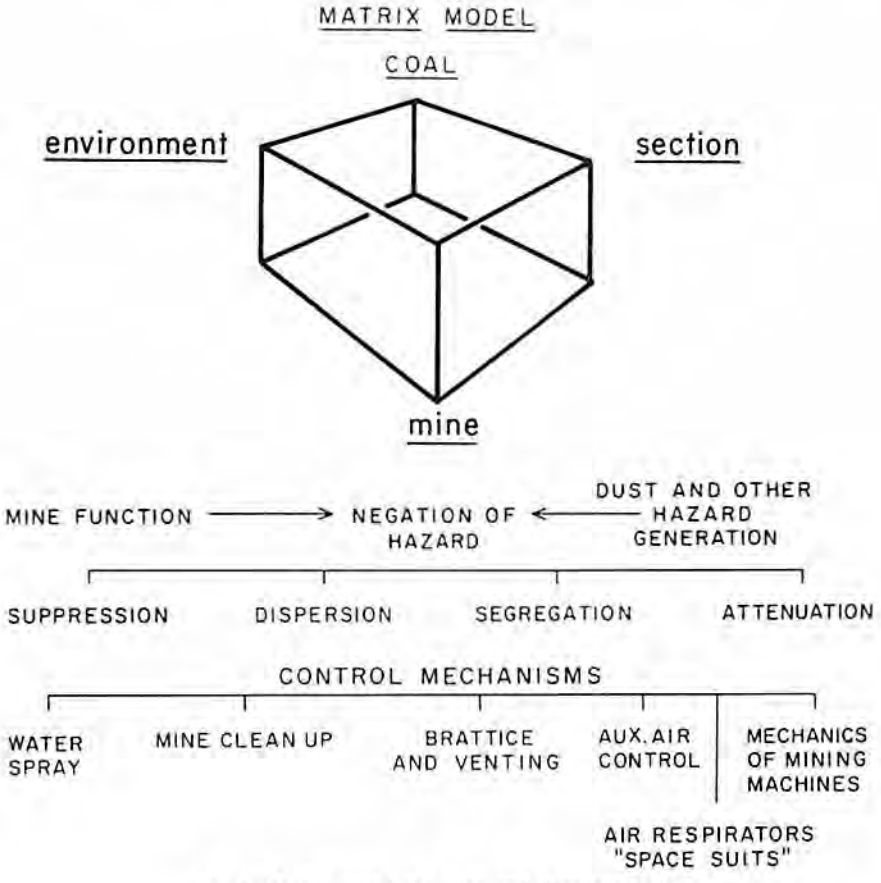


Fig. 1—Matrix model for mine and dust interaction

RESULTS OF TESTS

Let's review some facts derived from dust tests of varying results. Table 1 depicts the relationship between occupation and dust concentrations as sampled by personal sampler. Table 2 shows dust concentrations in mines classified according to type of regular equipment used.

Table 3, courtesy of the U. S. Bureau of Mines, shows rather low values for operations, although a lot of them range above the 3 mg level. But we can say from our work at most mine sections, that 3.0 mg is definitely achievable. Kentucky's review of mine averages show some negative results; 56 percent of mines exceed 3 mg/m^3 level, 42 percent exceed 4.5 levels, and 73 percent are over 2 mg.

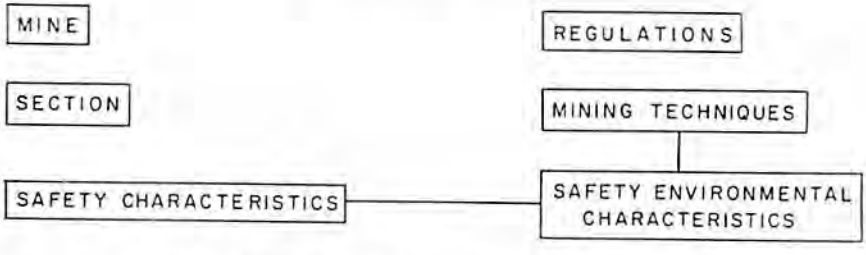
SYSTEM DESCRIPTION

1 SYSTEM IMPROVEMENT VS. NEW SYSTEM
2 STATEMENT OF PROBLEM IN MINES
3 MINER SENSITIVITY ENVIRONMENT FACTORS BASIC HAZARD PARAMETERS
4 BASIC PATH, DUST SYSTEM AND OTHER FACTOR INTERACTION

MINER	SECTION	ENVIRONMENT
SENSITIVITY TO HAZARDS	SENSITIVITY TO CONTROL OF HAZARDS	PROBABILITY OF SYNERGISM
INITIATION	REGULATIONS	DUST
AND	OPERATIONS	METHANE
SUSTAINED	MECHANICS	FALLS
PROTECTION	TRAINING	OPERATIONS
	GEOLOGY	

Fig. 2—Basic system description

SYSTEM PATH



TYPICAL MINING PROCESS PATH

CATEGORIES OF MINES

SAFETY REGULATIONS AND INFORMATION

CURRENT METHOD OF APPLICATION

PERFORMANCE STANDARDS

Fig. 3—Flow of interaction to fulfillment of hazards program

The tests were run in what appeared to be the dustiest sections. Many smaller mines have ventilation problems and lack the best techniques for machine uses. Approximately 1,200 tests in 500 mines were made by the State of Kentucky, and 800 mines were covered by the U. S. Bureau of Mines.

In essence, health and safety controls are quality standards for mine management to consider in the coal industry. We have tested a substantial number of sections. Tables 4 and 5 are layouts of earlier tests and the summary of revisions needed to achieve the test values.

In mine no. 4701 (Table 4) all sections had proper ventilation and correct use of brattice cloth. Water sprays on continuous mining machines were improperly directed and not functioning efficiently. When this was corrected, the reading came well into compliance.

In mine no. 4702 and no. 47021 the initial readings showed improper use of brattice cloth and water sprays. When brattice was run forward and kept in proper location, dust levels were reduced to below 3.0 mg/m^3.

In mine no. 4703 the proper use of brattice cloth was normal practice; however, large amounts of air were diverted through leaks in stoppings. Air measurements indicated location of leaks, corrections were made, and dust loadings fell by 50 percent.

Improper splitting of air was found in mine no. 5701 and 5702. The mine was below air volume for methane protection. When this was corrected, dust loadings fell well into compliance. Improved running of brattice lowered readings. Proper training of personnel in this area will further reduce dust loadings.

Water sprays and brattice were not correctly utilized in mine no. 5703. Personnel were instructed in the correct method. Dust loadings were reduced greatly.

In every section we cover all the operations, manpower attitude, competence of supervision to grasp dust techniques, and the applicability of tools for less dust, such as water, auxiliary ventilation, mine clean-up, rock dusting, and operation of machines. We urge people to attend federal and state courses such as Course 100 which is part of these efforts. No pat answers are readily used. It is a compendium of many factors that provides for lowest values.

We've looked at MRE vs. MSA sampler data, especially in the lowest dust number range (Table 6).

The data represent the initial parallel samples collected in a study to determine the relationship between the results obtained from an MRE sampler and a personal sampler in dust concentrations of less than 2 mg/m^3. These parallel samples were collected under as precisely controlled conditions as possible in coal mine environments.

TABLE 1—Mine mean dust concentrations related to occupation: Samples taken with the personal sampler.

Occupation	No. of mines	No. of samples	Dust concentration, mg/m³				Concentration, mg/m³		
			<1.6	1.61–2.4	2.41–2.9	>2.9	Low	High	Mean
Continuous miner operator	21	178	2	2	4	13	0.02	21.44	4.08
Continuous miner helper	19	131	4	3	2	10	.44	18.90	3.47
Cutting machine operator	15	98	1	6	2	6	.71	15.42	3.69
Cutting machine helper	8	37	1	3	–	4	.77	14.70	4.45
Coal drill operator	9	59	3	–	1	5	.42	12.94	3.55
Loading machine operator	18	97	2	1	2	13	.25	39.56	3.75
Loading machine helper	6	31	–	3	–	3	.50	14.48	3.17
Roof bolter operator	25	296	6	9	6	4	.09	38.50	2.46
Shuttle car operator	27	463	17	7	3	–	.12	10.50	1.45
Beltman	7	32	2	3	1	1	.42	4.97	1.85
Boomboy	6	20	5	–	–	1	.23	5.88	1.30
Timberman	12	49	7	1	–	4	.38	11.74	2.49
Shotfirer	12	83	5	2	2	3	.62	56.97	3.15
Supplyman	8	24	5	1	1	1	.05	9.36	1.59
Mechanic	19	142	17	2	–	–	.06	5.43	1.10
Section foreman	28	236	19	4	2	3	.14	14.51	1.69
TOTAL	29	1,976	96	47	26	71	—	—	—
PERCENT OF TOTAL	—	—	40	19	11	30	—	—	—

TABLE 2—Respirable dust concentrations in mines classified by the type of major equipment in use.

Equipment	Number of samples	Concentration of respirable dust in milligrams per cubic meter of air				
		Average	Low	Median	High	Return Aircourse
Continuous mining	59	14.41	0.33	5.08	137.68	3.10
Conventional mining	568	7.13	0.00	4.61	201.73	3.44
Hand loading	139	3.78	0.04	2.30	35.05	1.63

TABLE 3—Dust concentration related to occupation. Data provided by U.S. Bureau of Mines.

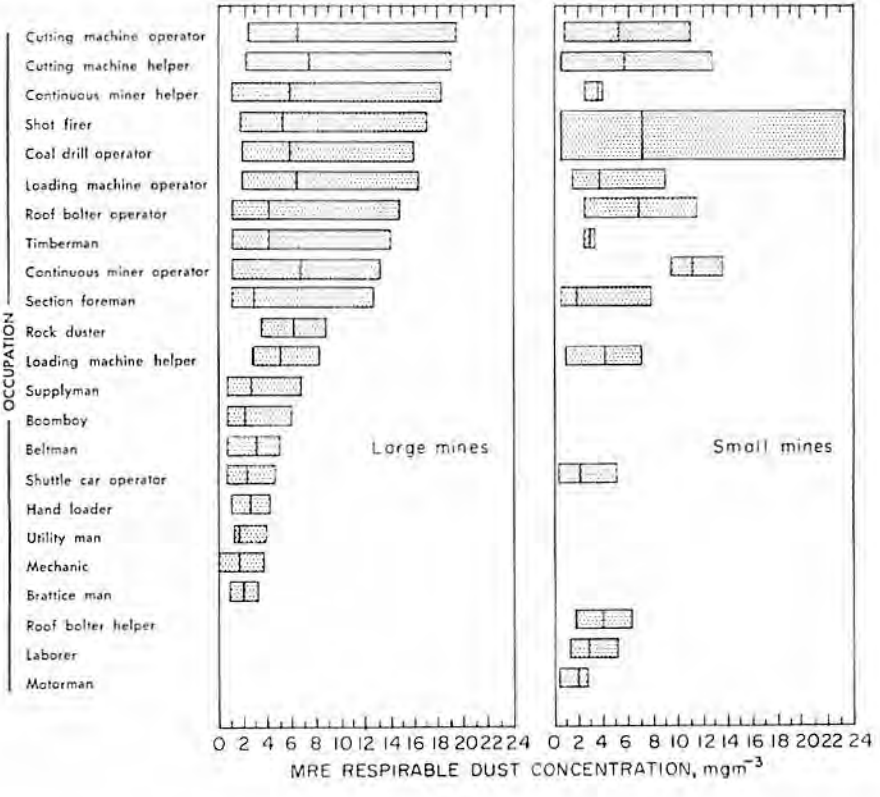


TABLE 4—Complication of dust sampling results taken in mines of Western Pennsylvania during April and May, 1970, generally high volatile coal

Mine No.	Section No.	Type of Mining	Init. Equiv. MRE Loading mg/m³	Final Equiv. MRE Loading mg/m³	Intake Air mg/m³	Air Volume at face (CFM)	Air Velocity at face (FPM)
4701	001	Cont.	3.5	0.333	0.16	2830	170
	002	Conv.	—	1.11	0.35	3200	210
	003	Conv.	—	0.666	0.20	3200	210
	004	Conv.	—	1.166	0.40	3680	190
	005	Conv.	—	1.083	0.34	3400	225
	006	Cont.	3.8	1.666	0.38	2873	170
4702	001	Cont.	9.98	2.008	0.907	3240	180
	002	Conv.	6.77	2.972	0.11	3200	40
47021	001	Conv.	—	1.099	0.167	9360	80
4703	001	Conv.	2.0	1.08	0.355	4760	88
	002	Conv.	1.3	0.781	0.177	5000	93
	003	Conv.	1.8	1.165	0.190	3360	115
5701	001	Cont.	3.7	1.5	0.5	7840	150
	002	Cont.	4.16	0.72	0.5	4800	90
5702	001	Conv.	3.33	2.06	0.57	10530	130
	002	Conv.	2.5	2.2	0.19	19000	270
5703	001	Cont.	4.0	2.43	1.66	2100	150
	002	Conv.	3.33	1.533	0.166	1650	110

TABLE 5—Comparison of basic and standard sampling cycle results taken in a mine in Western Pennsylvania during July, August, & September, 1970.

		[1] Initial Basic Sampling Cycle	[2] Standard Sampling Cycle
Mine No.	Section No.	MRE Equiv. (mg/m³)	MRE Equiv. (mg/m³)
4701	001	2.72	1.83
	004	2.78	2.22
	005	2.15	1.32
	006	1.83	1.60
	007	2.90	2.30
	008	2.84	2.53

[1] Average of 10 section tests required.
[2] Average of 5 section tests required.

TABLE 6—MRE vs. Personal sampler.

Sample no.	MRE (mg/m^3)	Personal Raw Wt. (mg)	Sampler MRE Equiv. (mg/m^3)
1	0.4153	0.5	0.8332
2	0.5785	0.4	0.6665
3	0.6700	0.5	0.8332
4	0.6639	0.3	0.5000
5	0.4153	0.5	0.8332

Our initial results indicate that the relationship that exists between the MRE and personal samplers at dust levels in excess of 2 mg/m^3 may not be valid at lower concentrations.

Because these values are the ones we'll test in 1973, how accurate is the correlation and actual sampler result? How reasonable at 2 mg/m^3 is the 1.6 factor? In reality, shouldn't we sample dust with units free of "multipliers" by directly reading the values? The use of continuous analyzers such as those under development at Pennsylvania State University are worthy of utilization in an integrated control mode. Let's move to the conclusions about a total safety concept.

CONCLUSIONS

1. We can (so far) get a section into the 3 mg range and have no serious "malingerers" that resist technical cures. Doing so, we do not reduce production.

2. Dust control systems and all other factors going with it should, indeed, raise output and provide a quality control check.

3. Knowledge is the key to the task. The need for comprehensive training and updating of skill is vital to the modern mine. Traditional efforts, apprenticeships, lectures, and safety sessions all appear to lack the elements really vital to a profitably managed mine. We applaud and will help any program or training such as that described in October's "Coal Age" about Kerr McGee's work. Airlines, utilities, and other critical occupations absolutely have to do this. Certainly mines are in that category.

4. Continuous miners and operator locations may need to be redesigned and rearranged. Better maintenance of face ventilation systems and better mine clean-up are also needed. In addition, certain mining systems may require the use of bag houses or other filter collectors to achieve acceptable dust levels.

5. Mine management must provide the continual initiative, and leadership both as it applies to their internal needs and to the overall direction and change of national policies and regulations.

These will be amended where definitive technical information is

developed and models or systems are derived which negate the older methods. The role of mine engineering societies developing standards based upon performance criteria and applied through systems is vital. The role of the competent professional engineer is the crux to an intelligent low cost adequately managed safety system audited by rational continuous readout controls.

Failure to use these capabilities will inherently drive up the cost ratios and place coal's potential in a bad way. Our competitive energy sources are quite capable of continuing their role at better economic levels.

We feel the technical answers are in sight and can be managed for mutual profit on the part of the coal industry and its markets.

Frank Dillard: Thank you Mr. Conrad. At this time, I would like to throw the floor open for any questions that might be directed to Mr. Conrad on any comments that he has made in his paper or anything you would like to ask him about his slides. Do we have anyone who would like to ask a question? If you do, would you please stand.

Donald C. Jones: Jim, we realize that the systems approach is, shall we say, the more modern way of attacking problems of major value to the industry. But the industry has already been hit pretty hard with the Health and Safety Act provisions, as you heard yesterday. One big mine, as an example, reduced production, and that means increased costs. Now does this mean if we are going to have to adopt the systems approach, we are also going to be in for an additional heavy cost?

James Conrad: No, I think it would be a misapplication if that would result in a higher cost. The whole theory behind the use of this technology, which is using common sense in intergrating all the factors involved, would have to lower costs, or else it's been misused. It apparently tells you the absolute facts of life, while in reality it tells you where your costs really are. You have not known that so far. It's got to do you some good or the whole theory behind it has never been right. We know that in some of the major programs, you could not run the weapons program, the atomic bomb program, and you cannot run some of the new transit activities without it. If you do not have this kind of thing it looks as if all of these factors are going to increase your costs, then you have not used the system technique correctly. It has been misapplied. It tries to tell you what you can anticipate later what you may not foresee right now. It has got to result in a better program.

Question from floor: I note the data on the dust concentrations

cuts off at less than 1.6. What is being done to obtain data in the 0.5 range?

James Conrad: We are continuing a lot of sampling to get values in that range lowered. We are getting quite a number of them as a matter of fact, especially in the air activity. Our effort there is basically to see how accurate is this correlation between the various types of sampling modes as they generate a value. The early work in this presents a lot of suspicion. Somehow it isn't necessarily the best testing of sensitivity towards generating and laying out the value of those low levels. We do not have that. I think you are going to have a hard time getting an accurate, honest measurment of the two-milligram or less level.

From floor: But really, isn't it the number of these small particles rather than the milligram level?

James Conrad: Yes.

From floor: Is this currently being considered for legislation?

James Conrad: Not that I know of specifically, but it is known and they are working on it. For instance, Jacobson and his people at Pittsburgh are well aware of it and are continuing to work on it. But it is not currently being proposed, and I think that it is one of the levels that a group of people are going to have to sit down and talk about and say—here are the critical facts, here are the steps that we think have to be amended in the regulations for a more rational program.

Frank Dillard: Do we have any other questions?

Donald Jones: Jim, we are using samplers. How reliable are those samplers going to be after they have been in service three months, five months, eight months? In other words, suppose a sample is taken eight months from now with a sampler that has never been checked. Does this mean you are going to get a reading with a higher value than you actually have, a lower value, or what is it?

James Conrad: That is a very good point. I did not cover it, but the text will cover some of it. We have varying results of accuracy with the pump. I will say, basically it is a pretty good pump considering the time in which they had to develop it. But if you don't take good care of it, and you don't consistently manage its maintenance and calibration every 80 to 200 hours (since depending on the nature of the pump, each pump is a little different) you are going to get results of variable accuracy. And it's going

to throw you off, if you don't watch out. In some cases if you have some clogging, it is going to generate so-called low values, and you are going to wake up to the fact and think you are off by a milligram. You are going to get a big surprise when someone runs inspection on you. We try to run cross section checks on this, to make sure our pumps are right. The client's pumps are running close to the line, and we check each other on this so we don't get drift. Unfortunately, if they are not maintained and they have certain sampling problems and they don't watch the intersection of production versus the dust, some people will tend to think they are getting high numbers. But this is because they are doing some other things in their dust generation program. But the pump maintenance and pump program has to be an important part of this thing, and you have to watch it or it will burn.

Question: Any cost estimates?

James Conrad: Calibration costs one hundred dollars a shot. Yesterday I asked how much a sampling routine would cost per day, now I'll give you an approximate figure. About 25 dollars a sample, including cassette, pump time, manpower, and other factors.

Frank Dillard: Thank you. I guess we better move into our next paper, which will be delivered by Mr. B. F. "Bill" Eads. And I am sure he just got through with a systems approach because he has a new mine coming on stream. He is a recent transplant from West Virginia, and he went to school at Marshall University in Huntington. He graduated from the University of Kentucky and was employed in the West Virginia and Kentucky coal fields prior to coming out here. He arrived in July of 1969, just in time to get involved with the new Monterey Coal Mine. I talked to him just before the meeting, and he said they were going to ship their third unit train. So I am sure he has some interesting things related to the development of the new mine they have just opened. The title of his paper is "Planning and Development of Monterey No. 1 Mine."

PLANNING AND DEVELOPMENT OF MONTEREY NO. 1 MINE

B. F. EADS
Manager Technical Services
Monterey Coal Company, Carlinville, Illinois

INTRODUCTION

Mr. Chairman, members of the Illinois Mining Institute, and guests. On behalf of Monterey Coal Company, I would like to thank the Institute for the invitation to appear before this group and for this opportunity to acquaint you with Monterey Coal Company. More specifically, we are very happy to discuss with you "The Planning and Development of Monterey No. 1 Mine."

At this point, I would like to say a few words about Monterey Coal Company. The Company is a wholly-owned subsidiary of The Carter Oil Company of Houston, Texas. Monterey was organized early last year to develop this mine to furnish coal to the electric utility market. The production of the mine will be 3,000,000 tons annually when fully developed. The mine is located five miles south of Carlinville, Illinois, which is approximately fifty miles south of Springfield.

Extensive core drilling resulted in the blocking out of a large mineable reserve of Illinois No. 6 Coal averaging over seven feet thick. At the mine location, the coal seam lies 300 feet below the surface and is overlain by a hard compact limestone averaging seven feet in thickness. The floor is generally level and is composed of fire clay of variable thickness.

In planning the new Monterey property, management sought to incorporate mining facilities that would be functional and attractive with appropriate consideration for the desired natural environment (fig. 1). Our plans for surface layout, traffic control, coal storage, water impoundment, power distribution, supply storage, waste disposal, and land reclamation reflect a desire to make this operation both functional and aesthetically attractive. We feel that we have succeeded in both aims in that our surface facilities are nearing completion, and our first coal was processed just two weeks ago on October 8. Our first unit train was loaded this last Monday, October 19. Surface areas disturbed during construction are being reclaimed and reseeded. Access roads and parking areas are receiving final grading and draining in preparation for surfacing with A-3 surface treatment and asphalt.

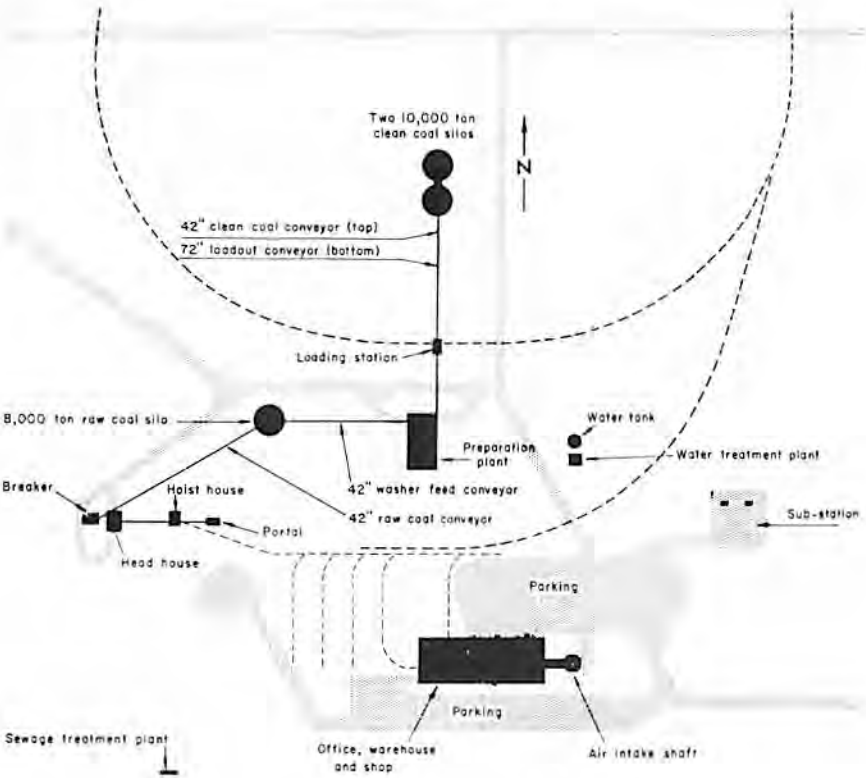
Fig. 1—Monterey No. 1 Mine.

I would now like to discuss the surface layout (fig. 2) in some detail and point out what should be of interest to you.

ADMINISTRATION BUILDING

The administration building is approximately 90 × 256 feet and is an all-metal prefabricated building. It houses the warehouse and shop in one end and the offices and bath house facilities in the other. The offices and bath houses are of masonry construction inside the prefabricated shell. The entire building is constructed on a concrete slab. Additional warehouse storage is provided over the office space by an additional concrete slab. The ribbed prefabricated siding and roof are surfaced with baked-on enamel for long life. The entire building, including the shop and warehouse areas is electrically heated. All the offices are centrally air conditioned while the bath houses are fan ventilated.

The flow of traffic through this facility was studied in detail. Parking areas are located adjacent to entrances, and an enclosed, heated ramp leads from the waiting room to the elevator. The building is provided with an assembly room leading off the waiting room where classes will be held. Offices for supply and maintenance supervisory personnel are located adjacent to the shop and warehouse. Truck ramp, supply track, and tracks leading into the shop facilitate the movement of supplies and equipment.



MONTEREY COAL COMPANY

MONTEREY NO. 1 MINE

Date: 10-13-70

Fig. 2—Surface layout of mine.

SUPPLY YARD

Adjacent to the shop and warehouse is the supply yard. This primary supply storage area consists of over 60,000 sq. ft. and is serviced by four track spurs arranged for supply storage on both sides. The tracks are flush with the ground to provide access by rubber-tired vehicles. This will enable fork-lift trucks to load supplies directly on the supply cars for movement to the mine slope portal. Locomotive power on the surface is provided by a 10-ton diesel powered track locomotive.

POWER SYSTEM

Power is delivered to the substations at 34.5 KV by the Illinois Power Company. One substation with a capacity of 7500 KVA

reduces this voltage to 13,800 V for distribution to underground, and the other, also with a capacity of 7500 KVA, reduces this voltage to 4160 V for distribution to the preparation plant and other surface facilities. All power cables, control lines, telephone lines, and mine communication lines are buried in conduit throughout the mine yard. There are no overhead lines except those to remotely located pump stations and fans.

The 13,800 V is distributed underground to the various power centers serving sections and belt conveyor drives. For this service the high voltage is reduced to 550 V. All section equipment is operated on 550 V except the shuttle cars which operate on 250 V D.C.

The 4160 V is distributed on the surface to various power centers where the voltage is reduced to meet the need.

The power distribution system is designed and equipped to meet all state and federal mining laws.

WATER SYSTEM

In the initial study of the water requirements for Monterey No. 1 Mine, it was concluded that the requirements would be 800,000 gallons per day. From this study, it was apparent that a large reservoir would be needed. Consequently, Smith Reservoir (fig. 3) was constructed with a storage capacity of 535,000,000 gallons. This reservoir is quite large, having a surface area of 95 acres, and is of the earth-fill type. A pumping station consisting

Fig. 3—Water impoundment in Smith Reservoir.

of a concrete intake and dual 600 gallons per minute vertical turbine pumps has been constructed. Water is delivered to the mine site through an 8-inch diameter concrete lined pipe. Water is stored in a 60,000 gallon capacity elevated tank. Secondary distribution to the surface facilities is by smaller diameter concrete lined pipes. The fire protection system is also supplied through these lines and consists of fire hydrants and hydrant houses strategically located on the surface. Stand pipes are located in all surface buildings.

Underground water distribution is accomplished by extending the 8-inch diameter concrete lined pipe down the mine slope. Hose cabinets are installed along the upper section of the mine slope in which the slope belt conveyor is installed.

Potable water is supplied by a water treatment plant located near the water tower. The treated water is stored in a 15,000-gallon capacity tank supported under the raw water storage tank by the same tower.

Sewage is treated in a 15,000-gallon capacity sewage treatment plant. Provision is made for surge capacity to accommodate the load which occurs at shift change time. All shower water passes through this plant and is retained for the required interval of time. It is fed through the plant on the hours between surges.

An integral part of the water system is more directly related to the preparation plant. A second earth-fill dam has been constructed to impound water for the plant and is called the Recirculation Pond. This impoundment facility has a capacity of 58,000,000 gallons and a surface area of 13 acres. A pumping

Fig. 4—Pump station at recirculation pond.

station (fig. 4), consisting of a vertical turbine pump mounted on a barge, with a capacity of 3000 GPM, furnishes water to the preparation plant. This reservoir receives clarified water from the slurry pond, all surface runoff from the mine area and can receive water from the larger reservoir by means of a bypass from the raw water system.

The permanent water system consists of nearly three miles of pipe lines and four pumps with a capacity of 4500 GPM.

RAILROAD

To service the No. 1 Mine, it was necessary to construct over 10,000 feet of track. This was done in a loop and allows the unit train to enter the property, load, and return to the mainline track by single switching. Unit trains of 6,000 tons capacity will be loaded twice daily. The Chicago and Northwestern Railroad will serve the mine.

ACCESS ROADS

Main access roads at the mine site are to be 24 feet wide with a 3-inch thick asphalt surface. Secondary roads are to be 20 feet wide and will have similar surfacing. Also, all parking areas are to be surfaced.

PREPARATION PLANT

The preparation plant was designed and erected by McNally Pittsburg Manufacturing Corporation and is one of the most modern jig plants.

Flow Pattern of Coal

Illinois No. 6 Coal will be delivered by a 48-inch slope belt having 35-degree carrying idlers, operating at 650 FPM and on an incline of nearly 17 degrees.

The slope belt is driven by two 450 HP motors and will deliver the mined coal at the rate of 1800 tons per hour to a stationary step-type screen having six-inch openings.

The overproduct from the stationary screen will discharge into a 10-foot × 24 rotary breaker, and the underproduct will bypass the rotary breaker. The rotary breaker is equipped with heavy manganese screens with 6½-inch diameter openings. The sized 6-inch × 0 coal from the stationary step screen and the rotary breaker will be discharged by gravity to a 48-inch raw coal incline storage belt.

The 48-inch raw coal storage belt will deliver the 6-inch × 0 sized coal at the rate of 1800 TPH to an 8000-ton concrete raw

coal silo, 70 feet in diameter and 117 feet high.

The 6-inch × 0 sized coal will be drawn from the concrete storage silo by seven 36-inch wide reciprocating plate feeders.

Five feeders are to have constant speed drives at a rated capacity of 145 TPH each. Two feeders will have remote controlled variable speed drives to provide a varying feed.

The reciprocating feeders are to be equipped with a new drive design as follows: all seven feeders are roller bearing equipped, driven through 20:1 hollow shaft reducers with 410/8 variable speed drives complete with 18-inch companion sheaves.

In addition, the two variable speed feeder drives will have a tachometer and a remotely controlled motorized adjustable motor base.

All seven reciprocating feeders will discharge 6-inch × 0 raw coal onto a 48-inch collecting belt conveyor, operating at 375 feet per minute and handling 1000 TPH.

The washery feed belt conveyor is 42 inches wide with 35-degree carrying idlers. It operates at 525 FPM and has a rated capacity of 1000 TPH.

The 6-inch × 0 raw coal discharged from the 42-inch washery feed belt conveyor will be automatically sampled before being distributed to two Mogul Wash Boxes. The 6-inch × 0 coal is prewet in the feed chutes to the wash boxes in order to wet the coal thoroughly before entering the wash boxes. This is being done due to the high percentage of ¼ inch × 0 in the 6-inch × 0 raw coal feed.

The middlings product from the two wash boxes will be crushed to 1 inch × 0. The crushed 1 inch × 0 middlings will be processed in a rewash box. The clean coal recovered from the middlings will be blended with the 6-inch × 0 clean coal from the two wash boxes. The rejects from the middlings wash box will combine with the primary rejects from the two wash boxes and will go by gravity to a 250-ton refuse bin located in the preparation plant.

The clean coal from the two wash boxes and the middlings rewash box are sluiced to four 6-foot × 16-foot double deck, floor mounted, vibrating, classifying screens. A stationary screen with 3 mm openings is installed in the sluices ahead of the vibrating screens to remove a portion of the water and extreme fines before being discharged onto the vibrating screens.

The top deck of the vibrating screens consists of spring steel wire cloth with a 1 inch opening. The bottom deck consists of twelve ⅛ inch stainless steel wedge wire flat panels having a 3/16 inch opening. Rinsing sprays are installed on both decks of the vibrating screens in order to remove slimes and fines from the coal.

The 6 inch × 1 clean coal from the four washed coal screens

goes by gravity to two 36-inch × 48 single stage double roll gearmatic crushers. A 2-inch × 0 product is made by the crushers and is fed directly to the washed coal collecting belt in the plant.

The 1 inch × ¼ clean coal from the four washed coal screens goes by gravity to four screen-type centrifugal dryers. Each dryer feed chute is provided with a bypass gate and a feed sample door. The four coarse coal dryers operate with a rotating screen basket at a speed varying from 330 to 360 RPM, a vibrating cycle variable from 1800 to 2200 cycles per minute, and an amplitude variable from 1/16 inch to 5/32 inch. The centrifugal dryer baskets are constructed in one piece and have a ten-degree angle. The basket screen is stainless steel reinforced and is constructed from stainless steel grizzly rod profile with a ½ mm opening.

The dried 1 inch × ¼ coal from the coarse centrifugal dryers reports with the 2-inch × 0 crushed coal to the horizontal washed coal collecting conveyor.

The ¼ inch × 0 clean coal and water from the washed coal screens is sluiced to two sumps and pumped to eight 24-inch classifying cyclones. The underflow from the cyclones goes to four feed boxes mounted above four 5-foot wide cross-flow screens. The cross-flow screens are equipped with a stainless steel ⅛ inch wire screen with an opening of 1 mm to make a classification at ½ mm. The overproduct from the cross flows goes to four 6-foot × 16 single deck floor mounted dewatering and desliming screens. These vibrating screen decks are equipped with stainless steel 3/32 inch with ½ mm openings on the first eight feet and ¼ mm openings on the balance. High pressure sprays are installed on each screen to remove fines and slimes from the clean coal.

The ¼ inch × ¼ mm clean coal from the desliming screens goes by gravity to four screen-type centrifugal fine coal dryers. Each dryer feed chute is provided with a bypass gate and a feed sample door. The four fine coal dryers are to operate with a rotating screen basket having a higher RPM, a vibrating cycle variable from 1750 to 1860 cycles per minute, and an amplitude variable from 1/16 to 5/32 inch. The dryer baskets are identical to the baskets furnished for the coarse coal dryers.

The dried ¼ inch × ¼ mm coal from the centrifugal dryers is collected on a horizontal small coal belt conveyeor in the plant.

The washed coal and small coal horizontal collecting conveyors discharge onto a 42-inch washed coal storage belt conveyor which delivers the 2-inch × 0 clean coal to a washed coal concrete silo or to a 42-inch washed coal transfer conveyor that discharges to a second washed coal silo. Each silo is 70 feet in diameter by 162 feet high and has a capacity of 12,000 tons of coal.

The ½ mm × 0 fine coal and water from the four cross flow screens and the four 6-foot × 16 desliming screens is sluiced to a large rectangular sump. The pulp is pumped to sixteen 14-inch diameter classifying cyclones by two 8 × 10 × 21-inch CW type pumps.

The underflow from the 14-inch cyclones discharges into four splitter boxes. At this point the underflow material, all or any portion, can be directed to the plant slurry sump or to four 5-foot wide cross flow vibratory screens via feed boxes. The cross flow screens are equipped with stainless steel ⅛ inch wire screen with an opening of ½ mm to make a classification at ¼ mm. The ½ mm × ¼ coal from the four cross flow screens discharges into the feed to the four 6-foot × 16 desliming vibrating screens. The underflow from the four cross flow screens goes directly to the plant slurry sump.

The overflow from the 14-inch cyclones returns to the plant head tank. A bleed-off valve is provided ahead of the head tank for bleeding off any portion to the plant slurry sump.

The overflow from the 24-inch cyclones also returns to the plant head tank. Prior to the head tank, a bleed-off valve is provided for removing any portion of the overflow to a splitter box. The splitter box directs all or any of the bleed-off portion of the cyclone overflow to the plant slurry sump or to the ½ mm × 0 fine coal sump.

The 2-inch × 0 centrifugally dried and crushed clean coal is drawn out of the two concrete silos by a total of fourteen 60-inch reciprocating plate feeders.

Ten feeders are to have constant speed drives at a rated capacity of 500 TPH each. Four feeders will be remotely controlled by the loading out operator and will have variable speed drives to provide a varying feed.

The fourteen reciprocating plate feeders are equipped with the same new drive design as the seven raw coal feeders.

The fourteen reciprocating plate feeders will discharge the 2-inch × 0 washed coal to a 72-inch wide collecting belt conveyor operating at 525 FPM and having a capacity of over 3500 TPH. The 72-inch collecting belt conveyor discharges to a 72-inch wide inclined loading belt conveyor which conveys the coal to the 200-ton unit train loading out surge bin that is located directly over the unit train track.

A complete automatic system is installed at this point to sample the clean coal ahead of loading into unit train cars.

A mechanical belt scale is installed on the 72-inch wide incline belt. The scale is provided with a remote ticket printer for weigh-

ing the coal just before loading. Mechanical belt scales are also installed on the 42-inch wide washery feed belt conveyor and also on the 42-inch wide washed coal storage belt conveyor. All three mechanical scales are equipped with remote totalizers and dial TPH indicators.

Loading

A new concept has been designed to load a unit train in motion having railroad cars in the unit train system of three different heights and capacities of 50, 70, and 100 tons.

The telescopic loading chute below the 200-ton surge bin has been designed to automatically operate in all the different positions required to load the railroad cars of different size by the unique use of back to back air cylinders attached to the telescopic loading chute and electric eyes mounted to the structure on each side of the railroad cars.

Dust Suppression System

A dust suppression system will be installed at the rotary breaker area, beneath the raw coal silo drawout feeders and at the feed section of the washery feed belt conveyor. The dust suppression will be accomplished by the use of Aquadyne with properly designed hoods at each point of application. This system has been used successfully at other preparation plants where the dust was a severe problem.

Miscellaneous Features of Plant

The preparation plant has the following features:

1. Concrete floors throughout the plant.
2. A large passenger and freight elevator equipped with all the safety features required by law.
3. A large machinery servicing well with a 5-ton supply hoist mounted in the top of the plant for servicing each floor.
4. Electric local spot comfort heating in the stationary work areas with additional electric heaters installed to prevent freeze-up of the preparation plant sumps, pumps, pipes, screens, and refuse bin.
5. Electric welding outlets provided on all floors in the plant.
6. Oxygen and acetylene outlets with gauges piped to all the floors in the plant.
7. MSA page phone type communication system throughout the plant.

8. Water outlets with valves on each floor level for hosing down the plant.
9. Plant foreman's office, sample preparation room, and rest room areas provided on the ground floor of the plant. These areas have walls constructed of 8-inch concrete blocks and a 3-inch reinforced concrete ceiling.
10. Two large rooms are provided for motor controls and transformers. Each room is sealed off, pressurized, and provided with a trolley for a service hoist. Machinery doors are provided on the exterior control room walls.

SLURRY POND

A slurry pond approximately 600 × 600 feet has been constructed to act both as a slurry settling basin and a disposal pit for solid plant waste. The area was excavated and clay dikes constructed on the four sides to a height of thirty feet with 2:1 slopes on the outside. The outer edges of the dikes are at a higher elevation than the inner ones. Solid waste from the plant will be deposited in layers on the inner edges of the dikes and therefore confine all runoff to the slurry pond. The outer edges will continue to be constructed of clay and will be kept higher than the disposal area at all times. The dike bases are of sufficient width to allow the ultimate height of the dike to be forty feet. The outer slopes of the dikes are to be planted in grasses and as this and other future ponds are filled and abandoned, the surface will be covered with soil and landscaped.

The slurry is pumped to this pond through a 12-inch diameter steel pipe. The clarified water from the pond overflows through a standpipe and returns to the recirculation pond for reuse in the preparation plant.

Plant waste will be hauled to the disposal area by two loader scrapers. These units were chosen so that they could also be utilized in slurry pond construction.

When the initial planning and engineering was completed on the Monterey No. 1 Mine, contracts were awarded for its installation. Allen & Garcia Company of Chicago was awarded a contract to act as engineers to design and install the surface facilities, slope, and shafts. The preparation plant was excepted and was awarded as outlined before. Allen & Garcia designed the administration building, slope facilities, shaft facilities, and the coal handling facilities to a point where they joined the McNally Pittsburgh contract. Subsequently, they subcontracted parts of the construction work to several contractors and did a portion of the work with their own work force.

SLOPE SHAFT

The slope and elevator shaft sinking started in May, 1969, and the sinking of the fan shaft started approximately three months later. The slope consists of two compartments with the bottom section serving as a track entry and the top having the 48-inch slope belt conveyor in it. The slope incline is slightly greater than 17 degrees and is 13 feet wide, with a clearance of 7 feet over the rail. The curved upper portion has a height of 7½ feet at the crown. The slop is concreted its entire length with a minimum thickness of 12 inches and a maximum of 18 inches. It is divided by a 6-inch concrete partition supported by 6 WF beams. A 50,000 CFM exhaust fan is mounted in the top section on the surface to provide ventilation over the conveyor belt.

The track consists of 60-pound rails laid on steel clad wood ties. The track is laid the full length of the slope for servicing the machinery under the 250-ton surge bin at the slope bottom. A turnout section is provided with a radius of 158 feet and a 15 degree grade which connects the slope track with the mine track system. Supplies and machinery will be lowered into the mine through the slope. The slope is 1210 feet long.

The slope hoist can be operated either manually or automatically.

ELEVATOR AND FAN SHAFTS

The elevator and fan shafts are 20 feet in diameter and concreted their full depths. Their bottom sections are flared to facilitate air movement and to provide room for other installations. An automatic elevator is provided in the intake shaft and has a capacity of thirty persons. An enclosed and heated ramp leads from the waiting room to the elevator entrance.

The fan shaft is located 3800 feet north of the elevator shaft. Exhaust ventilation is induced by high capacity twin Axivane fans with a total capacity of 600,000 cubic feet per minute. The fans are powered by 400 HP, 4160 V motors. A diesel powered unit is provided as an emergency standby. The shaft is also provided with a circular stairway.

Mine projections have been engineered for efficient mining and good ventilation. The bottom of the shaft was planned to accommodate man trip assemby and supply handling. Adequate parking areas are provided for track vehicles when not in use. Separate entries are utilized for man trip assembly so that vehicles moving to the north and east may be more easily dispatched.

MINING PLAN

The mining plan calls for driving six main headings for intakes and five parallel headings for returns with a 225-foot barrier between the sets. With a few exceptions, all entries and breakthroughs are to be driven on 75-foot centers. Six entries are to be driven in the submains, again on the 75-foot plan, and five entries to the room panels. After driving beyond the barrier at the room panel entrance, the panel entry and breakthrough centers are reduced to 50 feet. Rooms on 50-foot centers will be driven on both sides of the panels to a depth of 200 feet. Rooms on the return side of the panel will be driven as the panel is advanced to its depth of 2500 feet. The remaining rooms will be driven as the panel is abandoned. Present plans do not call for any final extraction at this mine. All abandoned areas will be sealed.

MINING EQUIPMENT

Each production unit is composed of a Jeffrey 120H Heliminer, three Joy 10SC 27B-DC shuttle cars, one dual roof bolter, one belt feeder, and other miscellaneous equipment such as auxiliary fan, rock duster, and pumps as required. The Heliminer cuts a full face 15½ feet wide, and the cutting head retracts to a 13-foot width for tramming. The shuttle cars are a proven machine with high capacity and traction ability needed for this operation. The other equipment complements the prime production units by being dependable proven machines.

MINE TRANSPORTATION SYSTEM

The mine coal transportation system will be composed of conveyor belts. The main conveyor will be a 48-inch wide, roof mounted, rigid frame belt conveyor, dual driven by one 300 HP and one 200 HP, 550 V, wound rotor motors. Starters with five steps of acceleration for each motor are provided. Each drive unit is furnished with a 13,800 V/600 V, 500 KVA power center provided with circuit breaker, under voltage release, ground fault test circuit, and other safety features. Capacity of these conveyor belts will be 1815 TPH at 700 FPM. Maximum length of these conveyors will be 5700 feet.

Submain belt conveyors will be 42 inches wide, roof mounted, rope supported, dual driven by two 150 HP, 550 V, wound rotor motors. Starters with five steps of acceleration for each motor are provided. Each drive unit is furnished with a 13,800 V/600 V, 300 KVA power center with safety features like those of the 48-inch conveyor power center. Capacity of these conveyors is 1175

TPH at 600 FPM. Maximum length of these conveyors will be 5,300 feet.

Room panel belt conveyors will be 36 inches wide, floor mounted, rope supported, tandem drive with a single 150 HP, 550 V, wound rotor motor. A starter with five step acceleration is provided. The drive units are furnished with a 13,800 V/600 V, 150 KVA power center with the standard safety features. Capacity of these conveyors is 565 TPH at 400 FPM. Maximum length of these conveyors will be 2500 feet.

The main conveyor belt will discharge into a 250-ton surge bin at the slope bottom. Coal is fed by a duplex reciprocating feeder onto a 54-inch buffer belt which in turn feeds onto the slope conveyor belt.

For the transportation of men, supplies and equipment, we chose to install a track haulage system. This system is composed of 60-pound rail laid on wood clad steel ties, 3 inches thick, supported on track ballast. This type installation will be used on all track except in the panels where rail will be laid on steel ties. Track will be installed in entries adjacent to belt conveyor entries. Trolley locomotives will be used to move supply cars between the slope bottom and the operating sections. Track ballast cars will be provided to transport and spread ballast. A track mounted tie tamper is provided for track installation and maintenance.

Man trip cars will be used to transport each unit crew to its working section. These cars are equipped with dual drive motors, dual brakes, sanders, and other safety equipment of the latest design. Supervisory and maintenance personnel carriers are also provided.

OTHER FEATURES OF MINE

Water will be piped to all areas of the mine by 8, 6, 4, and 3-inch diameter steel pipe. This system will provide water for fire protection, dust allaying at the face areas and at belt conveyor transfer points, and for other miscellaneous uses. The system is designed to provide adequate pressures and volumes for fire protection without the need of underground pressure or booster pumps.

A maintenance and repair shop will be constructed underground. It will be 26 feet wide and 225 feet long and will be equipped for most repair work short of overhauls.

A mine safety appliances bulk rock dust system has been purchased and is being installed. The bin capacity is 140 tons, and the loading area underground is located so any suspended dust is directed immediately into the returns. Dust is delivered to the

sections by track bulk car. MSA slurry dusters will be provided on each section.

CONCLUSION

Gentlemen, we feel that we have a good operation near Carlinville; one that will help the economy of the area. We feel that Monterey No. 1 Mine has been well planned and that we are off to a good start. By incorporating the most modern planning, equipment, safety devices, and practices into the design of the mine, we are very optimistic about the future. We would like to express our appreciation for all the cooperation we have received from our associates in the coal mining industry and from the equipment manufacturers, as well as the consulting firms who assisted in the planning.

Frank Dillard: Thank you Bill. After seeing all that new plant equipment I am a little bit jealous, but hopefully you'll have a lot of success in the new operation. Are there any specific questions you would like to have placed before Mr. Eads? We are running a little bit behind, but we do have time for some questions. I have one. Since you are associated with an oil company, do you use centralized lubrication system in your plant?

B. F. Eads: We do not have a centralized lubrication system, although we are buying very good products.

Frank Dillard: Do we have any other questions? Well, this brings us to our third paper, which will be delivered by Mr. Aubrey Cornette. He is from the neighboring state of Kentucky. He is also a neighbor of ours because we have an operation in Madisonville. He, like Mr. Eads, is a University of Kentucky graduate. This paper will be entitled "Providence No. 1 Mine—Open Pit Portal," and that may confuse some people who haven't seen this portal. It's a novel installation, and I am sure everyone will enjoy hearing about it, especially those who haven't already learned about this operation. Mr. Cornette is the Director of Engineering and Preparation for the Island Creek Coal Company, and like I said he is a graduate engineer from the University of Kentucky. He has 16 years of mining experience associated with all phases of engineering, and he is a registered professional engineer in Kentucky and Tennessee. So I give you now, Mr. Cornette.

PROVIDENCE NO. 1 MINE—OPEN PIT PORTAL

A. J. CORNETTE
Director of Engineering and Preparation
Island Creek Coal Company, West Kentucky Division
Madisonville, Kentucky

INTRODUCTION

Thank you for inviting me to speak to you about a new mine recently opened by the West Kentucky Division of Island Creek Coal Company. It is called the Providence No. 1 Mine due to its location three miles southeast of Providence, Kentucky. It is unusual in that an open pit was excavated to gain access to the coal seam, replacing coventional shafts or slopes.

Other companies in our area have openings which were dug by open pit methods to expose the coal seam for mining, but Providence No. 1 is unique because it was not excavated by large strip mining machinery. Instead, it was dug by smaller machines and the waste rock was hauled by truck from the pit.

The mine is designed for unit train loading of coal at the rate of 3,000 tons per hour. The first unit train was loaded on February 23, 1970, and trains have been loaded almost daily since that time.

The mine is operating in the western Kentucky No. 9 Coal, which is the same as the Illinois No. 5 Coal. This coal has been mined extensively in western Kentucky for many years, and most mines opened in it recently have been designed for raw coal production. The seam is a good quality utility steam coal. Mining conditions are considered fair, and little water is present. Roof conditions are suitable to be held by bolting in most areas.

At the portal location of the Providence No. 1 Mine (figure 1), the No. 9 Coal is 120 feet below the surface. The opening was started in an abandoned strip pit which had worked the No. 11 Coal. This coal is about 100 feet above the No. 9 Coal at this location. One side of the opening had been strip mined and the other side had been deep mined in the upper seam.

Since the abandoned deep mine contained water, a means had to be devised to assure that water from the abandoned deep mine would not drain into the open pit. To accomplish this, a keyway, about 16 feet wide, was cut through the abandoned mine works on the side exposed to them. This keyway was backfilled with earth and compacted to form a dam around the side of the pit which cut into the abandoned mine. This has proven to be an effective seal against water draining from the old mine into the pit.

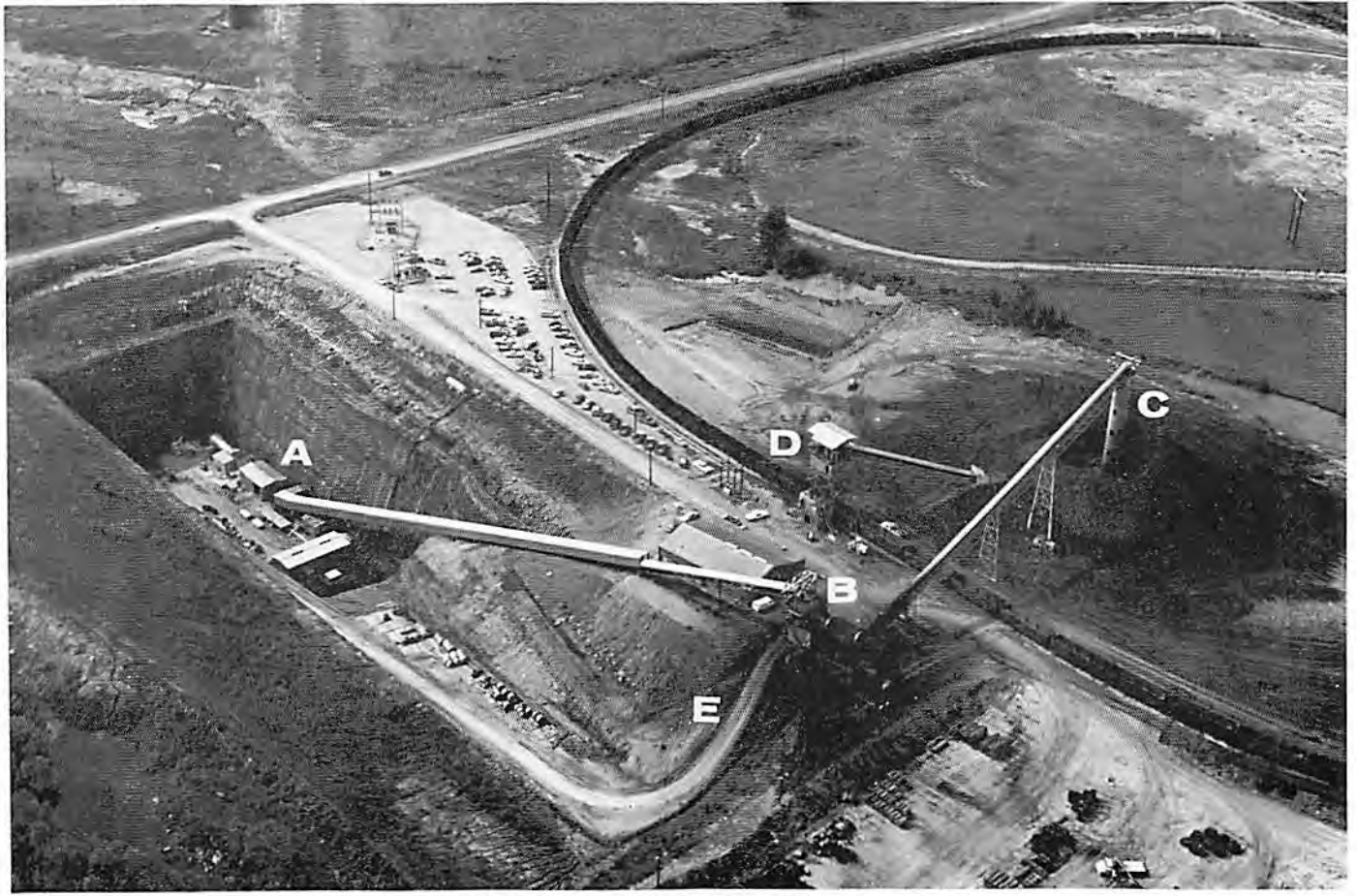


Fig. 1—Providence No. 1 Mine, Island Creek Coal Company. A. Three entries at base of cut. B. Step screen and rotary breaker. C. Lowering tower and storage pile. D. Unit train loading bin. E. Vehicle road into pit.

Strata removed from this box cut excavation contained shale, sandstone, and a layer of limestone about 15 feet below the surface. A geologic section of the pit from the surface to the bottom of the sub grade is as follows: 15 feet of unconsolidated material, 2 feet of limestone, 4.5 feet of coal, 8 feet of fireclay, 2 feet of gray shale, 51 feet of sandstone with shale streaks, 10.5 feet of sandy shale, 24 feet of shale, 5 feet of shale with concretions, 1.5 feet of slate, 5 feet of coal, and 2 feet of fireclay.

PIT EXCAVATION

The pit was excavated at first by bulldozers and scrapers, then as the cut became deeper, material was loaded by a front end loader into 35-ton rear dump trucks and hauled from the pit.

The walls of the sides and ends of the pit were cut by a system known as "pre-splitting". This process, which is used extensively in highway construction throughout the country, helps break a smooth cut through rock. Blast holes were drilled on the outside edge of the cut about 3 to 4 feet apart. Great care was taken to keep these holes aligned with each other and according to the predesigned slope of the walls. These outside holes were drilled in lifts of about 30 feet, then loaded with explosives and shot.

This procedure allows breakage on a line between the outside holes, giving a smooth wall of rock left standing. The inside of the excavation was drilled and blasted in a conventional manner. It was shot hard enough to allow free loading with a 12-yard front end loader and haulage in 35-ton rear dump trucks.

The open cut is 120 feet wide and 300 feet long at the bottom. At one end is a sump 80 feet long, 40 feet wide, and 30 feet deep. The sump was dug by conventional drilling, blasting, and mucking with a track mounted front end loader and a clam shell bucket.

The open pit construction required about 7 months to complete because considerable time was lost during severe winter weather. Construction was started on November 1, 1968 and completed on May 22, 1969. The opening contained 306,000 cubic yards of rock including 3,000 yards in the sump, and 28,000 yards in the keyway.

COAL ENTRIES

After the excavation was completed, three entries were started into the coal from the floor of the open cut. These entries were placed on 70-foot centers and are lined with tunnel liner and a concrete collar. Later a fourth entry was driven from the inside to the outside directly over the sump for additional air intake.

A 7-foot fan, which exhausts air from the mine, is set on one of the entries. The other three entries are used as intakes. The fan is set at about 80 degrees with the entry and directs the air to one end of the pit. An upturn at the end of the fan funnel and a 20-foot stack made of tunnel liner are installed to direct the air out of the pit. This has been done to prevent the air from re-circulating in the pit and being taken into the mine again.

The next entry contains the first 42-inch underground main line belt conveyor. The collar on it was constructed high enough so the conveyor in it elevates to dump onto the slope belt coming out of the pit. This entry also contains the high voltage power cable for the mine's primary electrical system.

The third entry contains the track used to haul men and supplies into the mine. This entry is also a primary air intake for the ventilation system. Track is extended out of this entry onto the bottom of the open pit. Two supply tracks that are located in the pit have connections extending to a small shop and a storage building. A cable reel track locomotive is used for switching supplies in the pit yard. Trolley power begins at the portal of the mine.

The entire bottom of the pit has been covered with a layer of concrete. Supply tracks were laid on steel ties, and concreted in place. The balls of the rails are about 1 inch above the concrete and a slot was made for the wheel flanges. The concrete floor in the pit drains to a 2-foot wide concrete box ditch around the entire pit, through which water runs to the sump.

BUILDINGS

Four metal buildings on concrete foundations and floors have been erected in the pit. One 24 by 60-foot building contains a small repair shop, some parts bins, and a maintenance office. This building has a monorail with a 1 ton traveling hoist that can pick up items from delivery trucks or from the mine supply cars and place them in the building.

A 12 by 12-foot building near the track portal contains bit grinding equipment for sharpening cutting machine, roof drill, and coal drill bits. It is equipped with an automatic cutting machine bit grinder and standard floor mounted grinders that have the necessary dust exhausting and collecting system.

Another 20 by 20-foot building contains the cap lamps, safety lamps, and waiting room. It is located directly adjacent to the track portal for easy pick up of the lamps.

The fourth building which is 24 by 40 feet, is for storage of larger items. It has a 2-ton traveling crane inside that can pick up anywhere in the building. A mine track extends into this building from

the supply tracks for loading rubber rail supply cars. The building is equipped with storage racks and shelves.

Heavier supplies such as rails, roof bolts, timbers, lubricants, concrete blocks, and other items are stored along side the two tracks in the pit. One area is covered with a shed for rock dust storage. Supply trucks and vehicles can travel anywhere in the pit, bringing supplies to the portal. A small rubber-tired fork lift is stationed in the pit for handling supplies. Mining machinery can be hauled directly to the mine portal and loaded on a lowboy for transporting into the mine.

ADVANTAGES OF OPEN PIT PORTAL

Some of the principal advantages of the open pit portal for this mine are worth noting. There is no slope or airshaft required to gain access to the coal seam and provide ventilation for the mine. There is no hoist or operator needed to lower supplies and men into the mine. Company owned or vendor's trucks can bring materials down the 15 per cent grade access road directly to the track portal.

PUMPING FACILITIES

Pumping facilities located in the pit at the large sump are designed and installed to handle runoff water going into the pit. Two vertical turbine deep well pumps, with 2,000 gallons per minute capacity are located on a platform over the sump. These pumps are mounted with 125 h.p. electric drives and pump water through a common 10-inch line out of the pit, discharging into a natural stream. A gasoline-driven centrifugal pump having a capacity of 1000 gallons per minute is installed at the edge of the sump for emergency use. It is primed and ready for use in the event the electric pumps fail. The primary pumps and the sump are designed to handle the amount of water which would run into the pit after a 3-inch rain in one hour. The sump also serves as the source of spray water for the mine.

CONVEYOR SYSTEM

The outside coal crushing and storing facilities are designed to operate at a capacity of 1,000 tons per hour. The system operates all the time the mine is operating since there are no storage facilities in the mine. Coal is delivered from the last underground 42-inch rope frame conveyor to the 42-inch rigid frame slope conveyor coming out of the pit. This slope conveyor operates at 605 feet per minute over 35 degree troughing idlers at a capacity of more than 1,000 tons per hour. It is about 660 feet long and has a vertical lift of 170 feet.

The slope belt discharges into a chute feeding a 6-foot by 16-foot step screen ahead of the breaker. An arrangement is provided to manually move gates at this point to discharge rock into a chute which dumps it onto the ground. This set-up allows rock to be loaded on the underground belt system, transported to the surface, and discharged ahead of the breaker. It is then picked up by a front end loader, loaded into a refuse truck and hauled to the gob disposal area.

The plus 2-inch coal from the step screen feeds the 10-foot by 24-foot rotary breaker. The breaker is equipped with 1-inch thick cast manganese steel screen plates, containing 2.5-inch round openings, bolted to 12-inch wide flange supporting beams. The RPM of the breaker is 14.2. Rock is discharged from the end of the breaker to a 50-ton bin equipped with a 48-inch motorized gate.

A 42-inch, 605 feet per minute stacking belt conveyor, elevated at about 16 degrees from the horizontal, carries the 2 by 0 inch coal to the top of a lowering tower. A suspended tramp iron magnet and belt scale are located near the tail of this conveyor. The 12-foot diameter by 100-foot high reinforced concrete lowering tower contains 22 openings for distributing the coal in a conical pile around it. Without dozing, the pile contains about 38,000 tons.

A reinforced concrete reclaim tunnel is constructed under the base of the lowering tower. It is arranged to employ five vibratory type feeders each rated at 750 tons per hour. Three feeders are located in line with the loading conveyor and two are at right angles to it. The tunnel is constructed to contain a 60-inch loading conveyor on an 18-degree angle from the horizontal. This 630 feet per minute, 3,000 tons per hour conveyor feeds a 120-ton loading bin over the railroad load out station. Live capacity of the storage pile is about 11,000 tons, with a bulldozer stationed there at all times during loading.

LOADING OF COAL

The loading conveyor is equipped with a 60-inch belt scale located in the tunnel for weighing the unit train shipments. This scale utilizes a weight totalizer, ticket printer, and rate indicator. The scale is guaranteed to weigh within .25 percent and has been approved by the Southern Weighing & Inspection Bureau, the railroad, and the customer. It is checked daily and calibrated weekly.

Sampling is accomplished by a primary cutter with a 7-inch opening located at the head pulley of the load out conveyor, which takes 486 pounds per cut, and is timed from 15 to 30-minute intervals. The primary cut is chuted to an automatic coal crusher, which crushes and riffles it at a rate of 2,000 pounds per hour to an 8 mesh lab sample.

Coal from the 120-ton loading bin is fed directly to a horizontal 4-foot by 8-foot motorized gate. Opening the gate directs coal to a motorized chute which loads coal into the railroad cars. This gate can be raised and lowered to accommodate any size rail car. Loading is done by moving the train one direction. This loading arrangement has proven to be effective in trimming a well loaded car.

Controls for the outside system are in two locations. The run of mine slope belt, the rotary breaker, and the stacking belt can be operated from a control room at the breaker building. The entire outside system can be operated from the loadout station control room. From this station, rate of loading can be controlled by regulating the vibratory feeders as well as start and stop control of the entire system. Short-wave radio communication is maintained between the train engineer and the load out control station at all times during loading.

RAIL FACILITIES

The mine is served by the Louisville & Nashville Railroad and is located on their branch line extending from Madisonville, Kentucky to Providence, Kentucky. Since the mine is situated immediately adjacent to the branch line, it was not necessary to construct a new lead line to the mine. A loop track about 6,300 feet long and a passing track next to the branch line, which is about 3,000 feet long, has been constructed. This allows a complete turn-around of the train for the unit train loading without blocking the branch line. Grades on the loop do not exceed 0.8 of one per cent, and horizontal curves are not more than 10 degrees.

In constructing the railroad loop fill, it was necessary to cross two abandoned strip pits. One of these was about 80 feet deep and 300 feet wide on the angle at which it had to be crossed. The rock material out of the open pit was used to fill these strip pits as well as to make the levee for the entire track. It proved to be an excellent fill material.

MINING MACHINERY

The Providence No. 1 Mine has four conventional units of underground mining machinery operating on a two-shift basis. Mining is done with a room-and-pillar system with no pillars taken. Each unit is equipped with high capacity machinery including one mobile loading machine, one universal cutting machine, three shuttle cars, two roof bolting machines, one coal drill, and one ratio belt feeder. Permissible powder is used for shooting the coal. Extra used machinery is employed for rock and clean up work.

Supplies and personnel are transported on a 44-inch gage mine track. Portal buses are used for mantrips, and track personnel jeeps are available for supervisory and maintenance people. Combination rubber-rail supply cars are employed to carry supplies to the sections. At the end of the mine track, the rubber wheels are used to take them to the face with battery supply tractors. Track rails do not extend into the panels.

The underground belt conveyor haulage system consists of 36-inch rope frame conveyors located on each panel section with one mining unit dumping on it. The panel belt conveyors discharge onto 42-inch main line rope frame belt conveyors operating at about 600 feet per minute. These conveyors are the tandem type powered by a dual 100 hp drive arrangement. The 100 hp drive units are interchangeable with identical units that operate the 36-inch conveyors.

ROCK DUSTING

Rock dusting at present is accomplished by track and rubber-tired distributors supplemented by portable units. A bulk rock dust storage system will be constructed in the near future for storing 100 tons of bulk dust in an outside storage tank and discharging it thru a borehole into the mine. A track mounted bulk car will be employed to transport the dust to the working units as well as to rock dust the main line and sub-main entries.

COMMUNICATION

Communication consists of trolley phones on the track-mounted equipment and station phones located on each unit. These units are also located in the shop outside and the superintendent's office at the top of the pit. Other units are located at strategic points in the mine and outside the mine.

POWER SOURCE

The mine receives its power from a utility-owned 5000 kva substation located near the northwest edge of the top of the pit. Island Creek Coal Company purchases power at 7,200 volts and transforms it to 440 volts for operating the outside facility and the underground machinery. High voltage power at 7,200 volts enters the mine through the open pit portal and is transmitted through 8-kv power cable to the working sections. All operating machinery is powered by 440 volt a.c. except the shuttle cars which are 250 volt d.c. It is expected that the 7,200 high voltage cable will supply the mine power needs for its entire life and no overhead transmission lines will have to be constructed.

OPERATION OF MINE

A bathhouse has been constructed near the intersection of the slope conveyor with the top of the pit. It contains change and shower facilities for the men and the foremen, offices for the mine clerk, superintendent, mine foreman, safety personnel, and small supply room. The men walk from the bathhouse down the gallery containing the run-of-mine slope conveyor. The lamp house is at the end of this conveyor gallery and adjacent to the track portal. The slope conveyor has been equipped with an auxiliary drive to operate the belt at 250 feet per minute for men to ride out of the pit.

This mine is not equipped with a supply warehouse since one is located at another mine 16 miles away; however, a large storage yard for supplies and equipment has been constructed adjacent to the open pit and next to the breaker area. It contains ample room for all items needed at the mine such as rails, lubricants, timbers, roof bolts, belt conveyor structure and drives, spare machinery, and many other items. From here the large supplies are trucked into the pit for loading into rubber rail supply cars.

Since the mine operates on two shifts and trains are loaded on two shifts, an operator is employed on each shift to run the unit train facility. He also has the duties of maintaining and overseeing the breaker operation and the outside belt conveyors. One heavy equipment operator and two supply men are employed on each shift. A total of 4 men is employed on each of the first two shifts to maintain and operate the outside facility.

CONCLUSION

The first dirt work on the open pit was begun on November 1, 1968, and coal was exposed by April 1, 1969. The first coal was mined in June, 1969, the first unit train was loaded on February 23, 1970, and the mine had four production units operating by March 16, 1970.

To date the outside crushing and unit train loading facilities have operated in an efficient and effective manner in performing the job for which they were designed to do. The open pit portal has not produced any unsolvable drawbacks, and is performing as planned by our company. It is believed that this manner of opening a mine is economical for seam depths up to 150 feet. Perhaps even greater depths will be practical as shaft and slope sinking costs rise.

Frank Dillard: Thank you Mr. Cornette. I have had the pleasure of flying over that installation and it's really striking. You look at it the first time and you say, well what happened there? It's

a real unique arrangement, and they have done an efficient job as you can see. Of course, they did have the advantage of being able to load raw coal. Are there any questions you would like to direct to Mr. Cornette?

Paul M. Budzak: You say you save 30 thousand dollars a year on hoisting engineering costs; what other savings do you effect?

Aubrey Cornette: You are effecting a savings on time since you do not have to place materials on a slope car and take them off when you get them down. Also, the cost of the open pit construction at this depth is not completely out of line with the conventional slope or shaft. But you do save time, and you do not have clearance problems—you do not have to worry about something being too big to go down the slope.

James Conrad: One good thing occurred to me is that a great deal of the particulate material in the air blowing out of the exhaust fan would tend to settle before it gets above the level of the rim of the pit.

Frank Dillard: Well, air pollution is certainly one of the things we are all concerned with. Our next speaker is Joseph W. Mullan, who is with the National Coal Association of Washington. He will deliver a paper entitled, "Current Status of Air Pollution Legislation and Its Relation to the Coal Industry." Mr. Mullan is the Director of Environmental Affairs of the National Coal Association. He is associated with the American Society of Mechanical Engineers and its Air Pollution Control Committee. He is a member of the Air Pollution Control Association (APCA), he served as Vice-President and Member of the Board of that Association. He is presently chairman of the Coal Utilization Committee, and he serves on the Board of Directors of the South Atlantic Section of APCA. Mr. Mullan is a graduate of the U. S. Maritime Academy and specialized there in engineering. He has worked with the Sun Oil Company as an engineer in the Marine Division, and he spent five years as a consultant with a real estate management firm, designing and constructing industrial water power plants. Since 1955, he has been with the National Coal Association in its Engineering Departments. Most of his work there has been devoted to the evaluation and application of coal as a fuel to industrial and utility power plants. One of his principal functions is to advise fuel users how best to meet or resolve air pollution problems associated with faulty equipment. This is a very timely topic, and now I would like to give you Mr. Mullan.

CURRENT STATUS OF AIR POLLUTION LEGISLATION AND ITS RELATION TO THE COAL INDUSTRY

JOSEPH W. MULLAN
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INTRODUCTION

While the '70's began only ten months ago, we have already witnessed the birth of what many have appropriately named "the decade of the environment." This certainly will be the decade for new legislation—new regulations and hopefully "clean air." Already Washington is faced with legislators playing "pollution politics" to the crowds. Students have redirected their efforts from Vietnam to the cleansing of the environment and everyone including the man on the street has become an environmental expert. This is the decade we all face, but where are we today?

Air pollution is not a new problem. It has been with us for centuries, and while much is left to be done, much has already been accomplished. I will try to make some comparisons which I believe, hopefully, will generate within each of you sufficient concern as to which comparisons are sound.

For example, what is the air pollution situation in Washington, D.C.? Compared with Gary, Indiana it is certainly a very clean city, but there are those who wish to compare it with the pristine air found in the midst of the Allegheny Mountains. While it is my own hope that Washington will never get to the levels experienced within the Gary area, I am also quite sure that it is not going to achieve the air of the Alleghenies.

Certainly this same comparison can be made for many portions of the states in which you are individually involved so that taking this comparison one step further seems a valid one.

"What about the goals stated in the proposed regulations?" For example, what is required to meet the goals suggested by several seemingly well-informed and well-intended citizens?

In the Washington region a recent review by authorities in one of the jurisdictions has stated that to achieve the goals required by these seemingly knowledgeable people will require:

1. Complete elimination of waste material burning;
2. Complete elimination of all coal burning;
3. Complete elimination of all oil burning, both residual and distillate;
4. Complete elimination of all industrial processes.

The agency further noted that additional reduction in emissions, both from autos and aircraft, would be required. And with all of this effort, the goal still may not be met.

Thus, we are faced with an interesting two-sided dilemma. On the one hand, we would have nearly complete elimination of all emissions. Presumably, this would give the Washington area background levels similar to those found in the Alleghenies. This action would be required for a city that has little industry, and where most of the emissions are from political sources. Opposed to this, at the other extreme, we have those who maintain Washington will become a wasteland as a result of the air pollution in the region.

Certainly, I do not wish to leave you with the impression that I favor air pollution, but like you, I must look at the proposed regulations, study the comparisons, and hope the control officials can arrive at a meaningful decision.

PROVISIONS OF CLEAN AIR ACT OF 1967

In any discussion such as this, it is necessary to look back to the Clean Air Act of 1967 and to the mandate it placed upon the National Air Pollution Control Administration. It stated that the NAPCA had the responsibility "to protect and enhance the quality of the nation's air resources so as to promote the public health and welfare and the productive capacity of the population; to initiate and accelerate a national research and development program to achieve the prevention and control of air pollution; to provide technical and financial assistance to state and local governments in connection with the development and execution of their air pollution prevention and control programs; and to encourage and assist the development and operation of regional air pollution control programs."

By now I am sure each of you is about ready to say, "So what!" Let's evaluate the statements, and for brevity's sake, I will relate solely to one item from each of the charges.

Protect and Enhance Air Resources

The first charge is to protect and enhance the nation's air resources. It is the word *enhance* that has developed many questions particularly as it relates to non-degradation of our air. Rather than take sides on this issue, at least in this paper, let me quote to you from a discussion by a control official at a recent regional air quality hearing. "The concept which usually causes controversy in considering air quality standards is the matter of non-degradation of the quality of the atmosphere, primarily in areas where pol-

lution levels at present are very low or almost non-existent. It is natural to desire to keep those areas which are now clean in such condition. However, to establish a standard which will require that there be no increase whatever in pollution levels at any place would imply an ability to control emissions with one hundred percent effectiveness or a prohibition of any additional human activity. Such actions are not possible in most circumstances and, therefore, it becomes necessary to accept some increase in pollution levels at some locations at least as long as population increases continue to occur."

The standards developed at that hearing will hopefully accommodate the two concepts while continuing to allow for the continued demands of the populace.

Gentlemen, this is a comparison which you, particularly those of you in the mining industry, must face today. The non-degradation concept is included in HEW's "Guidelines for the Development of Air Quality Standards," and thus you all will play a major role in this comparison.

Does this mean no new industry for the area? Does it mean only 100 percent pure air industries for the area, or does it mean a reasonableness on the part of all parties to insure the protection and enhancement of the air in that region? Surely, those of you not yet concerned with a designated air quality control region can sit back and relax, but I caution you, not for long. As additional regions are proposed, each of you will very soon have to face up to the issue—"Enhancement"—100 percent control of pollution or population.

Initiate and Accelerate Research

Now let's go to the second charge by Congress to HEW to initiate and accelerate research. Here a comparison is easily made, at least seemingly so, as it came up at every session I've attended in the last year. "If we can put a man on the moon, why can't we clean up the air?" And this is a good question not just to the National Air Pollution Control Administration or to the mining industry but a good question to each of you. Here comparison more truly relates to the establishment of values, and government officials must choose between Vietnam, low income housing, space exploration, transportation, or air pollution control. Industry leaders also face similar decisions—cost of new equipment, the competition from other countries, labor cost, and last but not least, air pollution control. It is far easier to say air pollution should be first in the eyes of legislators and industrialists than it is to accomplish such action.

One firsthand example that each of you may have faced is in convincing your teen-age son that those control devices on his convertible are really necessary when he is only concerned with getting more horsepower out of that "monster" under the hood. The legislators and the industrialists often find that the placing of values is a thankless and tiring activity in which no one is ever happy.

Make the comparison in your own areas of jurisdiction, at your own industrial facility—where do you place air pollution control? I hope it is high on the list.

Technical and Financial Assistance

The third charge is financial assistance. Again many comparisons can be drawn. Is it enough? Is it being used properly? Many feel the need to have the money spent on sampling devices, whereas others wish it spent on groups to stimulate public testimony at hearings. Others say it should be to expand personnel within the agencies themselves, and still others wish it spent in bringing violators into courts. Here I truly cannot say which is wholly right or wrong. I only cite the various comparisons and hope each of you take an active interest in seeing that the money spent in your respective state and local agencies achieve air pollution control.

Regional Air Pollution Programs

The last charge is really the heart of the Clean Air Act of 1967 and is the phrase concerned with "regional air pollution programs." The hearings on the Act developed many discussions of state activities and resulted in the regional concept for interstate situations. Legislators compared the activities and decided the real needs for air pollution control could be best served by attacking those centers of industry and population which represented areas of high pollution potential without regard to state lines. This proposal when compared with the seeming inability of states to solve such interstate situations as in New York City and the surrounding area seemed justified. Getting New York, New Jersey, and Connecticut together had been compared with the Vietnam truce talks. I am still not sure that the comparison solved anything in that area, although recent decisions in West Virginia and Ohio relating to the interstate problems have stimulated continued action by those favoring the interstate concept.

No single portion of the Clean Air Act has drawn more heavily on comparisons than the activities in the interstate air quality control regions. Each is comparing the related jurisdiction's standards and collectively comparing the federal criteria and guidelines and

then trying to develop a satisfactory implementation program. Here, comparison has required many long tiring sessions by state air pollution control boards and commissions, citizens, and industrialists.

The combination of enlightened citizens and availability of federal money has stimulated new and expanded legislation across the land. While much of this has been sound legislation produced by dedicated public servants, like in any other emotional issue, we in Washington, like you in Illinois, soon had to face the typical *White Knight*, who every morning jumped on his horse and rode off in all directions. At times I think the only rhyme or reason behind some of the proposals is the ability to draw a lower line on a chart or to pick a lower number. Excuse me if I sound cynical, but it's indeed unfortunate that the newly found experts in the field didn't take time to look at the many statewide programs that had truly begun the chore of reducing pollution. Let me hasten to add, this doesn't mean copying somebody else's ordinance.

Illinois' early program, devoted to the rational approach of attacking one problem at a time with the combined efforts of government and industry, certainly stands out even though of late this program has been redirected into a long series of adversary proceedings in the courts. Pennsylvania's programs, utilizing Technical Advisory Councils to draft needed legislation, has proven an effective tool to provide sane and workable legislation. West Virginia's approach of selecting those areas of maximum pollution and initiating control legislation is certainly a firm step in demonstrating that states can handle their own problems. And while California hasn't written legislation relating to coal, its efforts in the market place truly put them in a position of leadership. I hope Texas, Michigan, New Jersey, and Massachusetts, just to name a few, will forgive me but time doesn't permit comment on all.

STATE ORDINANCES

What specific legislation have states proposed and established?

1. Smoke—Take your pick of smoke emission, all the way from allowing No. 5 (yes, there is such an ordinance) to allowing no visible emission, or 0 Ringelmann, with No. 2 Ringlemann allowed for existing units and No. 1 Ringelmann for new units seemingly universally accepted, even though manufacturers will not guarantee No. 1 Ringelmann.

2. Fly Ash—Fly ash control too has had many forms. I won't try to complicate this session with pounds per million BTU or micrograms per cubic meter but suffice to say, an ordinance that requires 98 to 99 percent of all dust to be removed from the stack gases is going to require collectors that cost a lot of money to install and

operate. Such levels of control are now being proposed in most states for utility-type boiler plants.

3. Sulfur, Sulfur Dioxide—Sulfur and sulfur dioxide amount to nearly the same form of restriction if measured in the fuel or at the top of the stack. The sulfur limits cover the field from .5 to 3.7 percent depending on (at least the control officials tell me it is depending on) the pollution in the area. Of course, the most popular is 1 percent and while it has provided numerous toxicologists, epidemiologists, and engineers with a good living for the past few years, it is now providing income for lawyers in the form of suits to prove the unconstitutionality, lack of need, and outright ridiculousness of simply copying such a limit because this or that state has it.

EFFECTS OF LEGISLATION

I realize that I have not discussed the effects of this legislation on the coal industry. So far as the coal industry is concerned, the Clean Air Act of 1967, which I have just reviewed, set in motion on a national basis what was already underway in many local areas; namely, the establishment of air quality standards which could conceivably seriously affect major coal markets. Of the more than 500 million tons of coal being produced annually, almost 90 percent was consumed by users who would be affected by sulfur oxide and particulate emission regulations. And most affected would be the coal industry's largest market, the approximately 300 million tons consumed annually by the electric utilities. Since this is by far the fastest growing market for coal there was considerable concern. What has been the impact on these markets in the past two years?

Certainly in such local areas as New York City and northern New Jersey, where, in effect, fuels having sulfur content in excess of one percent have been outlawed, the air pollution laws have had a dramatic impact. Traditional shippers from central Pennsylvania and northern West Virginia have all but ceased deliveries. And other coal companies fortunate enough to have uncommitted reserves of low sulfur coal have benefited. Illinois suppliers to Chicago and St. Louis duplicate this situation, but those coal producers unable to supply low sulfur coal to these areas have not gone out of business. Far from it; they and most other coal companies find they cannot meet the demand for steam coal, irrespective of the sulfur content. So, one might conclude that the impact has been negligible during the two years since the Act became law. But one cannot ignore the future portent—in the near future for the users of electricity and in the long-range for users and producers of electricity and for the suppliers of fuel to power plants.

COUNCIL ON ENVIRONMENTAL QUALITY

The future impact of the air quality legislation on the power industry is difficult to assess because several other factors came into existence this year. These include the President's Environmental Message to Congress, the action by the Council on Environmental Quality, the formation of the National Industrial Pollution Control Council, and the President's most recent proposal now before Congress to combine all aspects of the environment into one Environmental Protection Administration.

The President's message proposed that for stationary sources of pollution:

1. The Federal Government establish nationwide air quality standards, with the states to prepare plans for meeting those standards within one year;
2. The designation of interstate air quality control regions to continue at an accelerated rate to provide a framework for establishing compatible abatement plans in interstate areas;
3. The Federal Government establish national emissions standards for facilities that emit pollutants extremely hazardous to health, and for selected classes of new facilities which can be major contributors to air pollution;
4. That Federal authority to seek court action that is extended to include both inter and intrastate air pollution situations in which, because of non-enforcement, air quality is below national standards, or in which emission standards or implementation timetables are violated; and
5. Failure to meet established air quality standards or implementation schedules can be made subject to court-imposed fines of up to $10,000 per day.

To accomplish this, President Nixon has already established a Council on Environmental Quality which, he stated, "will be the keeper of our environmental conscience." In addition, he established a National Industrial Pollution Control Council composed of the nation's principal industrial leaders. Its purpose will be to "provide a mechanism through which, in many cases, government can work with key leaders in various industries to establish voluntary programs for accomplishing desired pollution-control goals."

PROPOSALS OF CONGRESS

The Senate and the House have both drafted new "clean air" legislation that will, hopefully, go to conference within the next month. While each attacks the basic problem, they do add new means to solve the problem.

The House action follows closely the President's message, but the Senate whose subcommittee is chaired by Senator Muskie, does show some difference in approach. These include proposals for:

1. National Air Quality Standards;
2. Standards of Performance for New Stationary Sources;
3. Standards for Specific Emissions from Existing Plants; and
4. Prohibition of Certain Hazardous Material Emissions.

In addition, the proposal includes sections relating to citizen suits and mandatory licensing.

It is difficult to add much to the above proposals until we see the action they achieve in the halls of Congress; but certainly the intent across the board is a clean environment.

In closing, I must again refer to President Nixon's message in which he very succinctly pointed to the issues at hand. I quote . . . "I will only say that if we succeed in initiating a program that is effective in cleaning up our air and in cleaning up our water and in saving our recreation lands; if we succeed, there will be plenty of credit for everyone. If we don't succeed, who is to blame isn't going to matter."

Frank Dillard: Thank you Mr. Mullan. Are there any questions? We are running a little late. As I see by the clock, it is almost 12. It's nice to know that we do have someone in Washington on our behalf with a sense of humor, as well as the sense of the problem. I would like to thank all of the speakers and to turn the platform back to our President, Mr. Berta.

President Berta: Gentlemen, the meeting stands adjourned and in about 15 minutes we will have our Luncheon Meeting in the room right next door.

LUNCHEON MEETING

President Berta: We hope you had a nice lunch. Let's get on with the program and get you on your way, so we can have a successful completion of our 78th Annual Meeting. At this time we have some distinguished guests that I think possibly some of the people in the audience do not know. At this time I would like to introduce them. I'll start over here on the right-hand side of our guest table. The gentleman on the extreme right is Senior Geologist and Emeritus Head of the Coal Section of the Illinois State Geological Survey. He is an Honorary Life Member of the Illinois Mining Institute, Doctor Gilbert H. Cady. The next gentleman is the Director of our State Department of Mines and Minerals, Mr. David L. Gulley. The next gentleman is Chief Engineer of Old Ben Coal Company of Benton and First Vice-President of Illinois Mining Institute for the coming year, Cecil C. Bailie. The next gentleman is the Chief Engineer of the Sahara Coal Company, member of the Executive Board of the Illinois Mining Institute, Walter Lucas. Next gentleman is a member of the Board of the Illinois Mining Institute, past director of the State Department of Mines and Minerals, Mr. Leon Ruff. The next gentleman is Safety Director of Freeman Coal Mining Corporation, West Frankfort, and was chairman of our Thursday Technical Session, Mr. Paul Budzak. The next gentleman is Assistant Chief and Principal Mineral Economist of the Illinois Geological Survey and also a member of our Board of Directors, Hubert E. Risser. The next gentleman, Head of our Coal Section of the Illinois State Geological Survey, and I know everyone here has a pretty good feel for Hoppy, Dr. M. E. Hopkins. The Secretary-Treasurer does all the work, takes care of all the problems, and makes the President look good. Starting over on our left, we have one of our speakers this morning. Some of you folks may not have been in at the session, but at this time I would like to introduce James W. Conrad of Apt, Bramer, Conrad & Associates of Pittsburgh, Pennsylvania. The next gentleman was also one of our speakers this morning, B. F. "Bill" Eads, Technical Services Manager, Monterey Coal Company, Carlinville. The next gentleman was also a speaker this morning, Mr. Aubrey Cornette, Director of Engineering and Preparation, of the Island Creek Coal Company, West Kentucky Division, Madisonville, Kentucky. The next gentleman is with the Illinois State Geological Survey and is a past Secretary-Treasurer and Honorary Life Member of the Illinois Mining Institute, George M. Wilson. The next gentleman is General Manager of the United Electric Coal Company, Chicago, Illinois, our new President-Elect, R. F. Donaldson. I don't know if they are here for sure, but let me mention that we have four new board members, Mr. Risser and myself, Mr. H. C. Morton of Monterey, and H. V. Harrell of Free-

man Coal. Are Harrell and Morton here in the audience? Those are our four new board members for the Illinois Mining Institute for next year.

At this time I think it is only proper that we recognize some other good hard workers in our organization. Thank goodness they are always here helping and manage to make this thing continue to roll in real good style, the ladies that help us out down at the registration desk. At this time I would like to introduce them. They are Mrs. Betty Conerty, Miss Velda Millard, Mrs. Alton Vigal, Mrs. Mary Fortune, and Mrs. Joseph Tabor.

I want to be sure that everybody here or at our Technical Session and Business Meeting this morning know or have seen the students that are attending the various colleges, several of which hold IMI scholarships. I would like to have Dr. Rollins of the University of Missouri at Rolla introduce his students if he would please. (*Dr. Rollins introduced the following students: Michael Barry, Ray Colombo, Calvin Konya, William R. Mallicoat, Emil J. Teisa, and Forrest A. Younker.*)

President Berta: Thank you Dr. Rollins. Now from the University of Wisconsin in Platteville, Professor Dixon. (*Professor Dixon introduced the following students: Thomas S. Cushman, William Dixon, Dennis Emley, William Hake, Terry Hird, Pete Moffett, Ray Richardson, and Dan Steinhoff.*)

President Berta: Thank you Professor Dixon. At this time if you would all please stand, I would like to read the list of the names of the gentlemen who were members of the Illinois Mining Institute and who have passed away in the last year and in respect and consideration for these gentlemen have a moment of silence. Would you please stand. They are A. H. Armitage, John A. Bell, G. L. Beaumont, C. H. Hodgson, Ray L. Kaga, Merl C. Kelce, William Von Meding, Harold R. Wanless, Hugh White, James A. Graham, George Kostbade, Harold Richmond, and Walter C. Gill. (*Standing minute of silence.*) Will you please be seated. At this time I would like to turn the microphone over to Mr. C. C. Bailie, who has a very pleasant chore to take care of.

C. C. Bailie: Thank you Joe. This next order of business is one that is indeed a pleasure for me and an honor for me to perform. We are going to award an Honorary Life Membership to the second person whom I was ever acquainted with in the Illinois coal industry. One who introduced me to the industry, one who dedicated a half century of his life to the coal industry predominately in this State. We had to have his wife and friends tell a few white lies in order to be sure he would be here without giving the secret away. So, without further ado, it's a great privilege for me to pre-

sent to Mr. J. W. MacDonald, former Vice President in charge of Engineering of Old Ben Coal, the youngest retired consultant with the organization, an Honorary Life Membership with this organization. Mac, if you would come forward at this time. This award reads, "Honorary Certificate of Life Membership with Illinois Mining Institute, Founded February, 1892." This certifies that J. W. MacDonald is a qualified Life Member of the Illinois Mining Institute, an organization devoted to the building of the mining industry. Witnesses sealed said Institute with signatures of the President and Secretary this 23rd day of October, 1970. Congratulations, Mac.

Fig. 1—Mr. J. W. MacDonald (left) receives Honorary Life Membership Certificate from Mr. C. C. Bailie.

J. W. MacDonald: Ladies and Gentlemen, I want to return a compliment. Mr. Bailie was my assistant for a number of years, and before my retirement, I was able to tell the folks in Chicago that I had never worked with, for, under, or over an engineer that I thought as much of, as Mr. C. C. Bailie. I really enjoyed working with him, it wasn't over him, we worked together. We enjoyed working for Old Ben, and I do want to put a plug in for Old Ben. I can say this, I had six jobs in six years, anthracite, Illinois Central Railroad, C. and A., Arkansas highway work, and then I got down there with Old Ben, January 28, 1920. I enjoyed 47 years, five months and three days on my next and last job that I have

fulfilled. Included among the activities was being President of this organization one year, which I thoroughly enjoyed then. I am more than happy to see and find out today that my former assistant is now your Vice-President, and another year or so he will head this organization. Thank you Ladies and Gentlemen, and thank you Mr. Bailie.

President Berta: Now at this time, I would like to introduce our guest speaker for the luncheon. He is quite a gentleman. I have a list here a mile long, but I am really going to condense this. It was at his request. He said, "Let's make this simple and get to the point."

One of the nation's foremost experts on urban affairs and metropolitan politics, Dr. Norton E. Long, now holds the position of Curator Professor of Political Science and Director of the University of Missouri at the Center of Community and Metropolitan Studies in St. Louis.

He is the former director of the Institute for the Study of Violence at Brandeis University, where he also served as chairman of the Department of Politics.

Recently, in commenting on Dr. Long's appointment, the Chancellor of the University of Missouri at St. Louis, Glen R. Driscoll, said, "He is truly one of a small handful of leaders in the fields of political science and urban affairs."

From 1964 to 1965 Dr. Long was a senior associate at the Harvard-Massachusetts Institute of Technology Joint Center for Urban Studies, and before that he served as a special consultant to the Governor of Illinois (1961–63). For five years (1959–64) he was director of education at the Transportation Center of Northwestern University.

His government service includes two years (1946–48) as Assistant Administrator of the National Housing Administration, and from 1942 to 1946 he was Assistant to the Administrator of the Office of Price Administration. He also served, from 1942 to 1947, as a consultant to the Defense Production Administration.

Dr. Long has authored more than 40 articles for scholarly publications, most of which deal with urban affairs, metropolitan politics, community government, or public administration. He has held teaching positions at Northwestern, Michigan State, Western Reserve and Harvard Universities, and at Mt. Holyoke and Queens Colleges. He is presently political science editor for Dorsey Press.

Curator Professorships were established in 1968 by the University of Missouri Board of Curators to attract outstanding scholars with established reputations to prestige faculty positions on each of the four campuses. Dr. Long is only the second scholar to be

designated a Curator Professor. Ladies and gentlemen, Dr. Norton E. Long.

(*A very informative and timely discussion of "Politics and the Environment" was given by Dr. Long. The text of this talk is not published here. Dr. Long emphasized the need for reason in working out the problems facing our industry and its relation to the environment.*)

President Berta: Thank you Dr. Long. It was very informative and enlightening, and we appreciate your comments. At this time, I would like to express my appreciation of the privilege and pleasure of having been able to serve you gentlemen as your President, and at this time to turn over the gavel to the incoming President for the coming year, Bob Donaldson.

Bob Donaldson: I want to thank everybody for giving me this fine honor, and I will do my best to maintain the high standards that have been set by the past administrations. And I am sure you know that this Illinois Institute is one of the finest and well organized and well run organizations among several states. Now I would like to take this opportunity in your behalf to present the past President, Mr. Berta, a nice little souvenir gavel so he can look at it and think of all the work he did this year. And now, the meeting stands adjourned. We hope to see you all back next year.

Meeting Adjourned

Fig. 2—President-Elect Bob Donaldson (right) presents souvenir gavel to President Joe Berta.

CONSTITUTION AND BY-LAWS

Adopted June 24, 1913
Amended Nov. 12, 1926
Amended Nov. 8, 1929
Amended Nov. 8, 1935
Amended Oct. 21, 1938
Amended Oct. 23, 1964
Amended Oct. 23, 1970

ARTICLE I.

Name and Purpose.

The Illinois Mining Institute has for its object the advancement of the mining industry by encouraging and promoting the study and investigation of mining problems, by encouraging education in practical and scientific mining, and by diffusing information in regard to mining that would be of benefit to its members.

ARTICLE II.

Membership.

Section 1. Any person directly engaged or interested in any branch of mining, mining supplies, mining appliances, or mining machinery may become an active member of the Institute. Any person desiring to become a member of the Institute shall fill out a blank for that purpose, giving his name, residence, age and occupation. This application shall be accompanied by one year's dues of $3.00. Each application for membership shall be submitted to the Executive Board, who shall make an investigation as to the qualifications of the applicant, and shall be authorized to elect to membership and issue a certificate of membership to such applicant subject to the ratification of the next regular meeting of the Institute.

Section 2. Any person of distinction in mining may be elected an honorary member of the Institute by two-thirds vote of the members present at any regular meeting. Any member who has been an active member of the Institute and shall have retired from active business in mining may become an honorary member.

Section 3. The annual dues for active members shall be $3.00 and any person in arrears on August 1, of the current year, after having been sent two notifications of dues, shall be dropped from membership. Members in arrears for dues will not receive the printed proceedings of the Institute.

Section 4. Any active member may become a life member by the payment of $50.00 and shall be exempt from further payment of dues during his lifetime.

ARTICLE III.

OFFICERS.

Section 1. The officers shall consist of a President, First Vice-President, Second Vice-President, Secretary-Treasurer and twelve Executive Board members. The services of all officers shall be without compensation.

Section 2. Nominations for officers and the executive board shall be made by nominating committee of three (3) appointed by the President at least thirty days before the annual meeting, provided that anyone can be nominated on the floor of the meeting for any office for which an election is being held.

Section 3. The President, First Vice-President, Second Vice-President, and Secretary-Treasurer shall be elected by ballot, annually, at the regular meeting and shall hold office for the ensuing year.

Four Executive Board members shall be elected by ballot, annually, at the regular meeting and shall hold office for the ensuing three years.

Section 4. In case of death, resignation, or expulsion of any officer, the executive board may fill the vacancy by appointment until the next regular meeting, when the vacancy shall be filled by regular election. In case of a vacancy in the office of president, the duties shall devolve upon the First Vice-President.

Section 5. The executive board shall consist of the officers and twelve other board members.

ARTICLE IV.

DUTIES OF OFFICERS

Section 1. The President shall perform the duties commonly performed by the presiding officer and chairman. He shall, with the Executive Board, exercise a general supervision over the affairs of the Institute between sessions.

Section 2. The First Vice-President shall preside in the absence of the President and perform all the duties of the President in his absence. The Second Vice-President shall perform all duties of the First Vice-President in the absence of the First Vice-President.

Section 3. The Secretary-Treasurer shall keep a record of each meeting, shall read and file all resolutions and papers that come before the Institute, sign all orders for money, and shall purchase necessary supplies.

He shall keep a true record of all money received by him and payments made on account of the Institute. He shall pay out no money except on an order signed by himself, and shall retain these orders as vouchers. He shall give bond in such sum as the Institute may provide, the premium on said bond being paid by the Institute.

He shall act as editor-in-chief for the Institute and may furnish

the newspaper and other periodicals such accounts of our transactions and discussions as are proper to be published. His own judgment is to prevail in such matters unless objection is lodged at a regular meeting or by the executive board.

The retiring President shall act ex-officio in any capacity for the ensuing year.

Section 4. The President shall appoint an auditing committee annually to audit the accounts of the Secretary-Treasurer, and said audit shall be submitted to the annual meeting of the Institute.

Section 5. The Executive Board shall perform the duties specifically prescribed by this constitution; it shall supervise the expenditures and disbursements of all money of the Institute, and no expenditure other than current expenses shall be authorized without first having the approval of the Executive Committee; it shall act as program committee for each meeting to determine what is to be published in the proceedings and shall perform such other duties as may be referred to them by regular or special meeting of the Institute.

ARTICLE V.

Meetings.

Section 1. The annual meeting shall be held in the fall of each year and on such days and in such places as may be determined by the executive board of the Institute. Notice of all meetings shall be given at least thirty days in advance of such meetings.

Section 2. Meetings of the executive board shall be held on the call of the president, or at the request of three members of the executive board, the president shall call a meeting of the board.

ARTICLE VI.

Amendents

Section 1. This Constitution may be altered or amended at any regularly called meeting by a majority vote of the members present, provided notice in writing has been given at a previous annual meeting of said proposed change of amendment.

ARTICLE VII.

Order of Business

At all meetings, the following shall be the order of business:

(1) Reading of minutes.
(2) Report of executive board.
(3) Report of officers.
(4) Report of committees.
(5) Election of new members.
(6) Unfinished business.
(7) New business.
(8) Election of officers.
(9) Program.
(10) Adjournment.

ARTICLE VIII.

Dissolution

In the event of complete dis-

solution of the Institute, the cash assets of the Institute will be distributed to the University of Illinois at Urbana and the University of Missouri School of Mines, Rolla, Missouri, in a ratio of four to one respectively, for support of scholarships in Mining Engineering. Equipment will be donated to any not-for-profit organization that the Executive Board may determine to be worthy recipients.

(See Minutes of Friday Morning Business Meeting for proposed changes in Constitution.)

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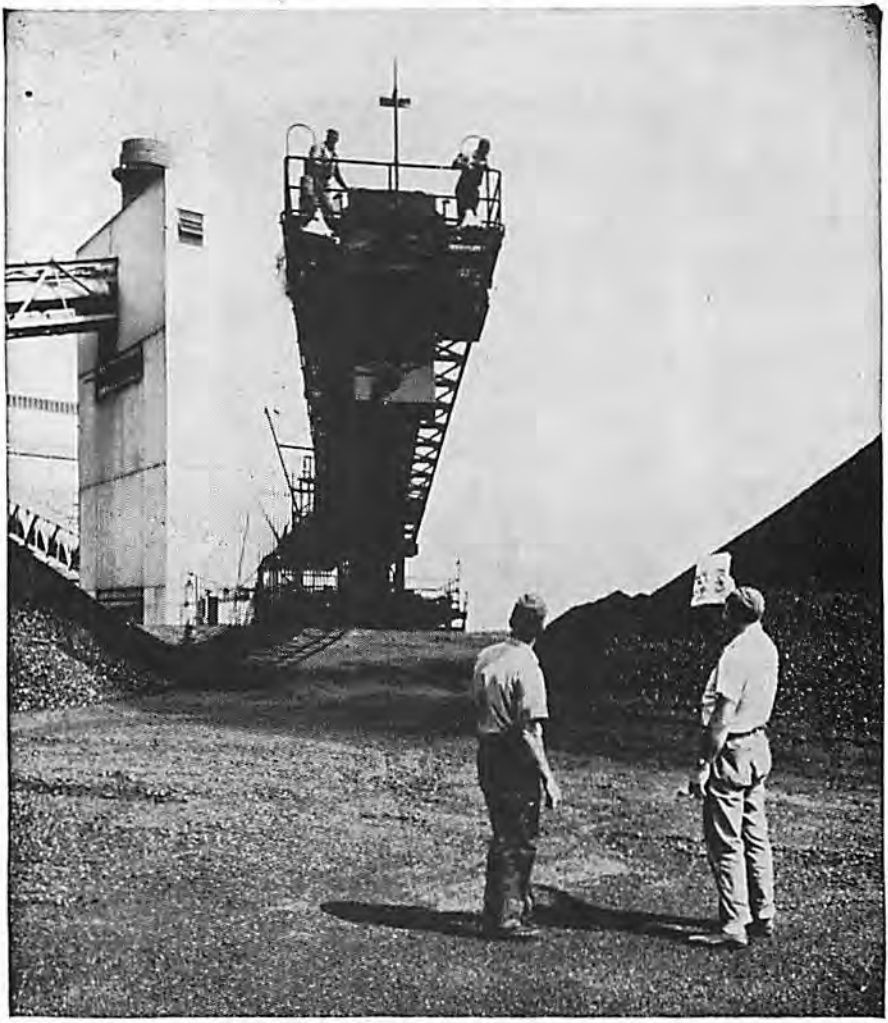

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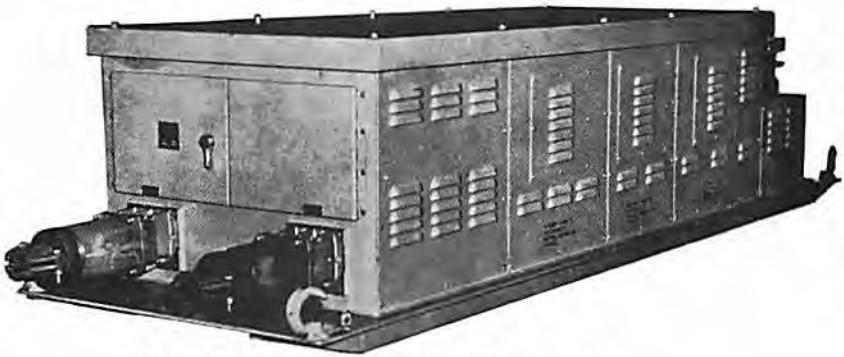

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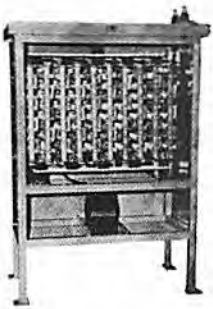

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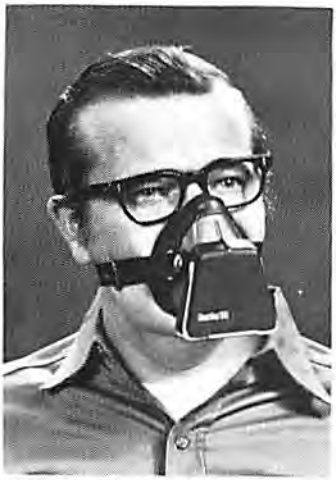

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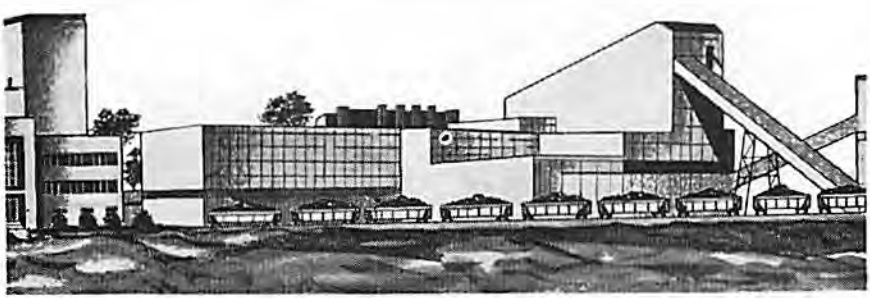

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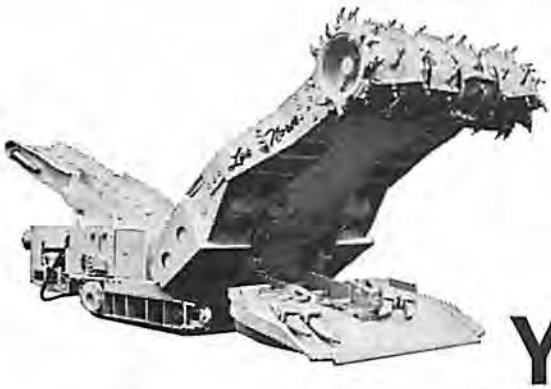

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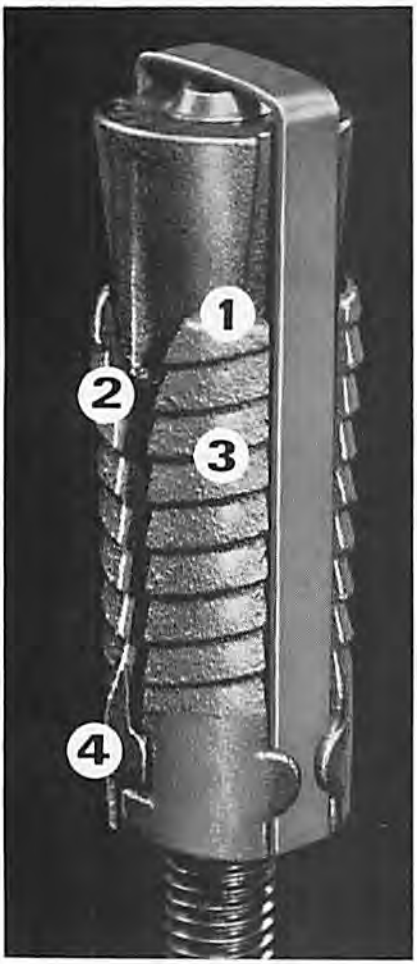

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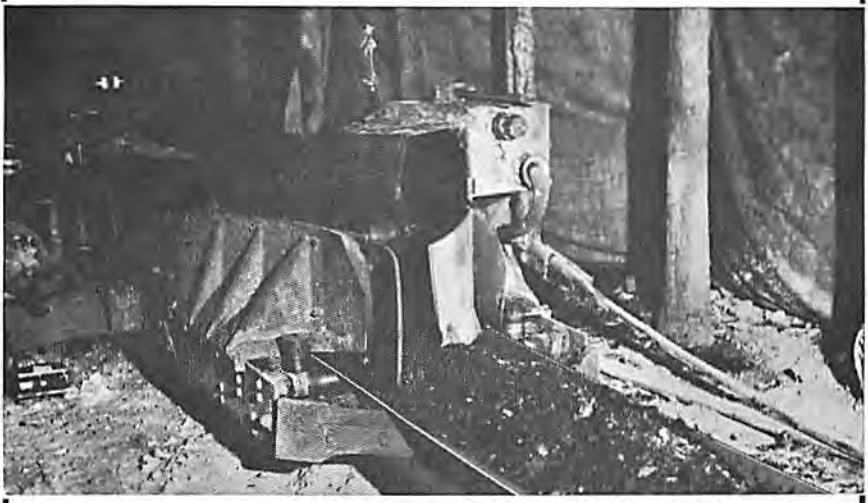

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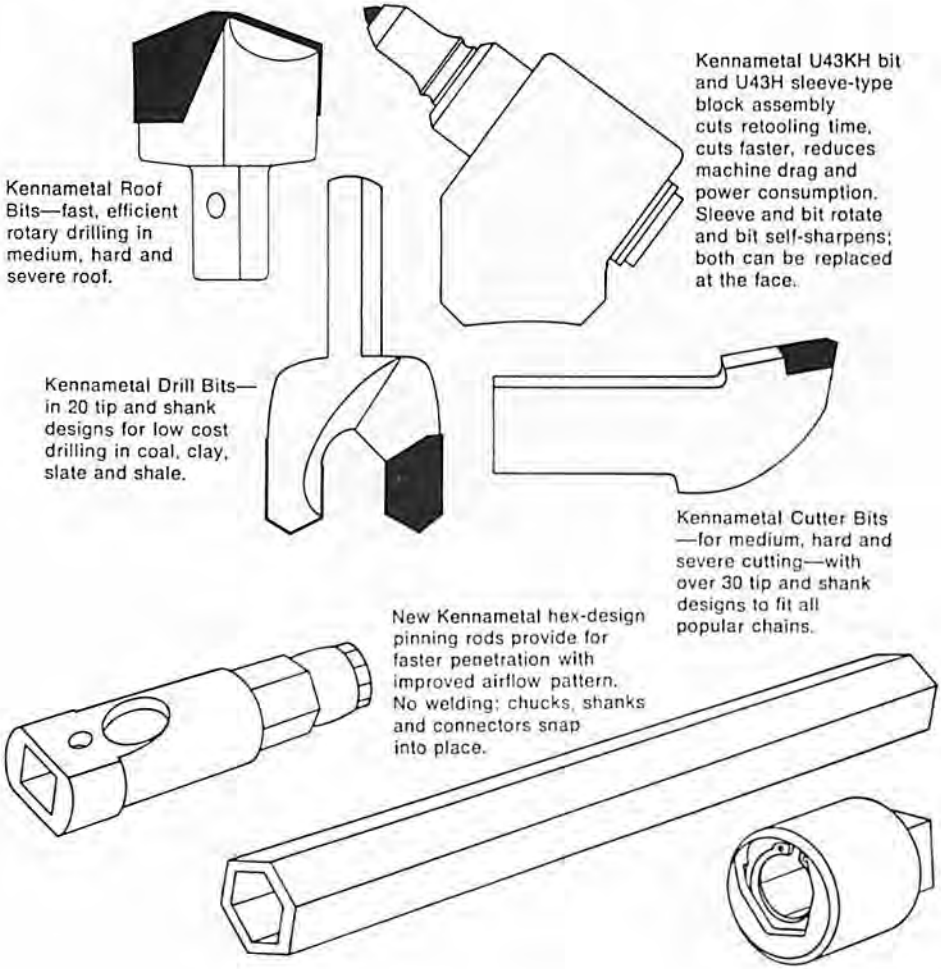

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expands its Illinois coal mining resources to serve midwestern utilities, steel plants and basic industries.

ROBERTS & SCHAEFER
in coordination with Freeman's staff helped complete the several stages of this project at a pace consistent with Freeman's operating and marketing requirements.

Orient No. 6 in Jefferson County, Southern Illinois, is now in full operation. This is the 9th mine operated in Illinois by General Dynamics' subsidiary companies. Robetr & Schaefer has been assigned engineering and construction responsibilities at 7 of these Freeman and United Electric properties.

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A floodloading station for fast, efficient unit-train shipments is supplemented by a random loading system to accommodate special purpose and small volume accounts.

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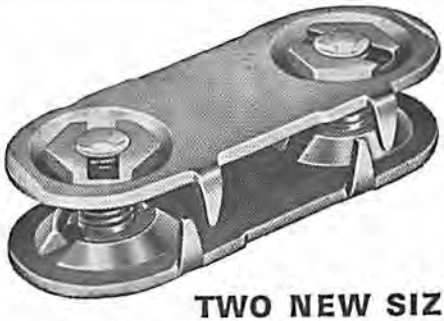

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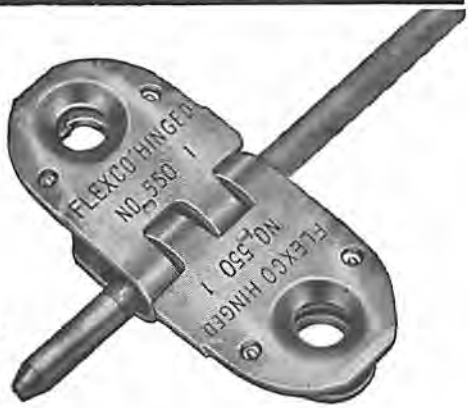

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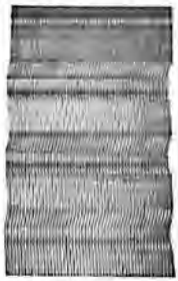

Hendrick Cascade Wedge Wire Screens—unexcelled for screening and dewatering coal. Cascade's unique "step" construction eliminates flooding caused by overloads... increases the weight of solids processed as well as the amount of water in screen underflow. Can be mounted on any equipment presently using profile type screens. Openings from ¼ to 1½ MM in stainless steel.

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TAPERED "12" is ideal for heavy-duty dewatering service on shakers and vibrators; in chutes, drags, sluiceways; in wash boxes and heavy media separators.

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PROFILE D. For heat dryers and dewatering of irregular shaped grains; also for retarding surge of water and material.

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Hendrick produces a complete line of perforated screens for every type of Centrifugal Dryer.

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3/64"	20-18
1/16"	16-14
3/32"	16-14

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Users think we're going all out with our new all-steel expansion shell

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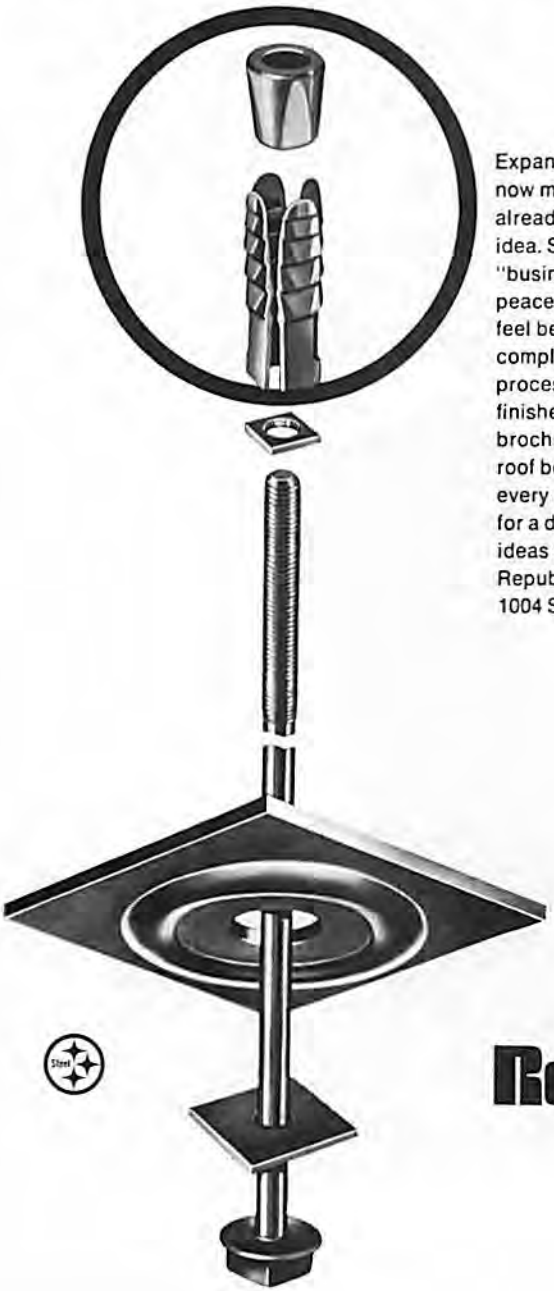

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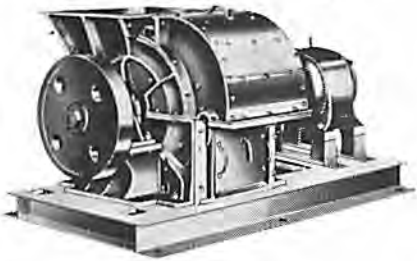
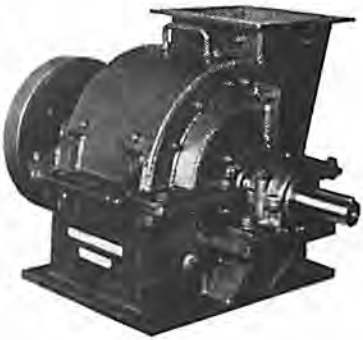


The "S" type crusher for reducing efficiently R. O. M. or lump to screenings in one operation. These crushers were designed to give constant and continuous operation.



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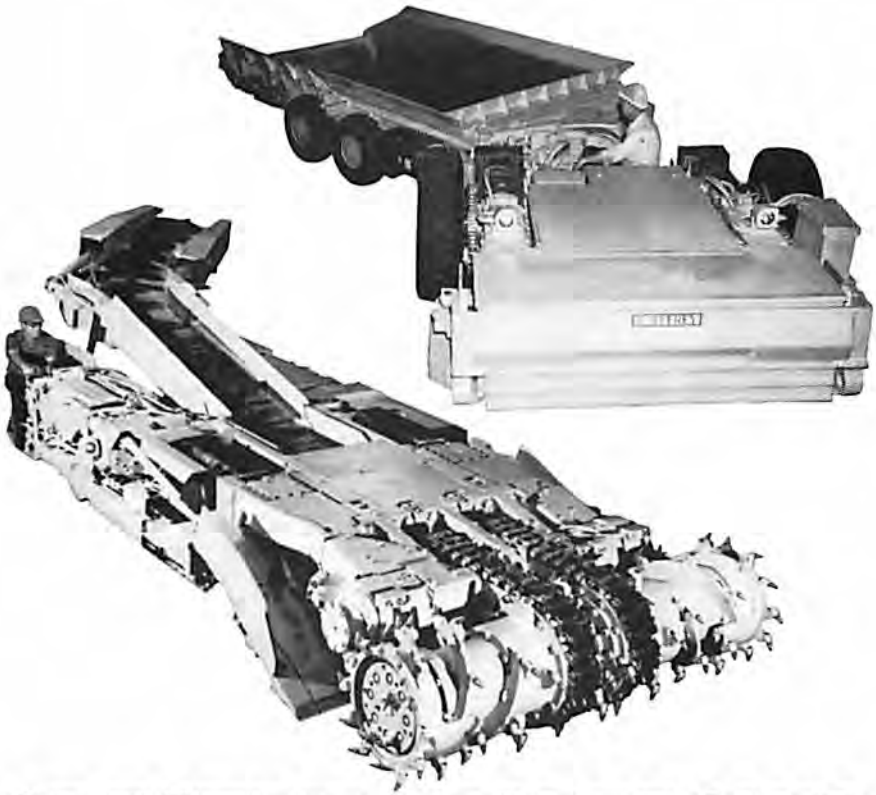

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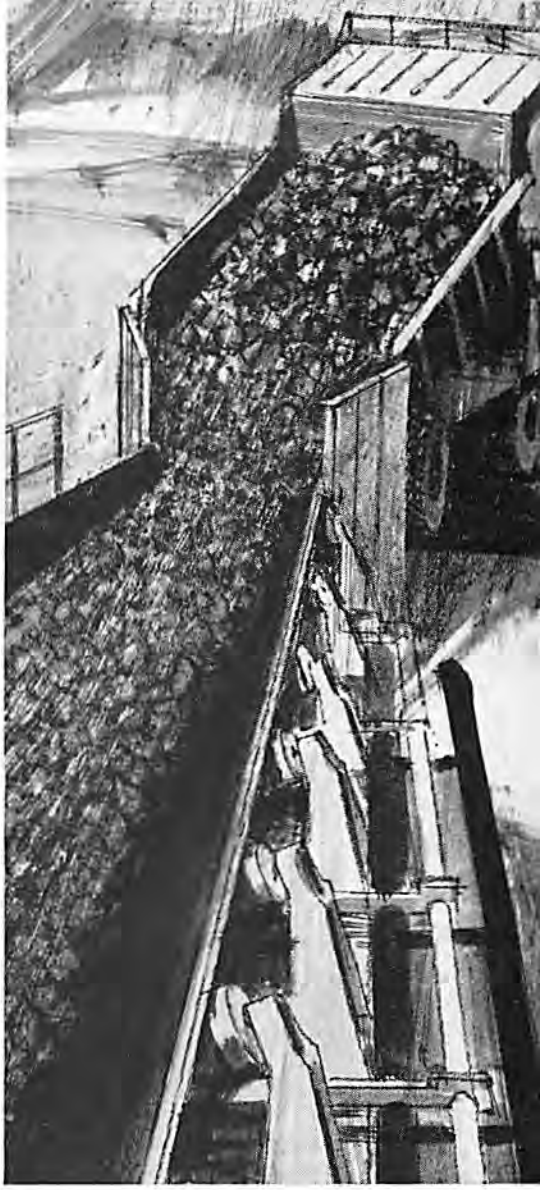

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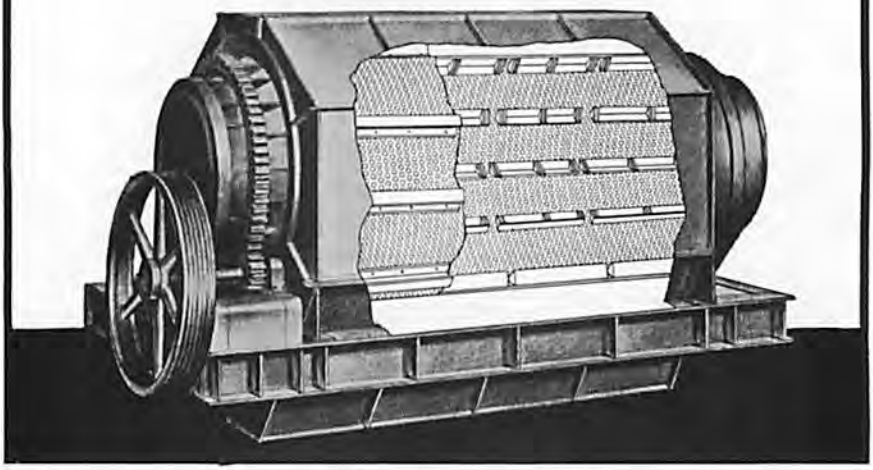

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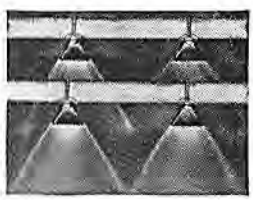

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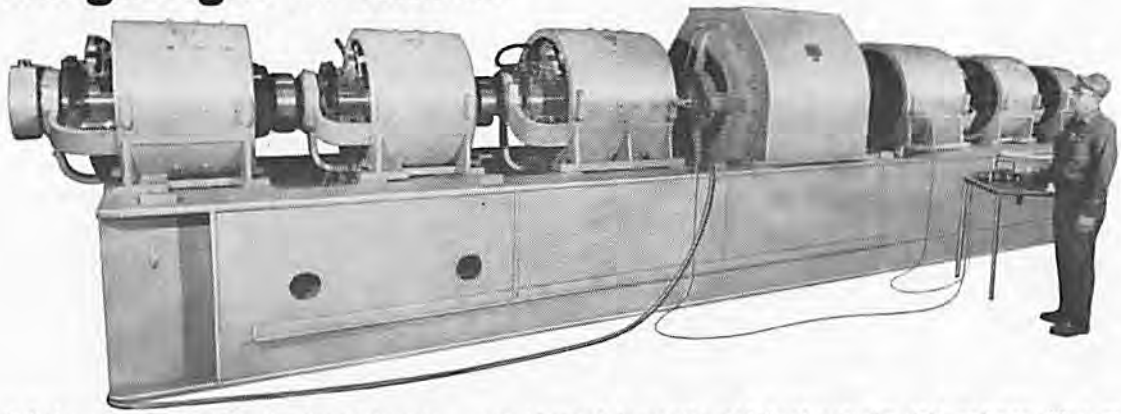

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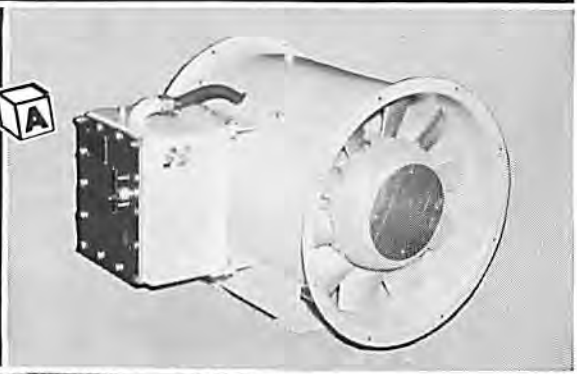

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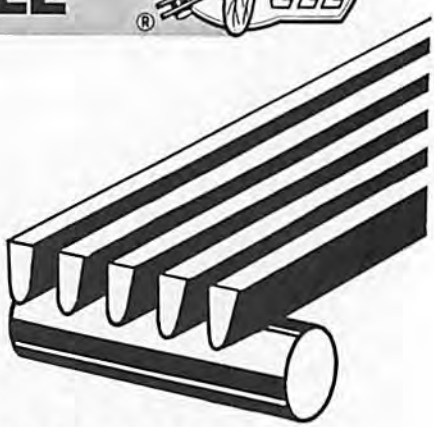

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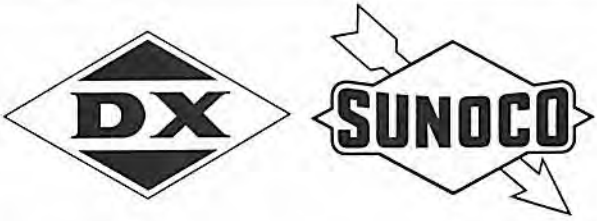

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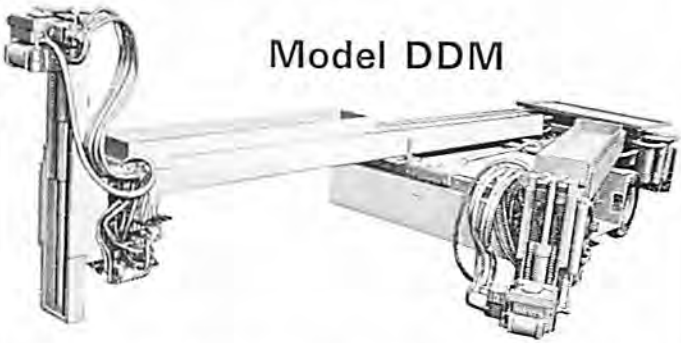

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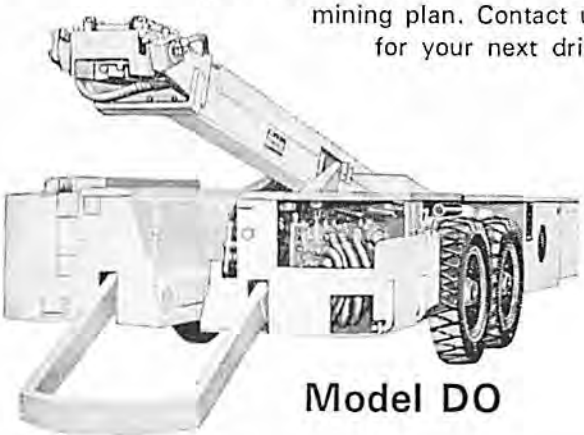

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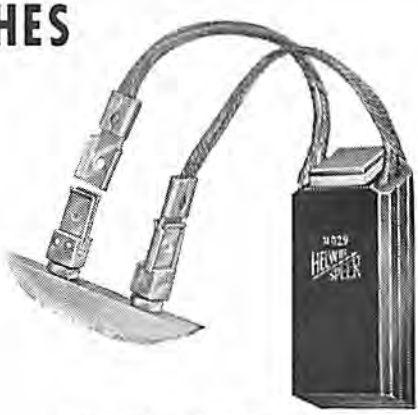

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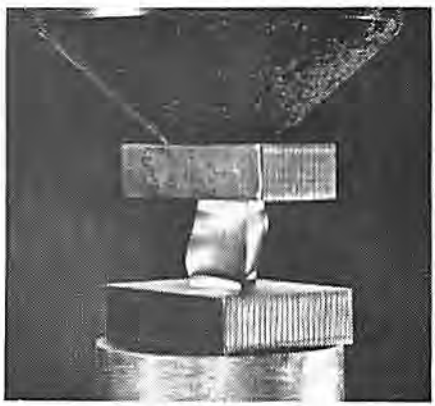

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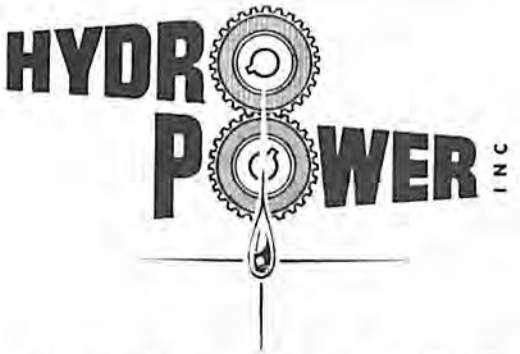

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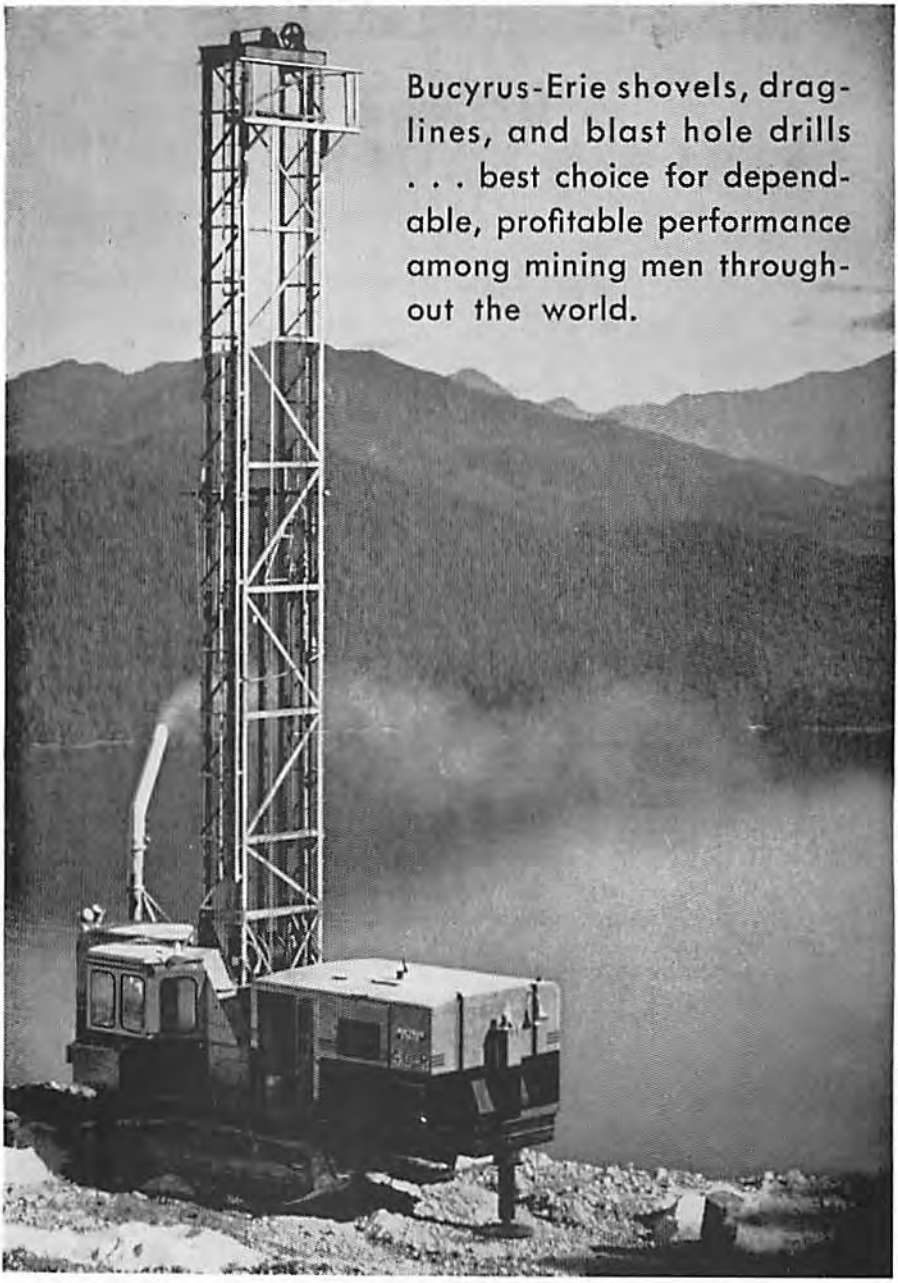

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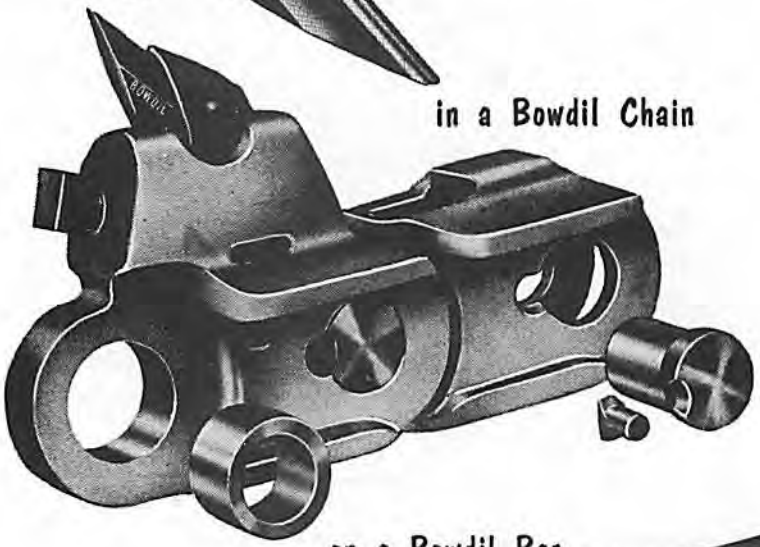

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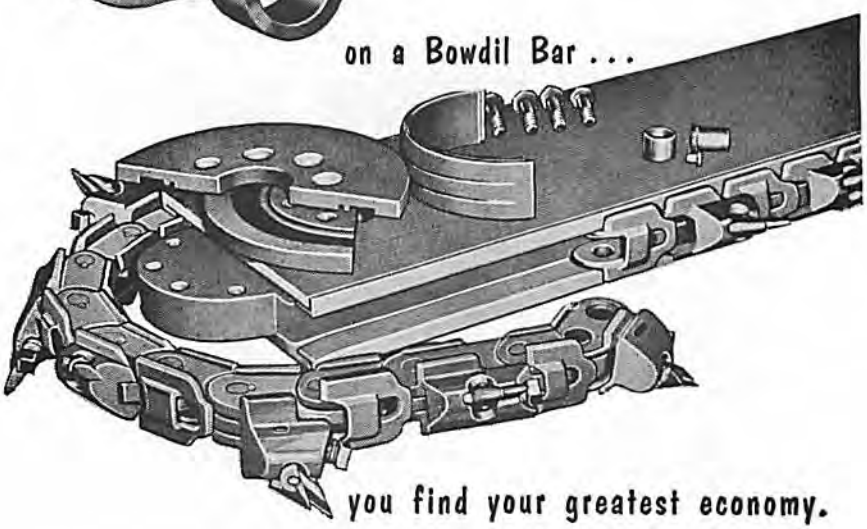

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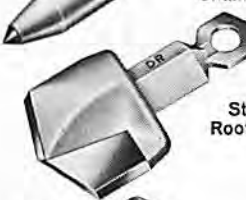

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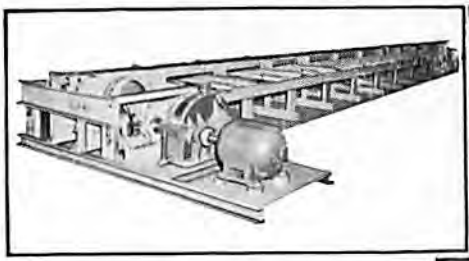

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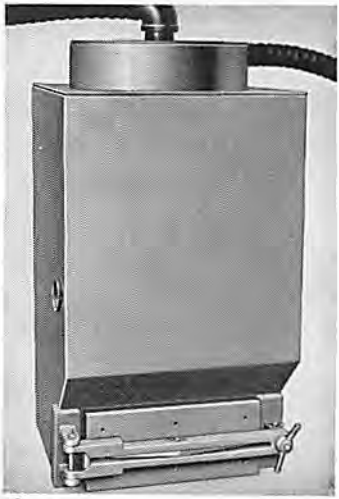

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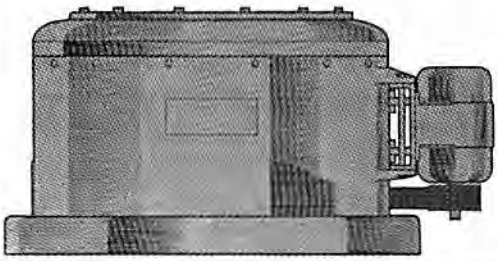

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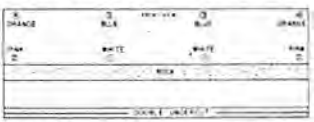

Delay shooting gives relief for all holes. Four delay periods and double undercut reduce impact on roof and rib lines.

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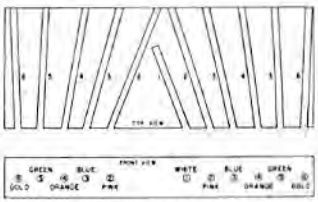

Center "V" technique gives relief for shooting "from the solid." Six to eight delay periods pull full face, increase production per cut.

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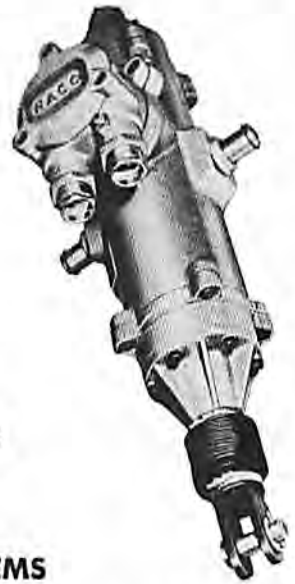

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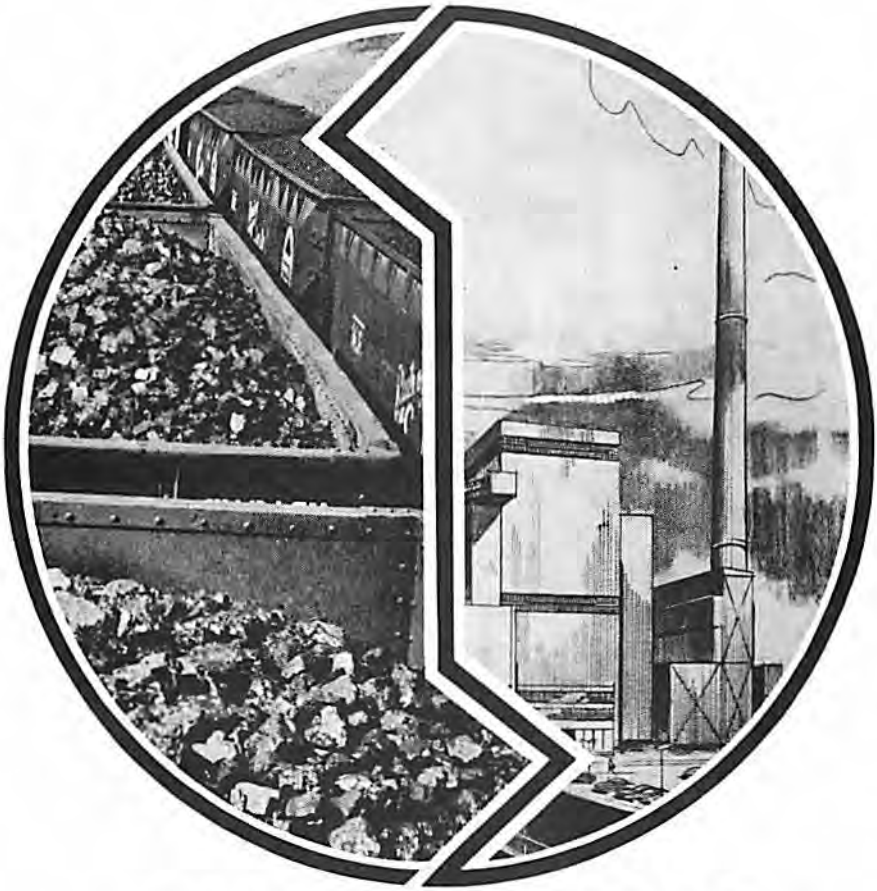

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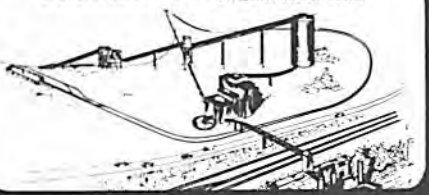

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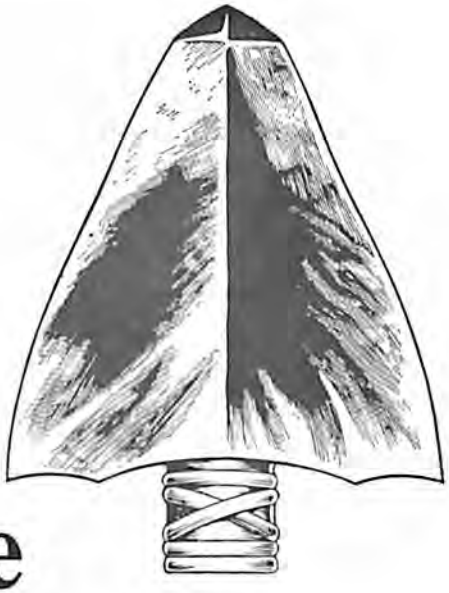

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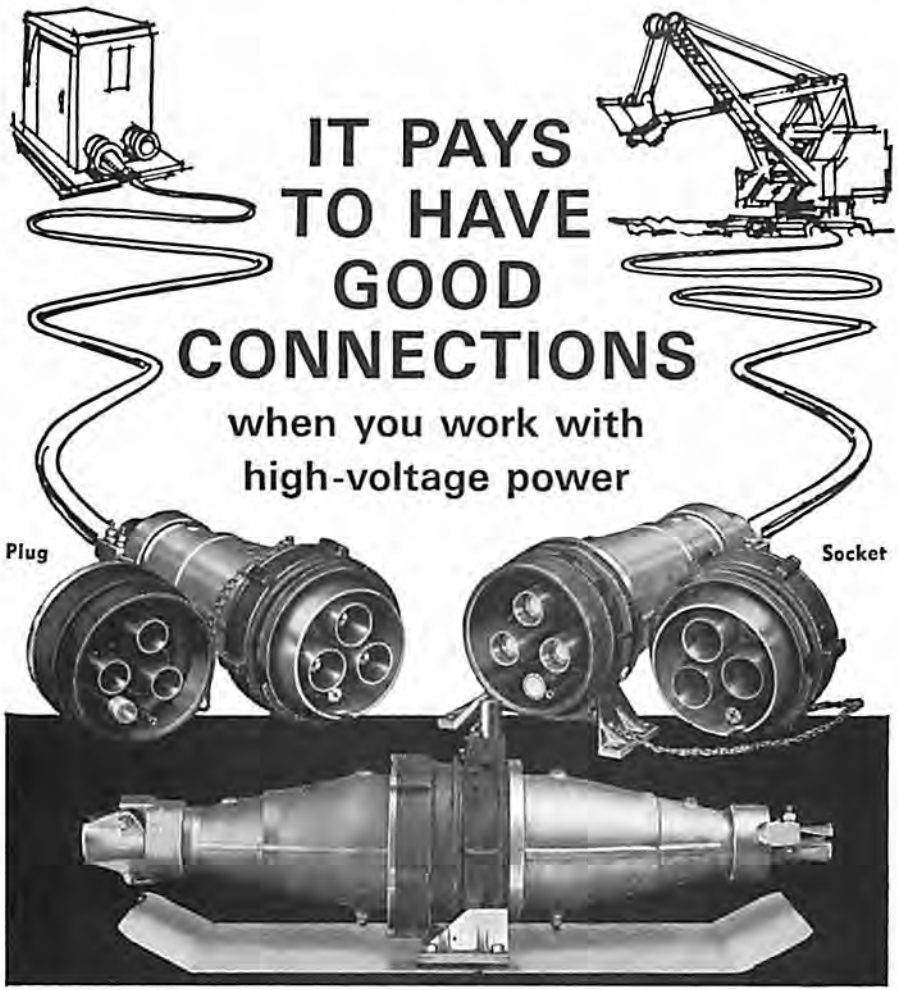

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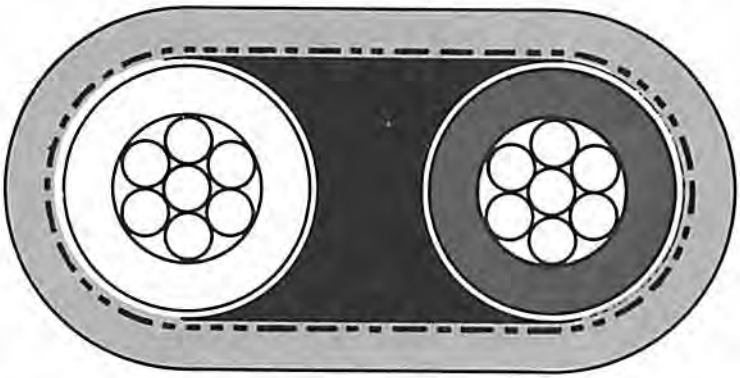

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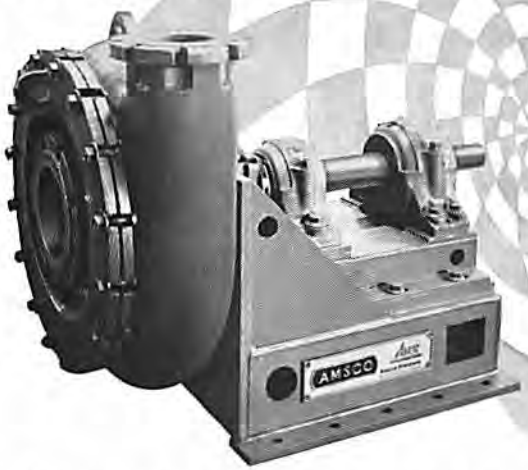

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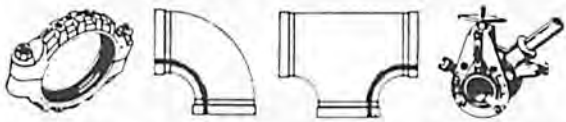

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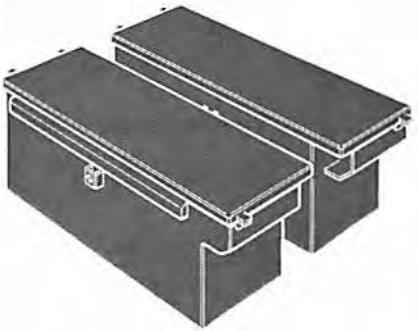

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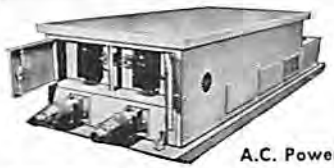

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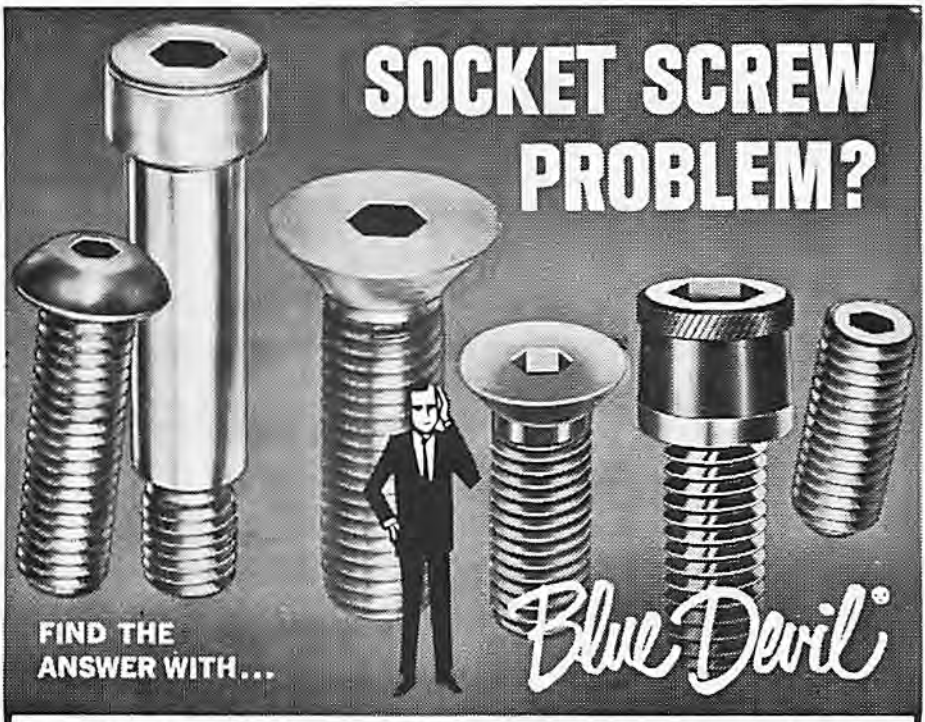

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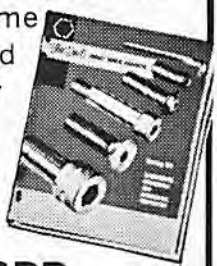

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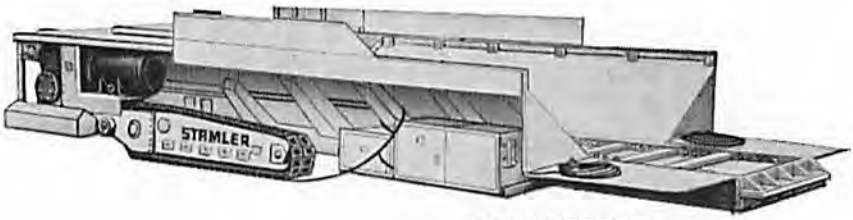

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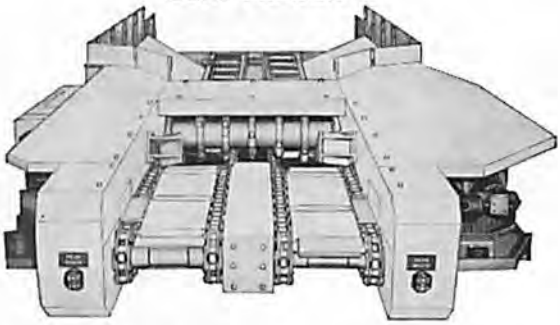

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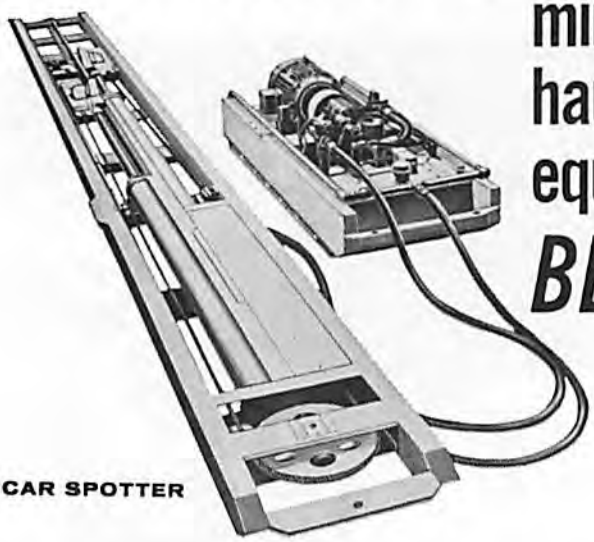

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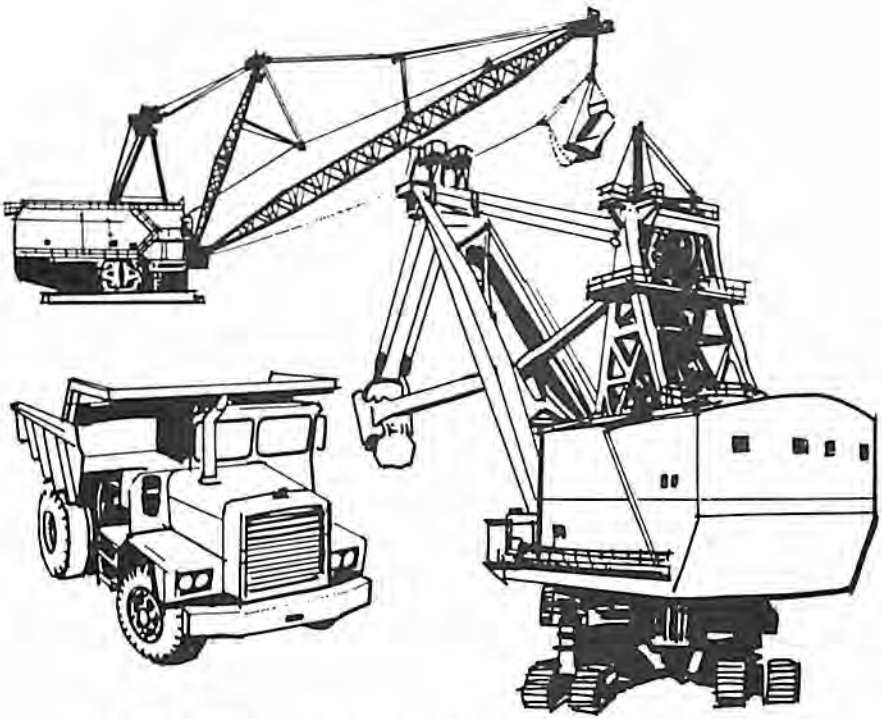

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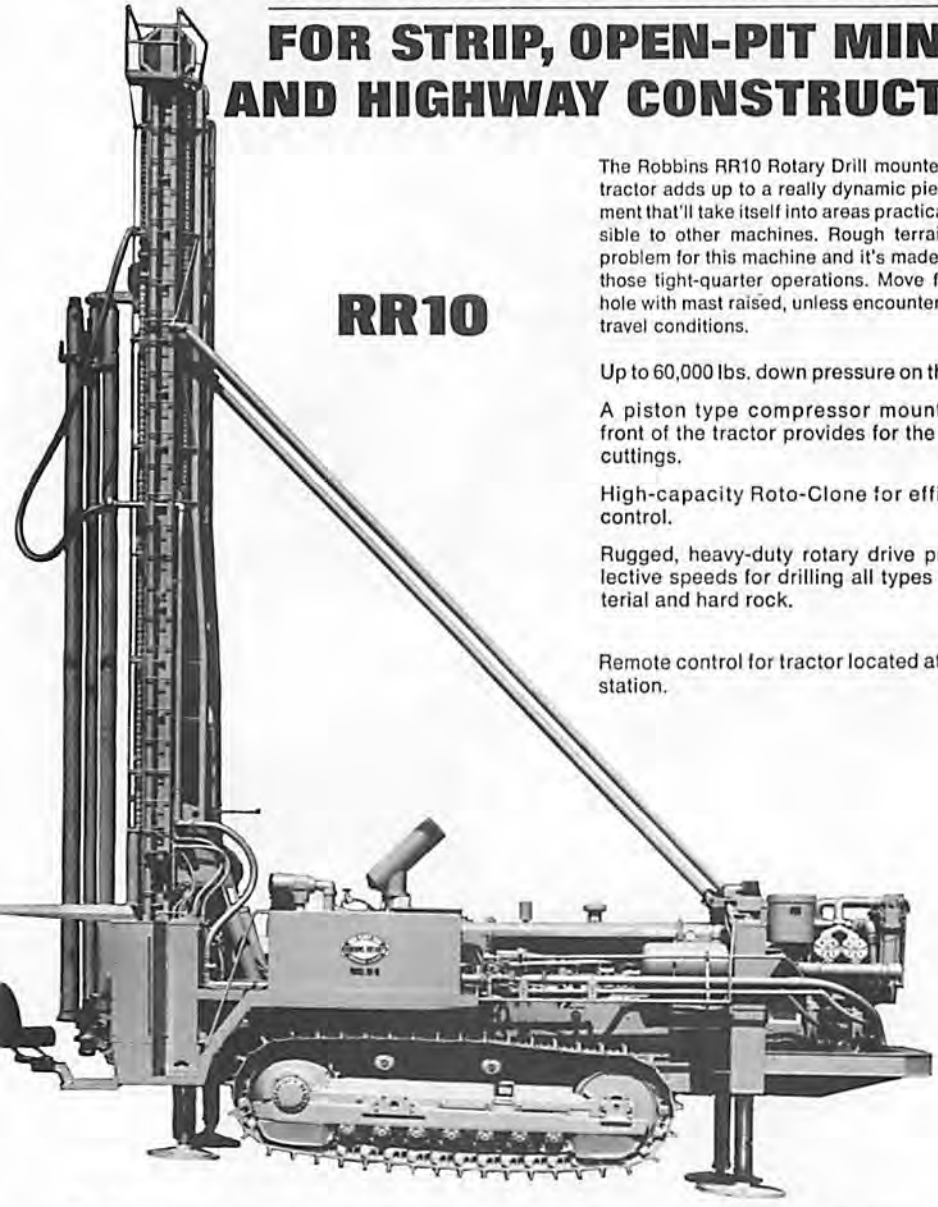

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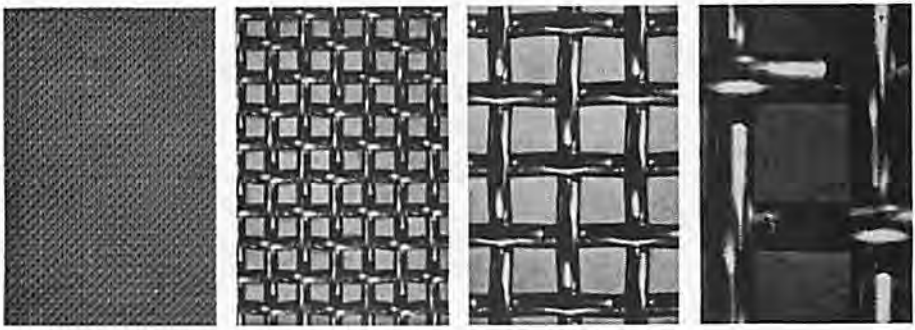

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