PROCEEDINGS

of the

ILLINOIS MINING INSTITUTE

FOUNDED FEBRUARY, 1892

Sixty-second Year

1954

Annual Meeting SPRINGFIELD, ILLINOIS November 11, 1954



HAROLD L. WALKER President, 1954

In Loving Remembrance

WILLIAM ORTMAN, Feb. 22, 1931 S. W. FARNHAM, March 12, 1931 H. C. PERRY, April 13, 1931 A. J. SAYERS, Oct. 11, 1931 C. E. KARSTROM, March 24, 1937 JOSEPH D. ZOOK, May 28, 1932 EDWARD CAHILL, Aug. 4, 1932 JOSEPH VIANO, Dec. 12, 1932 JOHN ROLLO, Feb. 6, 1933 DAVID I. ROCK, Aug. 2, 1933 WM. HUTTON, Aug. 18, 1934 FRED K. CLARK, Oct. 24, 1934 ERWIN CHINN, April 16, 1935 ADAM CURRIE, June 12, 1935 W. H. SLINGLUFF, Sept. 10, 1935 CHAS. B. SPICER, Oct. 26, 1935 NELSON P. MORRIS, Sept. 3, 1936 DON WILLIS, Dec. 9, 1936 T. E. COULEHAN, Jan. 11, 1937 ALBERT WEBB, March 5, 1937 H. B. COOLEY, March 23, 1937 C. W. SWANSON, July, 1937 JOSEPH McFADDEN, Sept. 15, 1937 E. G. LEWIS, Sept. 21, 1937 E. L. STEVENS, Sept. 28, 1937 W. C. ARGUST, Dec. 17, 1937 H. H. TAYLOR, SR., Dec. 28, 1937 E. L. BERGER, May 27, 1938 J. I. THOMPSON, June 24, 1938 P. W. MacMURDO, July 11, 1938 J. A. EDE, July 26, 1938 M. C. MITCHELL, Sept. 11, 1938 C. F. HAMILTON, Sept. 22, 1938 H. C. LONGSTAFF, Oct. 12, 1938 JOHN JOHNSON, Jan. 2, 1939 C. A. BLOMQUIST, Jan. 9, 1939 JOHN WHITE, April 15, 1939 CHARLES HAFFTER, May 21, 1939 BRUNO F. MEYER, July 21, 1939 JOHN A. GARCIA, Aug. 11, 1939 A. J. MOORSHEAD, Oct. 16, 1939 HARVEY E. SMITH, Nov. 6, 1939 C. W. McREAKEN, Nov. 30, 1939 C. C. HUBBART, March 4, 1940

SAMUEL HANTMAN, Sept. 13, 1940 SIMON A. BOEDEKER, Oct. 12, 1940 JOHN H. DAVIS, Oct. 21, 1940 S. J. WILLS, Oct. 22, 1940 HARRY HANTMAN, Nov. 5, 1940 J. W. GLENWRIGHT, Nov. 27, 1940 J. C. WILSON, Dec. 18, 1940 NICHOLAS CHRISTENSEN, Dec. 26, 1940 JOHN W. POLING, Jan. 31, 1941 JOHN T. RYAN, Feb. 20, 1941 M. F. PELTIER, April 2, 1941 F. M. BEAN, April 30, 1941 C. J. SANDOE, Aug. 29, 1941 F. M. SCHULL, Aug. 20, 1941 F. F. SCHLINK, March 15, 1942 FRED F. GERMANN, March 31, 1942 JOHN MENTLER, April 28, 1942 HUGH MURRAY, June 5, 1942 G. D. COWIN, June 14, 1942 JAMES M. ROLLO, June 15, 1942 SYDNEY A. HALE, Aug. 12, 1942 BYRON BROWN, Sept. 17, 1942 J. E. SEYMOUR, Nov. 21, 1942 OTTO AWE, Dec. 6, 1942 A. F. ALLARD, Dec. 29, 1942 THOMAS R. STOCKETT, Feb. 15, 1943 A. R. JOYCE, April 7, 1943 W. S. BURRIS, April 9, 1943 A. H. MALSBERGER, May 7, 1943 J. B. FLEMING, May 19, 1943 H. T. MORGAN, May 29, 1943 E. W. HASENJAEGER, July 29, 1943 C. W. WATERMAN, Aug. 7, 1943 J. R. HURLBURT, Sept. 6, 1943 JAMES S. ANDERSON, Sept., 1943 F. F. JORGENSEN, Nov., 1943 E. W. BEARD, Jan. 5, 1944 W. M. ELDERS, Jan. 22, 1944 THOMAS ENGLISH, April 3, 1944 FRANK TIRRE, May 22, 1944 *J. K. CHILDS, June 10, 1944 W. S. STINTON, Dec. 6, 1944 E. W. HAWLEY, Jan. 29, 1945 J. C. ANDERSON, July 7, 1945 F. A. FLASKAMP, Aug. 12, 1945

* Killed in Action

In Loving Remembrance

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A. P. TITUS. Nov. 9, 1950 A. W. DUNCAN, Nov. 20, 1950 GILBERT W. BUTLER, Nov. 26, 1950 FRED W. RICHART, Dec. 10, 1950 CHARLES L. BOWMAN, Jan. 30, 1951 B. P. MELTON, February 22, 1951 A. F. KEENAN, March 18, 1951 GEORGE M. LOTT, April 12, 1951 D. F. McELHATTAN, April 12, 1951 M. J. CHOLLET, April 20, 1951 WILLIAM BURNETT, JR., June 14, 1951 E. J. COFFEY, July 20, 1951 A C. CALLEN, July 30, 1951 F. E. WEISSENBORN, August 7, 1951 R. A. BARTLETT, November 26, 1951 D. D. WILCOX, November 30, 1951 A. D. BUSCH, January 1, 1952 F. H. SEYMOUR. February 20, 1952 C. M. O'BRIEN, April 16, 1952 JOHN L. CLARKSON, June 9, 1952 HARRY VOGELPOHL, June 15, 1952 HECTOR HALL, August 21, 1952 J. J. RUTLEDGE, September 11, 1952 NORMAN PRUDENT, September 18, 1952 WALTER WHITING, September 25, 1952 D. W. JONES, November 26, 1952 G. H. BERGSTROM, December 11, 1952 E. J. STERBA, December 31, 1952 W. J. JENKINS, January 12, 1953 FRED J. BAILEY, January 16, 1953 A. C. BASS, Feb. 10, 1953 A. R. JAMISON, Feb. 25, 1953 ANDREW JUNELL, Murch 4, 1953 HARVEY CARTWRIGHT, June 4, 1953 L. A. DUNBAR, July 30, 1953 R. W. WEBSTER, August 10, 1953 L. A. TROVILLION, Sept. 4, 1953 H. A. REID, October 20, 1953 **GEORGE MEAGHER.** November 6, 1953 WILLIAM J. McDOWELL, Dec. 12, 1953 L. E. YOUNG, Dec. 27, 1953 O. V. SIMPSON, March 25, 1954 CASPER D. MEALS, April 27, 1954 HARRISON H. JOHNSON Jr., July 20, 1954 BEN H. FIRTH, October 21, 1954 JACK BULLINGTON, October 29, 1954 LOWELL T. MALAN, December 29, 1954 H. KENNETH VOGEL. January 4. 1955 CHARLES H. DUESING, January 8, 1955

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PAST PRESIDENTS OF ILLINOIS MINING INSTITUTE

FOUNDED FEBRUARY, 1892

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1953-54 HAROLD L. WALKER, M & N Engineering Company, Alton, Illinois.

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PROCEEDINGS OF ILLINOIS MINING INSTITUTE SIXTY-SECOND ANNUAL MEETING

Held in Springfield, Illinois

FRIDAY, NOVEMBER 12, 1954

MORNING SESSION

10:15 A.M.

The Sixty-second Annual Meeting of the Illinois Mining Institute, held in the Ballroom of the Abraham Lincoln Hotel, Springfield, Illinois, convened at ten-fifteen o'clock, Vice President J. W. Mac-Donald presiding.

Chairman MacDonald: We will call this meeting to order, the Sixty-second Annual Meeting of the Illinois Mining Institute, and gentlemen, I welcome you here.

Your officers are most pleased to see the desirable attendance here today and last night.

We will not read the minutes of your past meeting, by reason of their having been published in the year book of the Institute.

With your permission I would like to provide a brief review of some activities within the interim period since our last meeting.

As you may gather from my presence here, and as most of you know, your President, Mr. Harold L. Walker, is now connected with the India Institute of Science, at Bhalgapur, India. He left this country on June 25. That explains his absence and my presence, being your Vice President.

Second, it was necessary for us to accept the resignation of our good friend and fellow worker, Past Secretary-Treasurer of the Institute, for reasons with which you are all familiar. They were set forth in the circular letter sent to our membership by Mr. Schonthal.

His official resignation and the acceptance will both be printed in the year book.

The resultant vacancy necessitated a replacement, wherein we were most fortunate in having appointed and having the position accepted by your present Secretary-Treasurer, Mr. George M. Wilson, who is also geologist in the Educational Extension Division of the Illinois State Geological Survey.

Gentlemen. I know you will accord him the same help and cooperation that you extended his predecessor.

Also, I am sorry to advise you that Mr. H. Dodge Freeman has resigned from membership on your Executive Board. Mr. Freeman is now connected with the White

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Pine Copper Company in northern Michigan and is living in that area. He thought he should be replaced by an individual directly connected with the coal industry and living in Illinois, or nearby, which would be to the advantage of your organization. For that reason only his resignation was accepted.

The nominations will include recommendations to cover the necessary replacement.

Gentlemen, that covers those minor items wherein you should be advised.

We will now have our Secretary's report by Mr. Wilson.

REPORT OF THE SECRETARY

Mr. Wilson (Secretary-Treasurer): Your Institute has maintained a membership of about 1000. We will announce at the banquet tonight how many new members have joined the organization at this meeting. The registration, at nine o'clock this morning, was 368.

The cash balance as of November 1, 1954, was \$2,394.72. Our Institute holds interest-bearing bonds which have a cash value of \$12,000.

The PROCEEDINGS for 1954 are now being compiled. The response from our regular advertisers has been most gratifying and we want to thank them for their continued support. As of November 10 we had contracts for about 100 pages of advertisements for the 1954 volume.

This is your new secretary's first report. I want to thank all the officers, members of the executive board and committees, and the general membership for their cooperation. Chairman MacDonald: Thank you, Mr. Wilson.

Gentlemen, you have heard the reading of the Secretary's report. What is your pleasure? May we accept it at this time?

Mr. Ben H. Schull: I move we accept it.

Mr. B. E. Schonthal: 1 second it.

Chairman MacDonald: It has been duly moved and seconded that the minutes of your Secretary be approved.

Those in favor of the motion as stated indicate by saying "aye"; opposed "no." The motion is carried by unanimous vote.

At this time, gentlemen, we will ask for the report of your Nominating Committee.

Mr. J. P. Weir is Chairman of that committee, and we will have his report at this time. Mr. Weir.

NOMINATING COMMITTEE REPORT

Mr. J. P. Weir: Mr. B. E. Schonthal and Mr. Charles Mulvaney served with me on this committee.

The Nominating Committee of the Illinois Mining Institute report their nominations as follows:

OFFICERS

- President: J. W. MacDonald of the Old Ben Coal Corporation, Christopher, Illinois.
- Vice President: Mr. Earl Snarr, Chicago, Wilmington and Franklin Coal Company, Chicago, Illinois.
- Secretary-Treasurer: George Wilson of the Illinois Geological Survey, Urbana, Illinois.

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To fill vacancies created by the resignation of Mr. H. Dodge Freeman and the expiring terms of J. S. Forman, E. E. Green, Lawrence Kiss and Moss Patterson, we nominate the following to serve on the Executive Board:

EXECUTIVE BOARD

- Mr. Morris Cunningham of the Goodman Manufacturing Company in Chicago.
- Mr. Oliver M. Evans, Midwest-Radiant Corporation, St. Louis, Missouri.
- Mr. A. G. Gossard, of the Snow Hill Coal Corporation. Terre Haute, Indiana.
- Mr. H. C. McCollum, Peabody Coal Company, Chicago, Illinois.
- Mr. C. Ward Padgett, Johnson City, Illinois.

Mr. J. A. Simon: I move that the nominations be closed, and the report of the Nominating Committee be accepted.

Mr. Schonthal: I second it.

Chairman MacDonald: It has been regularly moved and seconded that the nominations be closed, and that those named be elected to the respective offices, wherein I assume the nominees to the Executive Board will occupy the unexpired terms of the resigned members in the sequence named.

Are you ready for the question, gentlemen?

(Cries of "question.")

Those in favor of the motion will indicate by saying "aye"; opposed "no." The motion is carried by unanimous vote, and is so ordered.

RECOGNITION

Gentlemen, we now have the privilege of participating in a recognition that is well due, and will be handled through a message you will now receive from Mr. B. H. Schull, Director of the Illinois Department of Mines and Minerals, Mr. Schull.

Mr. B. H. Schull: Mr. Chairman, Mr. Secretary, and gentlemen: It is a great privilege and a pleasure for me to have the opportunity to present this to a man like Mr. Schonthal, who has given so much to this organization.

I now take great pleasure, Mr. Schonthal, in presenting you with a medallion which is inscribed, "The Illinois Mining Institute, Twenty-five Years Service Award to B. E. Schonthal, Secretary-Treasurer from 1929 to 1954, in recognition."

On the other side we have, "I. M. I., by order of the Executive Board, as approved in the Annual Meeting of November 12, 1954." Mr. Schonthal.

Mr. Schonthal: Thank you, Mr. Schull.

(The assembly arose and extended a prolonged ovation to Mr. Schonthal.)

Mr. Schull: Mr. President, if you please, I would like to offer a motion at this time to elect as Honorary Secretary-Treasurer for life, Mr. Bale Schonthal.

(Cries of "second.")

Chairman MacDonald: Gentlemen, the motion has been made whereby this meeting will approve the provision of this medallion as so stated on the medallion, together with the election of Mr. Schonthal as the Honorary Secretary-Treasurer for life. It has been regularly

Our Advertisers, who make this volume possible, will appreciate your inquiries.

moved and seconded. We will now vote on the question.

Those in favor of the motion as stated will please say "aye"; opposed "no." The motion is carried, and so ordered.

Mr. Schonthal: Thank you, gentlemen. (Applause.) Well, you all know that I am a man of few words. I don't know what to tell you, except I am sure you all know that I appreciate this more than I can tell you.

This last thing, about this motion, about this honorary secretary for life, makes it all the more important for me to take care of myself and have a lot of fun and be around here for a long, long time, so I can be up to these meetings and be the Honorary Secretary.

It is going to be fun. They say anything that is fun is not work, and it has been fun for twenty-five years. I have had a lot of fun. We have done a lot of work and we have had a lot of cooperation, and I have never yet, in the twenty-five years, asked any of you members for any help or advice that didn't come through right away.

That has been the fun of it. 1 appreciate this very, very much. believe me, from my heart. Thank you so much. (Applause)

Chairman MacDonald: Mr. Schonthal, were it not for the fact that we expected your resignation to enable your continued presence with us, it would never have been accepted in the first place.

We will now have a report covering the Scholarship activity, which will be presented by Dr. Thomas A. Read, the head of the Department of Mining and Metallurgy at the University of Illinois. Dr. Read.

SCHOLARSHIP REPORT

Dr. Read: It is a pleasure for me to be here to give the annual report on scholarships and to attend for the first time a meeting of the Illinois Mining Institute.

I was very much impressed, when I came to the University of Illinois three months ago, to hear of the splendid work which has been done by the Institute and the mining industry of the state in providing scholarship assistance for mining students. As you all know, the mining schools of the country are not currently attracting enough students to supply the needs of our industry for trained mining engineers, and it is tremendously important to the welfare of the nation that we all do all we can to cope with this problem. Scholarship awards certainly represent one of the more effective ways that we can bring home to the student the realization of the great and important need of our mining industry for well-trained men, and thus these awards have a significance which goes far beyond merely easing the financial burdens of the scholarship holders' education. I sincerely hope that it will be possible in the course of time to expand this scholarship program and make it even more effective in attracting capable students to the study of mining.

I am now happy to introduce to the members of the Illinois Mining Institute the scholarship holders for the current year whose names are listed below.

Old Ben Coal Company

Edwin G. Jackson, 115 South Race Street, Urbana, Illinois

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Raymond Rogers R. R. I, Mulkeytown, Illinois

- Alfred E. Pickard Jack Tisdale, 426 South Central, Benton, Illinois
- Peabody Coal Company James R. Yancik 7th South Street, Mt. Olive, Illinois
- Illinois Mining Institute Paul Robert Sprehe, 605 West Noleman Street, Centralia, Illinois
- Henry Petter Supply Company Charles E. Childers, 1302 West Edwards Street, Carlsbad, New Mexico
- Sahara Coal Company Raymond G. Adams, R. R. 2, Metamora, Illinois

In conclusion 1 would like to summarize our current undergraduate enrollment figures in mining engineering. We have forty undergraduates in mining, of whom eight are seniors, who will graduate this year.

Chairman MacDonald: Thank you, Dr. Read, for that encouraging report on a subject in which we are all deeply interested.

I would like to call on Mr. M. D. Cooper at this time. Mr. Cooper is the Director of Mining Engineering education for the National Coal Association, and we would like to hear from him with respect to students' scholarships and student activity at this time.

Mr. M. D. Cooper: We are fortunate in having Dr. Read present such an interesting report and give us an insight into what is going on at the University of Illinois, which has one of the best curricula in mining engineering.

We all have a decided obligation to see that properly inclined students get into the University, and that brings up the point that a boy cannot expect to get into a course in mining engineering if he doesn't have the proper preparation.

And the proper preparation is a rather simple matter, but not very clearly understood. We can do a great deal to tell the youngsters in the high schools what they must have in the way of preparation in order to get in.

It is simple. If a boy has a minimum of three years of English, three years of mathematics and a year of science, he is pretty nearly sure to be welcomed at any college of engineering. It may be determined after he gets into the freshman class, whether he is adaptable to mining engineering or electrical engineering or chemical engineering or whatever it might be, but he can't hope to be prepared if he gets up to the senior year in high school without completing the necessary subjects.

Therefore, I suggest that we have an obligation, as members of the coal industry, to tell the high school boys what they ought to do in order to get in.

There is no use in persuading a boy to give up an inclination to go into some other profession. He might want to be a doctor or a lawyer, or he might want to be a merchant, and there is no use in persuading him to give up something for which he has a strong inclination.

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But if he is neutral on the subject, or if he is inclined towards engineering, we can certainly give him the encouragement that he needs, and there is one factor in regard to mining engineering that is especially valuable-it does act as an introduction to various forms of engineering. So if a boy starts out with the idea that he would like to be a mining engineer, and he finds later that he is better adapted to some other branch of engineering, he gets a good introduction to civil, to electrical, mechanical, geological, and even to a certain extent to other branches of engineering.

So we needn't feel hesitant in suggesting to him that he take a course in mining engineering, and we can do a great deal by way of scholarships, or even by ordinary, common, everyday advice, to encourage him along those lines.

(Applause)

Mr. Fred See corrects me and says that four years of mathematics is now required. That, of course, is true, but I imagine if a boy comes from a high school where he isn't able to get four years of mathematics and shows an unusually good record in three years, they will give him rather serious consideration. He may have to enter with some make-up work to do, but at least if his record is first class, it seems reasonable to believe that he will get a good reception. (Applause)

Mr. Lisle Rose: Mr. President, if you will pardon a brief footnote to this. Mr. Ross Martin and I are representing Dean Everett of the University of Illinois during his unavoidable absence.

The University, though it does offer four years of mathematics, has made a number of provisions—five to be specific, whereby this requirement can be met. Four of those are other methods than the taking of four years of high school mathematics, so this hurdle, although it is an increase over our previous requirements, is by no means a stopper for any man interested in mathematics and engineering. We at the University should be delighted to have any of you write to Dean William Everett and get information on these and other requirements

The University is making a sincere effort to obtain more engineering and particularly more mining engineering students. We are appreciative, as Dr. Read has already told you, of what the Institute has done. Thank you very much for your time. (Applause)

Chairman MacDonald: Thank you for those comments. Mr. Cooper, we are more than glad to have your timely advice. Your recommendations are very pertinent to the needs of the mining industry.

* *

With your permission, gentlemen, I would like to follow a rather irregular procedure by appointing each and every one of you as a committee of one to exercise your best efforts in furthering and following the suggestions and advice provided by Mr. Cooper,

Mr. Secretary, is there anything further in the way of business that should come to the floor?

Anyone on the floor have anything?

If not, we will proceed with the presentation of papers that our program calls for at this session.

I will ask the gentlemen who are participating in that phase of

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the program to please come to the rostrum at this time. you probably noticed in the film, when the material comes in contact

Gentlemen, I would like to present to you Mr. Eugene Neihaus, Preparation Engineer with the Sahara Coal Company, who will preside as your chairman for the presentation of the papers during the balance of our forenoon session. Mr. Neihaus. (Applause)

(Mr. Eugene Neihaus assumed the chair.)

Chairman Neihaus: Thank you. The first paper is being given by Mr. D. C. Reilly of Hewitt-Robins. It is entitled "Cable Belt Conveyors." I think it will be very intercsting,

(Mr. Reilly presented his paper entitled "Cable Belt Conveyors" which was followed by the showing of a movie.)

Mr. Reilly: I would like now to try to answer any questions that you may have pertaining to this type of conveyor. We feel for long hauls and high lifts it definitely has a place in this country, not only in its low applications, but possibly in strip mining, where the link can be readily extended with a minimum of cost because the belt is relatively inexpensive in comparison with the conventional belt.

Are there any questions at this time?

Voice: How about the impact of material that is moving along the belt? What kind of wear do you get on the belt, at the holding point?

Mr. Reilly: There shows very little wear due to the fact that it is like a mattress and is resilient. As you probably noticed in the film, when the material comes in contact or arrives at the belt, the belt and the cable form as a complete stringing mattress. There hasn't been any difficulty or punctures of the belt not only because of the resilience, but also because the cables are supported between trusses.

Voice: Could you go into any greater detail on going around a curve, or horizontal misalignment?

Mr. Reilly: Yes sir, I can. As I mentioned in this one installation, they are negotiating a horizontal curve. Fortunately, it is near the tail end, where the relative tension is fairly low in the cables.

However, in negotiating this curve, it was found necessary to bank the curve of the belt and the cables at five degrees. Roughly, a two-hundred foot radius was enabled by this feature. They wanted to get it down to even less.

It has worked successfully. They had a little difficulty—which was straightened out—with the bottom cable falling off the shifts. In other words, you cannot tie the top and bottom shifts together as shown in the original film of the design, where actually the lineal movement falls in line with the cable and you have to disconnect your top from the bottom in that movement, so they are independent from one another in negotiating the curve.

Voice: Do you think that would be possible near the head end?

Mr. Reilly: No, you would have trouble there. The tail end is your best location.

Voice: Do you know whether or not they were going to leave the shoes off, or had they given that up, at the one job?

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Mr. Reilly: I can answer your question this way: As you noticed, on the original belt the protrusion of the straps from the edges provides a gap between the edge of the belt and the cables. Now, with falling ceilings, over in England, being as evident as they are, they have rocks jammed between the edge of the belt and the edge of the cable.

With this in mind Cable Belt Limited has designed an entirely new belt which includes the shoes as an integral part of the belt. In other words, the belt will cover the complete unit, and there will be no gap between the edge of the belt and the cables as previously designed.

In other words, the belt will include the shoes as an integral part of it. The steel straps will be changed to steel bars, molded as an integral part of the belt to give it resiliency.

Voice: Are there any fixed width limitations to this type of operation?

Mr. Reilly: No sir, except possibly in the small widths. Due to the fact that we have to use a differential gear box, the width of the spacing between the cables is somewhat limited mechanically by the size of the differential gear drive that would be required.

However, in certain horsepower ratings you could get down to eighteen-inch width belt, which we have been working on. Forty-eight inches is the maximum width design at present.

It must be remembered that the cross section area of a cable belt conveyor is greater than the conventional, therefore we can carry more material per foot, and another interesting thing to notice we do not have the percentage load to reduce the tension, which you normally might do with a conventional conveyor, to bring the cost of the belting down.

Voice: Is four hundred feet a minute the fastest speed you can run?

Mr. Reilly: That will be the fastest installation. However, on the trial installation that you saw, they increased the speed to five hundred feet per minute without any difficulties at all.

Voice: What is the comparative cost per foot, including structure as well as the carrying belt—that is, including the belt itself?

Mr. Reilly: That is a rather difficult question to answer. In comparing it with a conventional belt conveyor, it first must be realized that the application of the cable belt conveyors is for long haul and high lifts. With this in mind, the break-even point in cost per foot initial cost per foot—would be about even for the cable conveyor and a conventional conveyor.

Any other questions? I want to thank everyone for the opportunity of presenting this paper, and I certainly hope you enjoyed it. (Applause)

Chairman Neihaus: Thank you, Mr. Reilly, for a very interesting paper.

Our next paper is presented by Mr. William McCulloch, from Roberts and Schaefer Company in Chicago. It is entitled "Effect of Market Trends on Pneumatic Coal Cleaning."

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EFFECT OF MARKET TRENDS ON PNEUMATIC COAL CLEANING

By WILLIAM C. McCULLOCH Sales Representative Roberts and Schaefer Chicago, Illinois

On previous occasions 1 have made the statement that a percent of moisture is just as detrimental as a percent of ash. On this statement I have not been challenged and I think that combustion engineers are in accord. This being true I am now prepared to throw out a further challenge. From the standpoint of cost of delivered B.t.u.'s, pneumatic cleaning is the most acceptable of all the preparation methods. We recognize the limitations of the process and the reasons the process is not universally accepted. However, there is a progressive change in the industry and I shall try to point out the basic criteria which verify the above statement.

If we use raw coal as the basis of comparison, it appears obvious that the replacement of extraneous ash with moisture gives no benefit. The comparison is not that simple, however, because the measurement of the values is more often visual than scientific. The inspector or fireman can see the free ash-forming impurities and he has the ash residue to dispose of, but the water vapor goes up the chimney and he merely burns more coal to keep up the steam. Scientifically conducted boiler tests, however, confirm the results of the laboratory analyses and the further proof is in the cost sheet that governs the purchasing agents' choice of fuels.

We must also know the washability characteristics of the raw coal before we can determine whether or not any cleaning at all is required. The washability data show how much free impurity is present and the quantity and quality of the intermediate bone coal as well as the pure coal. We can then know the prerequisites of the cleaning equipment.

An attempt to evaluate the specific benefits derived from cleaning coal for steam generation is somewhat disappointing. If one considers only the total B.t.u.'s in the raw coal, obviously some heat units will be removed in the cleaning process. There is unquestionably some dividing point, based on the total incombustible in the refuse particles, where it is more desirable to discard the particles than to combine these particles with the cleaned coal. The factors that control the dividing point are based on mining cost, freight rate, cost of handling both the coal and the ashes, and also the load rating in the boiler plant.

J. D. Price, Superintendent Coke

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Specific Gravity		Dry Basis			Cumulative Float		
Sink	Float	Wt%	Ash%	Btu	Wt%	Ash%	Btu
	1.40	78.5	8.4	12950	78.5	8.4	12950
1.40	1.50	6.9	19.3	11220	85.4	9.3	12810
1.50	1.60	2.8	26.5	10044	88.2	9.8	12722
1.60	1.70	1.8	33.4	8834	90.0	10.3	12645
1.70	1.90	2.3	43.2	7145	92.3	11.1	12507
1.90		7.7	66.8	3232	100.0	15.4	11793

WASHABILITY DATA

Assume 14.0 per cent total moisture, \$4.00 mine price per ton, and \$3.00 freight per ton.

	Yield %	As Received Btu	Delivered Cents/million Btu
Raw Coal	100.0	10142	34.5
Float 1.90	92.3	10756	34.1
Float 1.70	90.0	10875	34.1
Float 1.60	88.2	10971	34.4
Float 1.50	85.4	11017	34.9
Float 1.40	78.5	11137	36.4

Plant, Colorado Fuel and Iron Corporation, in a paper entitled "The Overall Efficiency of Coal Washing," which has been published by the A.I.M.E., has demonstrated that there is an optimum degree of washing for any given coal used in coke making for blast furnace fuel. He brings out the fact that washing to too low an ash with resulting decreased recovery can be just as costly as no washing at all, and his charts show that the highest economic value may be obtained by operating at some intermediate point. The same correlation of facts may be set up for steam coal if all the factors are known.

With the possibility of oversimplification, but to illustrate how the cost of heat units at destination is affected by only the mine production costs and freight, the following tabulation is set up for a typical central Illinois coal using published prices rounded off for comparison only.

On the above basis the lowest price is in the range of washing between 1.70 and 1.90 specific gravity. It is in this specific gravity range that pneumatic cleaning can be utilized most effectively.

Less than ten years ago a plant was built in southern Illinois that was designed as an all stoker-coal plant. As recently as 1948 I had the privilege of describing that plant in a paper delivered at our

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Institute meeting. Pneumatic cleaning was outstandingly successful in the preparation of domestic stoker coal in that plant as well as in many others. However, the trend of today's market precludes the necessity of an all stoker-coal plant. In the community in which I live there have been approximately 3,-000 new heating units installed during the past year. Of this number only two were coal stokers. We must recognize this trend and adapt. our preparation methods to it. This does not mean that we are not going to require preparation for the markets that are available to us, but we shall need to modify it to give the greatest value to the ultimate consumer. I am sure that pneumatic cleaning is the solution and I shall try to show you why.

If we refer again to the chart we note the optimum condition between 1.70 and 1.90 specific gravity. Further observations show that the lowest ash particle rejected is about 58 per cent total incombustible or about 6,000 B.t.u. as received. As previously stated, airwashing is effective in this specific gravity range. It is not necessary to clean the coal at a low specific gravity to obtain the most beneficial overall results. It may be true that for certain coal in specific market areas low gravity washing may be required to meet a competitive market. But unless other factors of low cost mining or overhead are present to offset the increased costs the operation will not be profitable. Our chart shows that we get only 78.5 per cent recovery if we require an 8.4 per cent ash. Our as received B.t.u. value is decreased by only 262 for this increased recovery. Further, to increase the recovery another 10 per cent to the raw coal basis the as received B.t.u. value is decreased

by 733. It is necessary to point out that these values are computed with 14.0 per cent total moisture which in the area of this typical coal represents bed moisture only.

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If we now make a comparison with wet washed screenings we observe that the added surface moisture ranges from 3 per cent to 6 per cent. Assuming a value of 5 per cent S.M. on the typical coal, we have by the A.S.T.M. definition a total moisture of 18.3 per cent and the B.t.u. value is decreased to 10,152, which is only 10 B.t.u.'s higher than the raw coal we had to start with. Obviously, in the screenings size with wet washing, we have replaced ash with moisture and the final B.t.u. value is the same.

We are all aware that this condition applies only to fine coal and I would not have the temerity to say that pneumatic cleaning should be used for stove and egg coal, but there are satisfactory installations operating on coal as coarse as 15/8 inches. Granted that we accept the truth of our major premise that a percent of moisture is just as detrimental as a percent of ash, there are among us some who yet will not concede the advantages of the pneumatic process. I think we can more readily answer these skeptics by listing the things that air-washing will not do before we point out the things that it will do. In the first place it will not clean wet coal in the fine sizes below 1/2 inch. Surface characteristics are not improved, that is, if coal is discolored or painted with clay or other objectionable material, air-washing will not brighten the appearance. Flats, particularly in the heavy bone fractions, will report with the coal. Air-washing is essentially a black and white separation and

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will not make a precise cut on a coal difficult to clean. Presizing is required to produce a relatively narrow size range in the feed. Dust is a problem both inside and outside the plant.

To offset these disadvantages we have a very imposing list of advantages. The wet coal mentioned above can be thermally dried more economically than could the wet coal resulting from water washing. In spite of the Federal laws requiring more and more wetting at the face to allay dust, the moisture percentage is lower than with wet washing. Probably the most important advantage of air-washed coal is the condition that it will not freeze in transit in winter weather. Further, air-washed coal sheds rain in transit. Wet-washed and heat-dried coal is susceptible to absorption of water that would drain out of a car of air-washed coal.

Air-washed coal flows freely, both in unloading and in handling through the boiler plant. It does not choke chutes or foul up feeders or conveyors.

The B.t.u. value is the highest for any given coal. This is true specifically in the fine sizes where heavy media separation is not applicable.

Air-washed coal is more amenable to oil treatment. It is important even for industrial applications to prevent dusty conditions during storage when the coal is allowed to dry out, and oil treatment is simpler if the coal is airwashed. For domestic stoker coal oil treatment is imperative.

Air-washed coal eliminates the problem of stream pollution. It is necessary to provide dust collection to prevent air pollution, but this is a simple application when compared with dust collection during heat drying. The air-washing process separates the dust which may be recombined with the clean coal or discarded as refuse if desired.

Of interest to the operator is the comparatively low cost of running the plant. Based on the clean coal produced in a typical plant, the cost is established at \$0.048 per ton. This cost may be broken down approximately one-third each to power, operating labor, and maintenance, including refuse disposal. Capital costs and amortization are not included.

In a recent paper read before the American Mining Congress, J. B. Morrow summed up his discussion with the opinion that preparation plants furnishing coal for public utilities will tend to have a more simplified and less costly flow sheet in the future. There will be a tendency toward more air-washing of the fines for this market even with some preliminary heat drying.

J. É. Tobey, in his discussion of the same paper, broadened the concept to include metallurgical coal as well with special reference to the reduction of sulfur.

I have not attempted to give you an efficiency figure or value to be applied to air-washing. Factors other than specific gravity are important and it is necessary to enlarge on the familiar washability studies in order to determine the amenability of coal to the air-washing process. It is desirable, therefore, to conduct pilot plant runs of car load tests to prove the possibilities. In general we know that effective cleaning is obtained in the sizes down to 48 mesh. Air-washed coal may be higher in ash than wetwashed coal, but there is selectivity in sulfur reduction and free pyrite is removed equally well.

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Air-washing of coal has passed through several phases since its introduction over thirty years ago. There is no need at this time to trace the development of the different kinds of equipment or recount the difficulties that prevented more rapid acceptance of the process. At this time, to the best of my knowledge, only one type of equipment has any commercial importance. The Super-airflow manufactured by Roberts and Schaefer Company is the only unit on which new sales were reported in the past several years. A McNally Brusset Vacuum Jig installation was made several years ago in West Virginia and satisfactory operation is reported.

Description of the operating principle and the mechanism of the Super-airflow has appeared in the literature previously and will not be repeated here. However, a slide showing a section of the airflow may be interesting. Slides showing installations of airflows and the photographs of the Freeman Coal Mining Corporation, Crown Mine, Farmersville, Illinois, and the Pocahontas Fuel Company, Inc., Itmann Mine, Itmann, West Virginia, may also be of interest. Mr. McCulloch: If any of you have any specific questions, either about the charts or the sections of the airflow itself, I shall be happy to answer them. Thank you very much. (Applause)

Chairman Neihaus: Thank you, Mr. McCulloch, for your paper, sir.

Vice President MacDonald: Gentlemen, we are running a little late on our schedule. It is now practically twelve o'clock, and with Mr. Moroni's permission he will hold his paper to be presented the first thing this afternoon.

With that, our program will be a little crowded this afternoon, and it will be absolutely necessary that we start on time. Your program specifies two-thirty. We will begin promptly at two-thirty. It is a timely subject that Mr. Moroni will speak on, which will be the initial presentation this afternoon.

Without further ado, we will adjourn for the present.

(The meeting was adjourned at twelve o'clock.)

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FRIDAY AFTERNOON SESSION

November 12, 1954

The meeting convened at two thirty-five o'clock, Vice President MacDonald presiding.

Chairman MacDonald: Gentlemen, I would like to call the meeting to order.

This afternoon 1 am happy to say that Mr. Murrell Reak, Assistant Director of the Department of Mines and Minerals of the State of Illinois, will serve as chairman and guide the discussions.

There is one request that I would like to make, which is: Those of you who may have a question to present following the delivery of the paper, please give your name on arising, so that it may be a matter of record.

Without further remarks, because we have to reach an early conclusion, I will present to you the chairman for this afternoon, Mr. Reak. (Applause)

(Mr. Murrell Reak assumed the Chair.)

Chairman Reak: Thank you. I have just been asked in the last few minutes to pinch hit for a chairman who was supposed to preside here this afternoon, but due to some illness in the family, or something similar to that, as I understand it, he was unable to do so.

It has been explained to me that this morning's program was not completely fulfilled, and we will start the afternoon program by hearing Mr. Gene Moroni, Chief Engineer of Bell & Zoller Coal Company, with a paper entitled "Reversing the Air to Provide Exhaust Ventilation and Related Needs."

At the conclusion of the paper, a discussion will follow. As Mr. Mac-Donald previously stated, if you have a question, when you arise please state your name and title, if possible, so that we can include it in the proceedings of the meeting.

I now take great pleasure in introducing to you, Mr. Gene Moroni of the Bell & Zoller Coal Company. Mr. Moroni. (Applause)

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REVERSING THE AIR TO PROVIDE EXHAUST VENTILATION AND RELATED NEEDS

By GENE MORONI

Chief Engineer Bell & Zoller Coal Company Johnston City, Illinois

The scope of this paper is narrowed to experience gained at the Buckhorn Mine, of the Bell & Zoller Coal Company, Johnston City, Ill. The company's other four mines have always used exhaust ventilation systems.

The Buckhorn Mine enters the Illinois No. 6 coal seam by a two compartment slope inclined 15 degrees 30 minutes. Distance from the portal to the intersection of the coal is 937 feet along the slope, a vertical depth of 250 feet. The manway and belt compartments are rectangular sections, concrete lined from the portal to 200 feet inby. The manway has a concrete floor the entire length of the slope. The interior dimensions of the manway and belt compartments are 10'-0" x 7'-6" and 8'-0" x 7'-6" respectively.

The initial ventilation system at the Buckhorn mine was a circular concrete-lined vertical airshaft, a 10'-0" internal diameter, which provided the downcast opening to the mine. The slope provided the upcast. The fan was a Jeffrey 8H-96 Aerodyne Fan, designated as an 8-foot fan, and driven by a V-belt drive by a 125 H.P. induction motor. The blades were adjustable for seven different positions. The maximum volume of air passed by this fan during its service was 120,000 C.F.M. at a 4" water gauge.

The downcast air was split into two splits near the shaft location. The longer split, in July, 1953, had a total air travel distance of 41,000 lineal feet through which passed 80,000 C.F.M. The cross-sectional area of the entries averaged 112 sq. ft. Development projections provided for a minimum of two intake and two return entries except at overcast locations where one overcast was provided to cross the intake over the return. The primary track haulage system was on the return air entries, and motor generator and rectifier stations were in cross cuts between the two return entries.

Mine development is typical room-and-pillar with panel development at 90 degrees to the mains and cross entries. Abandoned or worked-out areas have been scaled by concrete block stoppings across the outby openings of the abandoned entries. An earlier practice at this mine circulated intake air through two abandoned panels near the slope bottom to condition

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the intake air. However, this practice was soon discontinued and the panels were sealed.

The mine used the pressure ventilating system until June, 1953. Then, in order to conduct all return air through air courses coutaining no power cables or electrical equipment (preparatory to the introduction of pillar mining and to conform to the preference of the Bureau of Mines to use exhaust ventilation in all our gassy mines) the ventilation was changed from pressure to exhaust. The surface structure was remodelled at the vertical air shaft by simply removing the pressure fan and installing the exhaust unit. The job was completed during the miners' vacation period of 1953. The new exhaust unit is a Jeffrey 8H-60 Aerodyne fan, V-belt drive by a 75 H.P. induction motor. At present, the fan is delivering 106,000 C.F.M. at a 3" water gauge.

Mechanical changes to control direction and force of air currents within the mine preceded the actual fan change with few difficulties. The change involved only a few problems, although a similar change at a different mine with different characteristics might encounter many difficulties.

The greatest problem was partially remedied at the time of the change, and completely remedied a short time afterward. Roof control became the greatest difficulty.

The original entries left top coal in place supported at regular intervals by wooden cross bars and lagging. The first 10,000 feet inby the hopper location were so developed. From there on, top coal was removed as normal mining procedure and the roof shale was held in place by roof bolts with 6" x 6" x V_4 " steel plates in addition to rail or cross bars where necessary,

Prior to the ventilation change, in the entries that were to become intake air entries, loose top coal and shale were sealed. In some instances all top coal was taken down, the roof was bolted with two bolts, 54'' centers, supporting a treated plank, $66'' \ge 7'' \ge 11/2''$, at intervals of 48'' along the centerline of the entry.

Both slope compartments and the future intake entries were coated with a water-proof roof coating material. This material is a heavy fibrated asphalt mixture containing asbestos fiber and an oil thinner having a high flash point and a slow rate of evaporation. The material, when applied in accordance to the manufacturer's instructions, provides an elastic rubber-like coating to the surface treated. It repels water, and in some noted instances expelled the water from the moist surface being treated. The roof and upper 8" of contact between roof and rib were treated along approximately 7,000 feet of entry (i.e. 7,000 feet for each intake entry).

The immediate effect of the hot. humid, downcast air on the slope and entries protected by this coating was negligible, but upon those portions of untreated entries inby a distance of 12,000 feet the effect was devastating. The exposed roof shale deteriorated completely and rapidly, spalling between the roof bolts and creating hazardous working conditions. Immediate application of sealing compound reduced and minimized the detrimental elfects of the air. The exposed top coal was adversely affected, and subsequent treatment prevented further deterioration. From 12,000 feet inby to the further sections of the mine, the intake air had become

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conditioned to such an extent that few if any ill effects on the roof could be attributed to the action of the air.

Personal comfort for the personnel who work directly in the downcast air, particularly during the winter months, cannot be overlooked. A comfort station for employees while awaiting transportation to the surface was provided near the manway slope. During the winter months, all mainline locomotives are equipped with a plexiglass shield 36" square mounted in a pivoted frame to provide windshield protection for the motormen. A minimum quantity of air is circulated in and about the coal receiving hopper area, sufficient to carry the dust away but at the same time eliminating high velocity air travel in the area.

Dust control on main line haulways, while always a problem, is somewhat magnified and au adequate means for allaying the dust to prevent its being carried into the active mine workings must be provided.

Rigid inspections of all seals must be and should be maintained at all times, but particularly so upon the reversal of the air. It has been our experience that a period of approximately eight months was required to stabilize the gas emission rate from behind the seals, regardless of atmospheric pressure. Since that time, the seals emit little if any gas.

Face ventilation of the active workings provided no particular problem, for even though the mine is classified as gassy, the rate of emission of methane from the coal and overlying shale has not noticeably increased, and analyses of return - air samples indicate only slightly more methane than pre-

viously. Total methane content in the upcast return at the last inspection was reported as 0.23%, or 344,448 cubic feet in 24 hours.

A suitable plan should be provided and all supervisory personnel thoroughly instructed as to their duties and requirements in case of a fire. This precaution is mandatory regardless of the type of ventilation, but particularly so where motor-generator and rectifier sets are operated on the main intake airways.

There are possibly many other needs which have not been discussed in this paper, but the author's limited experience prevents discussion of them. The author gratefully acknowledges and thanks the management at the Buckhorn mine for their cooperation and help.

Mr. Moroni: There is one other thing that I forgot. It is just a common, everyday precaution which you all have to exercise, and that is protection of any equipment from freezing during the winter months. Pipe lines and rectifier sets which have water-cooling systems have to be properly protected when these units are situated on the intake area.

At the same time 1 would like to call to your attention a paper prepared by C. A. Herbert, Mining Engineer of the Bureau of Mines. It is entitled "Roof Coating to Prevent the Detrimental Effect of Mine Atmosphere on Mine Roofs During the Summer Months."

I might say that his paper is very complete in its description of the roof-coating compounds and their effects and advantages and disadvantages.

If there are any questions, I shall be glad to attempt to answer them. (Applause)

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Chairman Reak: Thank you, Mr. Moroni, for a fine paper relative to reversing the air to provide exhaust ventilation and your analysis of results from the change in this type of ventilation.

I am sure that there are a lot of men here who are particularly interested in this type of ventilation with respect to large plants. Especially where we have many miles of roads, certainly this type of ventilation plays a very important part in it.

So anyone, wherever you are, if you have any questions you would like to ask Mr. Moroni, we would like to have you stand and give us your name so it can be entered in the proceedings at this time. Do you have any questions?

If not, Mr. Moroni, we want to thank you for an excellent paper. I am sure it has been of great benefit to all who are interested in this type of ventilation.

Our next paper is entitled "The 50-R Drill and its Operation," by Mr. Lafe Stewart, Maumee Collieries Corporation, Terre Haute, Indiana.

Mr. Stewart. (Applause)

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THE 50-R DRILL AND ITS OPERATION

By LAFE STEWART

Chief Engineer Maumee Collieries Company Terre Haute, Indiana

Proper fragmentation of overburden has always been a major problem in stripping operations. In these days of high costs, together with high overburden ratios, the item of drilling and shooting accounts for approximately one-third of production cost.

Over the years drilling methods and blasting procedures have been changed and revised as new devices and equipment have been developed. First, the old miner had his single jack and double jack. Then came various types of cumbersome piston drills, most of them operated by steam. Various forms of hammer drills began to appear, using either water or air as a coolant. The small diameter, one and onehalf to three inches, did not provide adequate capacity for explosives in hard material, so the need for larger diameter holes led to the use of so-called "well drills."

The adoption of the well or churn drill increased the hole diameter to about 6 inches, and increased the explosive capacity from 400 to 900 percent for each foot of hole drilled.

At first, the churn drills were a type developed for water drilling and were inadequate for the severe service required in mines and quarries. The comparative success of these drills, however, brought about the development of special purpose blast hole churn drills, with improvements such as crawler mounting, added strength for continuous hard drilling, and means for guiding the drill tools when starting the hole. These machines were constantly improved up to and including the development of the Bucyrus-Erie 42-T, capable of drilling up to a 12-inch blast hole.

As mining operations grew larger and tonnages increased, the defects of the churn drill became more evident: it was slow and it was expensive in manpower per foot of hole. Its saving grace was that it did break large tonnages of coal per foot of hole.

Meanwhile, the oil industry had developed the rotary drill to a high state of perfection. Manufacturers were quick to adapt the oil well rotary rig to blast hole drilling. It would seem like a simple adaptation to make, but it took several years to develop it. Extreme mobility and speed of set-up were required, but the most difficult problem was cooling the bit and removing cuttings from the hole.

Early designs, which naturally followed the oil well pattern, used

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water or drilling mud as a coolant, but they did not prove entirely satisfactory. It was not until Mr. Hugh Lewis, then chief engineer of the Michigan Limestone and Chemical Company, tried compressed air instead of water as a medium for coolant and removal of cuttings that the problem was solved. When this had been developed, the so-called dry rotary blast hole had arrived.

The Maumee Collieries Company had by 1952 adopted a drilling and blasting practice based on the use of eight 42-T Bucyrus-Erie churn drills with 10" bits. Annual requirements were approximately 15,000 holes with total footage of 700,000 feet and six to eight million pounds of explosives. Water requirements approached 60 million gallons.

Needless to say, we examined with great interest all of the new developments concerned with drilling and blasting procedures. At our mines 10" holes were being drilled at the average rate of 17 feet per hour, with a 50 man labor force. Reduction of costs seemed to lie largely in getting increased drilling speed.

During the past two or three years several manufacturers had developed rotary drills employing roller cone bits and compressed air to remove cuttings. However, these machines were all designed to drill smaller than 10" holes, but they all made a great step forward in the reduction of drilling costs.

Since our interest lay in a machine capable of drilling 10" to 12" holes, Bucyrus-Erie was persuaded to enter the field and design and manufacture a roller cone compressed air machine capable of drilling vertical holes of 12" diameter. In September, 1952, the first of these machines, designated the 50-R, was delivered to Maumee Mine No. 27 at Dugger, Indiana, and immediately proved that such holes could be drilled at astonishing rates of speed.

Briefly, the machine is a crawler type, weighing 51 tons; mounts tandem compressors of 1280 cfm capacity: operates on a 4,000 volt circuit with Ward-Leonard control on drill stem rotation from 1 to 150 R.P.M.; uses 7" diameter stem in 33 feet sections above a 5 foot stabilizer on which is attached a 105/s" roller cone bit. Rotation of the bit is by motor drive from the top of the stem, which raises and lowers by rope hoist. Down pressure is applied by a hydraulic motor. Dust blowing out of the hole with the cuttings is collected by a Roto-Clone collector. The 50-R was designed to drill 105/s" holes at a rate of 100 feet per hour in the type of overburden existing at Maumee mines.

We now operate three of these machines and have now had enough experience to establish our production rates.

In view of this experience, then let us examine the comparative potential of a driling and shooting operation using 42-T churn drills against one using the 50-R dry rotary drill.

Assuming the productive capacity of a stripping unit as a million yards per month of 31 days and a drilling pattern of hole spacing 27 x 30 feet—which gives us a yardage of 30 yards per foot of hole we find our drilling requirements to be 33,333 feet of drill hole per month.

The 42-T drills require one hour of shift time to drill 17 feet of hole or 1961 drill hours per month. This

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would require 291 shifts of 63/4 hours each. This means then that four 42-T drills are required for three shifts, six days every week. Normally the first and second shift would require three men to each unit to drill and load the holes, while the third shift would use only two men. Two foremen would normally be required. This makes necessary the employment of 34 men on a straight 6 day basis.

On the same basis, the 50-R drill requires one hour of shift time to drill slightly over 100 feet of hole, or 333 drill hours to do the same job as the 42-T's at 1961 hours. This would require 50 shifts of 63/4 hours each. Therefore, one 50-R drill operating two shifts daily, six days a week, would do the same job as the four 42-T's operating three shifts daily. The manpower requirement would be only seven men, including one foreman, to replace the 34 men required for the 42-T's. This is only 21% of the labor force required by the 42-T's to do exactly the same amount of productive work and to do it better.

The figures used in the hypothetical example given here are based on records of drilling in our own mines and are truly comparative because they are produced by the same crews and at the same location and under identical working conditions.

The figure of 17 feet per hour for the 42-T churn drills is an average of over two years of operation of eight machines. The monthly averages in this time varied only from a low of about 15 feet per hour to a high of about 21 feet per hour.

The figures on the 50-R performance are based on two years' experience with one unit and one

year's experience with a second unit. The third unit has only recently gone into service and figures are not yet available. The monthly averages in this time have varied from a low of about 90 feet per hour to about 150 feet per hour.

In drilling 817,000 feet of 105/8''holes to date, we have averaged 100.22 feet per hour or 676.37 feet per shift of 63/4 hours. Our apparent saving in the combined item of labor and drill supplies has been approximately 25¢ per foot.

The drill has exceeded expectations in many ways and has now enabled the driller to keep pace with other phases of the industry.

There are some very definite limiting factors, however, to the use of such a drill:

1. First is probably cost. The 50-R costs about four times as much as a comparable churn drill.

2. Second, the drill must have enough work to perform before it can be economical—therefore, its use is limited to the larger operations.

3. Third, weight may be a factor; it may be too heavy for use where the terrain is very rough or the ground too soft for satisfactory movement.

 Fourth, there is the possibility of delay in production in case of major breakdowns, as all drilling is concentrated in one machine.

The advantages of the machine are apparent wherever conditions permit its use:

First-drill speed increase from 17 feet to over 100 feet per hour of operation, allowing one 50-R to replace as many as 6 churn drills, allowing a reduction of labor force to a minimum.

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Second—the production of clean, smooth bore holes with stemming material already prepared at the mouth of the hole, increasing the efficiency of shot loading and of the blast itself.

Third—the elimination of the expense and inconvenience of an extensive water supply system which is subject to freeze and which makes much mud and water around the pit area—slowing other operations and adding to equipment maintenance costs.

Fourth—the speed and the ability of the 50-R to produce economically a high footage of large diameter drill hole makes possible the economical use of bulky, slow speed explosives.

In conclusion, may I say that we are well pleased with the operation of these machines and the economies they have produced, and believe that they are one more step in the direction of higher production, less labor and more efficiency in the regular pattern of American Industrial Progress. (Applause)

Chairman Reak: Thank you, Mr. Stewart, for that very descriptive paper on the operation of the 50-R drill.

I am sure that many of the strip mine operators in our audience are very much interested. Do we have any questions on Mr. Stewart's paper at this time?

If not, we will pass on to the next paper, which I am sure most of the operators of Illinois are particularly interested in, for it has to do with the properties of clay, as related to coal mining problems.

The paper will be presented by Mr. Arthur White, Associate Geologist of the Illinois State Geological Survey, Urbana Illinois. Mr. Arthur White. (Applause)

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PROPERTIES OF CLAY AS RELATED TO COAL MINING PROBLEMS

By W. ARTHUR WHITE

Associate Geologist Illinois State Geological Survey Urbana, Illinois

An understanding of clay materials is very important to the coal mining industry. Underclay is commonly the floor of mines in coals of Pennsylvanian age, and many mine roots are composed of shale, argillaceous limestone, or argillaceous sandstone. The properties of the argillaceous sediments may determine whether a mine will be a success or failure. This report points out reasons for the differences in the properties of underclays, shales, argillaceous limestones, and argillaceous sandstones.

First, we must understand what a clay mineral is. "Clays and shales are essentially aggregates of extremely minute crystalline, usually flake-shaped particles that can be classified on the basis of their structure and composition into a few groups which are known as clay minerals. Some clays are composed of particles of a single clay mineral. whereas others are mixtures of clay minerals. Some clays are composed entirely of clay minerals, whereas others contain admixtures of quartz, pyrite, organic matter, etc." (Grim and Cuthbert, 1945, pp. 4-5). The clay mineral group are kaolinite, illite. chlorite, montmorillonite. halloysite, sepiolite-palygorskite, allophane, and mixed clay minerals.

To understand the properties which clay minerals give to sediments, we will have to understand the structure of the clay minerals. Figure 1 shows the two basic building blocks, units made of silica or tetrahedral sheets and alumina or octahedral sheets, which can extend indefinitely in two directions but have a definite thickness in the third. Figure 2 shows how these basic building blocks are bonded together to make the clay mineral crystals.

Kaolinite.- The basic unit of kaolinite (fig. 2) is 1 tetrahedral or silica sheet and 1 octahedral or alumina sheet. The units are stacked one on top of the other and are tied together by hydrogen bonds between the silica sheet of one and the alumina sheet of the unit above. The thickness of a kaolinite crystal is determined by the number of units which are bonded together. The crystals can be cleaved most easily along the plane joining two basic units. Grim (1953) states that electron micrographs show that the ratio or areal diameter to thickness is 2-25:1.

Montmorillonite. – The basic unit of montmorillonite (fig. 2) is two tetrahedral, or silica, sheets

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FIG. 1—Schematic drawing showing the basic molecular layers in the unit cells of clay minerals. The trapezoid and rectangle represent the kaolinite type structure. The two trapezoids and one rectangle represent the mica type structure.

with an octahedral, or alumina, sheet sandwiched between them. The basic units may be separated from one another by one or more layers of water. According to Grim (1953) the ratio of areal diameter to thickness is 200-300:1. Magnesium and iron may substitute for aluminum in the octahedral laver and aluminum for silicon in the tetrahedral layer. The charges resulting from the substitution of ions of lesser valence for those of higher valence are counterbalanced by ions such as calcium and sodium. being adsorbed on the surface. The ions adsorbed on the surface are known as exchangeable ions.

Illite.-The basic unit of illite (fig. 2) is similar to that of montmorillonite except that some aluminum always substitutes for some silicon. These charges are neutralized by potassium. Because potassium is too large to fit into the holes in the tetrahedral or silica sheet, it forms a double wedge between the silica sheets of two basic units and keeps them from coming apart. Thus a crystal is built up of basic units stacked one above another and tied together by potassium atoms. Like montmorillonite, illite has substitutions of magnesium and iron for aluminum.

Chlorite. - The basic unit of chlorite (fig. 2) is also similar to that of montmorillonite. Chlorite differs from illite in that a brucite layer ties the basic units together either by hydrogen bonding (as in kaolinite) or by a cation of higher valence substituting for magnesium in the brucite layer and neutralizing the charge produced by a substitution of aluminum for silicon in the tetrahedral sheet. In many chlorites, magnesium and iron replace aluminum in the octahedral sheet, trading three magnesium and/or iron atoms for two aluminum atoms. The ratio of areal diameter to thickness for illites and chlorites lies between those of kaolinite and montmorillonite.

Random mixed-lattice clay minerals.—Random mixed-lattice clay minerals (fig. 2) are made up of montmorillonite units alternating with illite or chlorite units. The ratio does not have to be 1 to 1: it may contain more montmorillonite layers than illite or chlorite layers or it may contain more illite or chlorite layers than montmorillonite. The ratio of layers determines the properties of mixed-lattice clay minerals: the more montmorillonite layers, the more nearly its properties will be like the prop-

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Fig. 2-Schematic drawings of the structure of the clay minerals showing how the basic cells are bonded together.

 $H_2O \equiv water$

 $Mg(OH)_{*} \equiv brucite sheet$

 $K \equiv potassium$

a = part of crystal which has the properties of chlorite

b = part of crystal which has the properties of montmorillonite

c = part of crystal which has the properties of illite

erties of montmorillonite; and the more chlorite or illite layers, the closer its properties will approach those of illite or chlorite.

PROPERTIES OF CLAY MINERALS Cation exchange.-Cation exchange is the ability of clays to adsorb certain cations and retain them in an exchangeable state: these in turn may be exchanged for other cations. The exchange takes place in a water solution, and the exchangeable cations are held on

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the surface of the crystals. The cations most likely to be present are Ca++, Mg++, H+, Na+, K+. Cation exchange capacities in milliequivalents per 100 grams are (Grim, 1953): kaolinite, 3-15; illite, 10-40; chlorite, 10-40; montmorillonite, 80-150; mixed-lattice minerals, usually between illite and montmorillonite.

For kaolinite two theories are used to explain the cation exchange reaction. One is that cation exchange takes place along broken bonds around the crystals (Kelly and Jenny, 1936); and the other is that Al+++ is substituted for Sitt++ in the tetrahedral laver of the lattice (Brindley and MacEwan, 1953). For montmorillonite both theories are combined (Hendricks et al, 1940): cation exchange capacity is about 80 percent caused by substitutions in the lattice (divalent iron and magnesium substituting for trivalent aluminum, and trivalent aluminum substituting for quadvalent silicon) and 20 percent caused by broken bonds around the edges. Grim (1953) believes that both factors contribute to the cation exchange capacity of illite and chlorite. Both factors are also present in random mixed-lattice clay minerals; exchange capacity will resemble that of the mineral predominating in its structure.

Plastic properties. – Grim's concept (1953) is that "plasticity develops when just enough water is added to satisfy the requirements of all available surfaces for water with a definite configuration *plus* a little more water which develops little or no definite configuration of water molecules." Wilson (1936) has found the following conditions for plasticity: "(1) The plasticity of finely ground minerals with water is due to the presence of stable viscous water films held on the surface of the particles. . . .

"(2) Minerals with a perfect cleavage have a higher plasticity than those without. In general, those which have a platelike structure are more plastic than those which have a perfect cleavage in some other crystal form.

"(3) Clay minerals are more plastic than other minerals having a platelike structure."

Whittaker (1939) found that kaolinite was not plastic until it had a surface area greater than 1.80 x 10' sq. cm. per gram of clay.

Hendricks and Jefferson (1938) and Macey (1942) have postulated a solid water layer on the surface of the clay mineral with a structure similar to that of ice. Grim (1948) has postulated that "oriented water (with the ice structure) would develop from about all basal plane surfaces of the clay minerals, and the rigid adsorbed water of one surface would meet that of another surface. The rigid water would serve as a bond to hold the clay mineral units rigidly in place. With increasing amounts of water the adsorbed layers would become thicker until a thickness was reached at which orientation was nil or imperfect. Such water, having fluid properties, could act as a lubricant between the flakes. According to this concept, the plastic condition develops in a clay-water system when there is enough water to supply all the rigid water that can develop on available surfaces and a little more water that has poor or no orientation to act as a lubricant between the flakes."

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Grim and Cuthbert (1945) lound that for montmorillonite, when sodium is the exchangeable cation, the rigid water layer between two flakes was 3 molecular water layers; when calcium is the exchangeable cation, the rigid water layer between two flakes was 4 molecular water layers. Any additional water adsorbed between the flakes has fluid properties.

Kaolinite, montmorillonite, illite, chlorite, and random mixedlattice clay minerals are the most common clay minerals found in underclays, shales, and other argillaceons sediments. Their particles are plate-shaped and they all have perfect cleavage in one direction.

Kaolinite, which is the most nearly equi-dimensional clay mineral found in clays and shales, varies from very plastic to slightly plastic. Plasticity seems to be related to particle size—the larger the particle size the less the plasticity. The relative surface area is greater as particle size decreases. Whittaker (1939) has shown that there is a relation between plasticity and surface area. The type of exchangeable cation changes the plasticity of kaolinite very little.

The plasticity of montmorillonite, on the other hand, is greatly affected by the type of exchangeable cation on the exchange positions. Sodium and lithium increase the plastic range as much as three to four times more than calcium or magnesium.

In contrast to kaolinite, a montmorillonite crystal is thin in relation to its length and width and therefore has a very large surface area. Hendricks et al. (1940) have estimated that the surface area of montmorillonite is in the neighborhood of $8 \times 10^{\circ}$ sq. cm. per gram.

Montmorillonite particles probably have the largest effective surface area of any of the clay minerals we are discussing, and it is the most plastic. Apparently both the surface area and exchangeable cations contribute to its plasticity; there are many large surfaces along which sliding takes place when the surfaces are lubricated. The thinness of the crystals would have less wedging effect than the thicker kaolinite crystals. The thin montmorillonite crystals can also be more easilv orientated with flat surfaces. parallel to each other than the larger kaolinite crystals.

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Chlorite and illite, being intermediate between kaolinite and montmorillonite, have intermediate plastic properties. The type of cation plays a lesser role than does particle size. The chlorite- and illite-type mixed-lattice minerals fall between illite and chlorite and montmorillonite in plasticity, most resembling that mineral whose crystal structure it is most like.

Investigations at the Illinois Geological Survey have indicated that shales which contain kaolinite and/ or well-crystallized illites are good coal-mine roofs, and that shales which contain mixed-lattice clay minerals and/or montmorillonite are generally poor roofs, probably because the latter shales adsorb water and swell, which causes the roof to crack and fall.

Underclay squeezes* have been found in a mine only where the underclay contains montmorillonite. Likewise, underclay squeezes occur in a mine where there is a large

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^{*} Roof-shale and underclay-squeeze problems will be discussed more fully in papers presented at the annual meeting of the American Institute of Mining and Metallurgical Engineers in February, 1955.
percentage of mixed-lattice clay minerals but not where the ratio of illite to mixed-lattice clay minerals is higher.

CONCLUSIONS

Montmorillonite and mixed-lattice clay minerals (particularly those with structure closely approaching that of montmorillonite) can be considered unstable clay minerals. They may be the cause of underclay squeezes or bad roof conditions if they are present in sufficiently large quantities.

Small amounts of montmorillonite give to clavs plasticity greatly out of proportion to their weight percentages because of their large contribution to the surface area.

Larger percentages of mixed-lattice minerals than montmorillonite would be required to produce the same degree of plasticity or swelling because of the smaller surface area of the mixed-lattice clay mineral.

As mine floor and roof materials, kaolinite, good crystalline illites, and chlorite can generally be considered stable, but it must be remembered that under sufficient stress any clay floor will flow plastically and any shale roof will crack.

REFERENCES

- Brindley, G. W., and MacEwan, D. M. C., 1953. Structural aspects of the mineralogy of clays and related silicates: Ceramic Symposium, British Ceramic Society, R. T. Green and G. H. Stewart, eds.
- Grim, R. E., 1948, Application of mineralogy to soil mechanics: some fundamental factors influencing the properties of soil materials: Proc. Second Internat. Conf. on Soil Mechanics and Foundation Engineers, v. 3, Amsterdam.
- Grim, R. E., 1953, Clay mineralogy: New York, McGraw-Hill.
- Grim, R. E., and Cuthbert, F. L., 1945, Bonding action of clays. Part I, Clays

in green molding sands: Illinois Geol. Survey Rept. Inv. 102.

- Grim, R. E., and Cuthbert, F. L., 1915. Some clay-water properties of certain clay minerals: Jour. Am. Cer. Soc., v. 28.
- Hendricks, S. B., and Jefferson, M. E., 1938, Structure of kaolinite and talcpyrophyllite hydrates and their bearing on water sorption of the clays: Am. Mineralogist, v. 23.
- Hendricks, S. B., Nelson, R. A., and Alexander, L. T., 1940, Hydration mechanism of the clay mineral montmorillonite saturated with various cations: Jour. Am. Chem. Soc., v. 62.
- Kelley, W. P., and Jenny, Hans, 1936, The relation of crystal structure to base exchange and its bearing on base exchange in soils: Soil Sci., v. 41.
- Whittaker, H., 1939, Effect of particle size on plasticity of kaolinite: Jour. Am. Cer. Soc., v. 22.
- Wilson, E. O., 1936, The plasticity of finely ground minerals with water: Jour, Am. Cer. Soc., v. 19.

Chairman Reak: Thank you, Mr. White, for your excellent paper on the properties of clay related to coal mining problems.

Are there any questions that the audience would like to ask Mr. White after listening to his paper?

1 am not surprised that we coal diggers have no questions to propound to this professor on the paper that has been presented. I do think it was a very fine paper.

Next we come to a paper that I am sure everyone in this audience is particularly interested in, because it deals directly and vitally with things that we are all interested in.

It gives me great pleasure at this time to introduce Dr. Walter H. Voskuil, Mineral Economist, Illinois State Geological Survey, and professor of Mineral Economics, University of Illinois, Urbana, Illinois, Dr. Voskuil. (Applause)

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THE MIDWEST COAL MARKET

By WALTER H. VOSKUIL

Mineral Economist Illinois State Geological Survey Urbana, Illinois

COAL MARKET TRENDS

The coal industry has been in market trouble many times. That is, many times the coal industry was able to offer much more coal for sale than the market would take. On each occasion some one dominant factor usually caused the difficulty. In times past it has been the controversy over lake cargo freight, the ICC order allocating coal cars in World War I, loss of space heating market to heating oils, and a little later, loss of market to natural gas.

In the present imbalance between the market for coal and what the coal industry can produce, the dominant factor is recent loss of the railroad market to diesel fuel.

If the coal industry is to adjust to a changing market, it must study and undertsand its market trends.

PLAN OF ANALYSIS

This paper presents a method of analyzing the market for coal in the Upper Mississippi Valley (including Illinois, Indiana, Wisconsin, Minnesota, Iowa and Missouri, Fig. 1). The Upper Mississippi Valley market area buys 90 percent of its coal from the associated coal districts of Illinois, Indiana, and western Kentucky, although 40 percent of its total coal requirements comes from castern Kentucky and West Virginia coal mines.

The chief consumers of coal are the electric utilities, by-product coke ovens, general manufacturers, and retail buyers of coal for domestic heating. All groups except coke ovens are represented in each local market.

The principal local markets are the metropolitan areas of Chicago, Indianapolis, St. Louis, Minneapolis-St. Paul, Milwaukee, Daven-



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	Interior Basin Fields	United States	Percent of U. S Total
1942	104	583	17.8
1943	113	591	19.1
1944	124	620	20.0
1945	119	578	20.6
1946	103	534	19.3
1947	115	631	18.2
1948	112	600	18.7
1949	82	438	18.8
1950	100	516	19.4
1951	96	534	18.0
1952	83	465	17.9
1953			
1954			

TABLE 1. COAL PRODUCTION, INTERIOR BASIN FIELDS AND UNITED STATES TOTAL, 1942-1952

(In millions of tons)

TABLE 2. FUELS PURCHASED BY CLASS I RAILROADS*

	Coal Thousand Tons	Fuel Oil Thousand Barrels	Diesel Fuel Million Gallons
1940	90,726	65,198	81
1941	107,383	80,725	119
1942	124,308	99,652	186
1943	133,174	115,563	231
1944	138,808	113,314	331
1945	124,220	111,966	454
1946	110,385	98,442	560
1947	108,373	96,745	800
1948	102,256	89,722	1,207
1949	66,920	63,158	1,535
1950	65,855	60,386	1,979
1951	55,874	54,424	2,459
1952	39,100	39,932	2,891
1953	28,998	24,647	3,141
1954 (est)	17,000	16,000	3,150

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The analysis first looks at the local coal supply, then examines the market outlook in each consumer group, and finally consolidates the findings for each local market area.

LOCAL COAL SUPPLY

The local supply of coal (that is, coal from Illinois, Indiana and western Kentucky) available to the Upper Mississippi Valley market area for the ten-year period 1942-1952 is shown in Table 1 (Figs. 2 and 3). Coal production in the Interior Basin fields fell drastically from 104 million tons to 83 million tons. But coal production was falling in the other coal districts, too, so that our local coal fields continued to produce about 18 percent of the nation's total coal production.

CONSUMER GROUPS

Coal from Illinois, Indiana and Kentucky has been used to produce electric power, as railroad fuel, fuel for manufacturing industries, and in retail trade, including domestic heating. A little coal has

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TABLE 3. ILLINOIS COAL PRODUCED AND PORTION SOLD TO RAILROADS

(In Tons)

1944	1952	1953
77,400,000	45,753,000	45,966,000
18,572,800	5,683,500	3,826,000
24.0	12.4	
	1944 77,400,000 18,572,800 24.0	1944 1952 77,400,000 45,753,000 18,572,800 5,683,500 24.0 12,4

TABLE 4. ELECTRIC POWER PLANTS, CAPACITY (KW) AND CALCULATED FUEL CONSUMPTION

		1952	Added in 1953	Planned for 1954-57	Total
1.	St. Louis area (KW) Coal required (tons)	1,077,708 3,416,334	168,000	225,000	1,470,708 4,662,149
2.	Chicago area (KW)	3,055,687 9,686,508	231,000	372,000	3,658,687 11,598,038
3.	Illinois river ports (KW)	659,892 2,091,858	75,000	-0-	734,892 2,329,607
4.	Mississippi River ports (KW) Coal required (tons)	358,831 1,137,494	-0-	25,000	383,831 1,216,744
5.	Joppa (KW) Coal required (tons)	735,000 2,329,950	312,500	625,000	1,672,500 5,301,825
6.	Wabash-Ohio Rivers (KW) Coal required (tons)	77,000 244,090	75,000	250,000	402,000 1,274,340
	Total (KW)	5,964,118	861,500	1,497,000	8,322,638

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begun to go to the metallurgical coal market. What are the trends in these markets?

۰.

Railroad fuel—a lost market.— The biggest single change in the coal market in the last ten years has been the loss of railroad fuel. The decline in coal and the rise in diesel fuel are shown in the chart (Fig. 4) covering the period since 1940, the year the first diesels were installed.

In 1944 the country's railroads bought 139 million tons of coal; in 1954 they bought 17 million tons. In 1944 railroads took 22 percent of the country's total coal output; in 1954 they took only about 5 percent. True, railroads may someday return to the use of coal as fuel, but such a possibility is beyond the period of present calculations. The history of the changeover period is shown in Table 2 which tells how much coal, fuel oil and diesel fuel Class I railroads purchased. Table 3 shows how Illinois coal producing companies shared in the decline.

Electric utilities.—The market for electric power has grown constantly and is expected to show further gains. The map (Fig. 5) shows the locations of principal electric utility plants in Illinois. Table 4 shows the kilowatt-hour capacities of plants in 1952, those added in 1953, and capacities of plants planned for completion in 1954 to 1957.

Each plant will use coal at the rate of 3.17 tons per year for each installed kilowatt capacity. (This is calculated on data from electric

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Quantity	B.t.u. in Millions	Cost in Thousands	Percent of Total Cost	Cost per Million b.t.u. in Cents
Coal, M/Tons	26,965,040	5,598.0	2.7	21
Anthracite, M/Tons	1,855,040	432.1	8.2	23
Coke, M/Tons	294,772,400	150,731.8	70.7	51
Fuel oil, M/bbls	73,714,696	33,218.5	15.5	45
Nat. gas, M/c.f 10,275.1	10,275,100	1,510.1	0.8	14
Mfg. gas, M/c.f	79,000,000	14,353.8	6.9	18
Mixed gas, M/c.f	51,000,000	6,870.5	3.2	13
Total	537,582,276	212,714.8		

TABLE 5. FUELS USED IN BLAST FURNACES AND STEEL MILLS IN ILLINOIS AND INDIANA*

*Source: Census of Manufacturers.

TABLE 6. PIG IRON COST DATA

Pig iron produced, net tons	58,339,942
Value of pig iron produced	\$1,708,313,000 \$29.28
Cost of fuel in pig-iron production	\$634,111,000
Less values of blast-furnace gas recovered and sold	\$ 52,925,000
Net fuel cost Net fuel cost per ton of pig iron	\$581,186,000 \$ 9,96
Wages and salaries paid Wages and salaries per ton of pig iron	\$111,413,000 \$ 1.90
Cost of materials, parts, containers and supplies (mostly ore) Cost per ton	\$751,673,000 \$12.88
Value added by manufacture	\$328,060,000 \$.5.61

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utilities in Illinois.) If the plans are carried out, electric utilities will increase their coal purchases by 7 million tons.

By-product coke ovens.—The market for coal in manufacturing is of two kinds: (1) coal and coke for the coke ovens for the iron and steel industry, and (2) all other manufacturing. The division may sound arbitrary, but there is a good reason for it.

In the first place, the reduction of iron ore to iron takes the lion's share—one-third or more—of all luels used in manufacturing. And in the second place the reduction of iron ore to iron requires coke made from specially suitable coals, practically all of which now come from West Virginia, Virginia and eastern Kentucky fields. Hence the by-product coke ovens are a major market for a special coal.

Table 5 shows the quantities of fuels used in the primary iron and steel industry of Illinois and Indiana, mainly the Chicago district, although Granite City also has a small iron and steel industry. The fuel for iron and steel is also the highest priced fuel, for it costs 51 cents per million Btu, as shown in Table 5.

The cost of the fuel in the manufacture of iron, as shown in Table 6, amounts to about one-third of the value of pig iron.

Three elements are significant in the cost of coke delivered at the blast furnace plant: (1) mine price of coal; (2) transportation costs

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	Million B.t.u.	Percent of B.t.u.	Cost \$ 000	Percent of Cost	Cents per Million B.t.u.
Coal, M/Tons	270,855,600	44.3	49,674	26.0	18,3
Anthracite, M/Tons 270	7,344,000	1,2	1,868	1.0	25.4
Coke, M/Tons5,700	148,200,000	24.1	78,210	40.6	52.9
Fuel oil, M/bbl	75,622,080	12.3	37,737	19.8	49.8
Nat. gas M/c.f	42,246,000	7.0	9,697	5.3	22.9
Mfg. gas M/c.f	14,400,000	2.3	3,462	1.7	24.1
Mixed gas M/c.f	53,000,000	8.8	10,831	5.6	22.0
Total	611,677,680	100.0	191,479	100.0	31.3

TABLE 7.	FUEL USED IN	MANUFACTURING	IN ILLINOIS AND COST, 1947,
	EXCLUSI	VE OF PURCHASED	ELECTRICITY*

from mine to coke plant; and (3) cost of processing coal to coke.

Coking coal for the Chicago iron and steel industry is shipped such long distances that it entails a high freight rate, now standing at \$4.64 per ton from eastern Kentucky and \$4.84 a ton from West Virginia. Also, the approaching scarcity of elite coking coals is bringing about a higher rate of price increase for these coals than for non-coking coal supplies.

General manufacturing.—Illinois manufacturing industries buy annually about 10 million tons of coal, six million tons of coke made from coal, and by-product gas made in the coke ovens.

A census on fuels used in manufacturing in 1947 has been published in a detailed report. Pertinent data from it are given in Table 7. Although prices have changed since 1947, the table nevertheless shows the relative quantities of each fuel used. Coal, including coke and by-product gas, furnished about 75 percent of the total fuels used in all manufacturing. The table shows that coal and natural gas compete in price, and that fuel oil, even in 1947, was priced considerably higher than coal. We cannot here consider comparative efficiencies of the fuels because we do not have the data.

The general manufacturing industries each use a comparatively

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(1) Industry No.	(2) Wages and Salaries in Thousands	(3) Cost of Fuel in Thousands	(4) Percent (3) is of (2)	(5) Percent of Total Cost
20	\$3,784,387	\$170,250	4.5	7.3
21	205,838	3,862	1.9	0.2
22	2,836,166	84,486	3.0	3.3
23	2,527,499	9,161	0.4	0.4
24	1,337,612	46,834	3.5	1.9
25	824,061	9,898	1.2	0.5
26	1,280,672	147,670	11.5	6.1
27	2,277,263	11,409	0.5	0.5
28	1,910,463	211,199	11.0	8.8
29	739,345	68,398	9.2	2.9
30	785,464	21,227	2.7	0.9
31	857,566	11,830	1.4	0.5
32	1,210,768	202,870	16.8	8.6
33	3,594,548	1,128,352	31.4	47.5
34	2,832,835	57,051	2.0	2.4
35	4,804,563	75,019	1.6	3.1
36	2,271,039	29,842	1.3	1.3
37	3,719,583	65,453	1.8	2.9
38	665,347	5,696	0.9	0.2
39	1,205,208	15,742	1.3	0.7
Total	39,689,527	2,376,801	6.0	100.0
ource: Bu	reau of the Census.			

Γ	AB	L.E	8.	COST	OF	FUEL	AND	SAL	ARIES	AND	WAGES	S PAID,	1947.
----------	----	-----	----	------	----	------	-----	-----	-------	-----	-------	---------	-------

20 Food and kindred products 21 Tobacco manufactures 22 Textile mill products 23 Apparel and related prod- ucts	 Printing and publishing in- dustries Chemicals and allied prod- ucts Petroleum and coal products Rubber products 	 33 Primary metal industries 34 Fabricated metal products 35 Machinery (except electrical) 36 Electrical machinery 37 Trensuprtation conjument
24 Lumber and products. except furniture 25 Furniture and fixtures	31 Leather and leather prod- ucts 22 Stone alay and glass prod-	38 Instruments and related products
26 Paper and allied products	ucts	39 Miscellaneous manufactures

small amount of fuel. For example, manufacturers of transportation equipment (including automobiles, railroad equipment, air craft and water craft) take only one-tenth as much fuel and power as does the primary iron and steel industry. And the same group has a fuel cost that is only 1.8 percent of its wage bill.

The general manufacturers could use oil or natural gas as fuel if it were convenient to do so, but when this fuel cost is only a small percentage of their total cost they are not critical of comparative fuel costs. They are more apt to try to save on wages, if possible (Table 8).

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Агея	Bituminous & Anthracite	Coke M tons	Fuel Oil M bbls.	Natural Gas	Mfg. Gas	Mixed Gas
	Coal M tons			(Ga	s in millions of cu	. ft.)
st. Louis Arca	2,794.0	494.4	1,663.0	27,861.1	7,288.6	2,204.0
Jhicago Arca.	6,152.4	11,227.8	18,252.4	11,732.1	336,218.2	215,170.2
coria Arca	1,270.1	22.8	221.4	2,752.6	μ	35.0
tock Island Area	382.6	34.6	98.86	2,209.2	58.6	275.4
a Salle Area	838.7	10.4	243.9	3,988.4	179.0	879.3
t. Paul-Minncapolis	303.1	50.8	725.3	6,746.2	399.9	557.8
filwaukee Area	1,049.2	83.3	1,329.8	Ţ	2,015.4	l

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PROCEEDINGS OF THE

		Millions of B.t.u.	Percent
Coal, M tons	6,152.4	161,192,880	22,7
Coke, M tons	.11,227.8	291,922,800	41.0
Fuel oil, M bbls.	.18,252.4	108,059,208	15.2
Natural gas, millions cu. ft.	.11,732,1	11,732,100	1.6
Manufactured gas, millions cu. ft.	336,218.2	84,054,550	11.8
Mixed gas, millions cu. ft.		53,792,550	7.7
Total		710,749,088	100.0

TABLE 10, FUELS USED IN MANUFACTURING IN THE CHICAGO AREA

LOCAL MARKETS

The local market areas consist of the major metropolitan areas, only seven of which are analyzed here. The summary of total fuels consumed in the seven local market areas is given in Table 9.

Chicago market.—The Chicago manufacturing district is unique in that it offers a market for two types of coal which are non-competitive, that is, coking coal and coal for general manufacturing.

The coking coal is imported from fields in West Virginia, eastern Kentucky and Virginia. Total fuels used and percentage distribution of each is given in Table 10. St. Louis market.—The St. Louis metropolitan area consists of Madison and St. Clair counties in Illinois and the city of St. Louis and St. Charles and St. Louis counties in Missouri.

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The St. Louis area has all types of manufacturing, as classified in the Census, but 80 percent is concentrated in food processing, apparel, chemical manufacture, processing and fabrication of metals and minerals, and manufacture of machinery. Total fuels used in the St. Louis area are given in Table 11. Coal furnishes 57 percent of the fuels used for manufacturing in the St. Louis area.

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	Millions of B.t.u.	Percent
Coal, M tons	73,202,800	57.1
Coke, M tons	12,044,000	9.4
Fuel oil, M bbls	9,844,960	7.7
Natural gas Mill c/f	27,861,100	21,7
Mfg. gas Mill c/f	3,644,400	2.8
Mixed gas Mill c/f2,204.0	1,763,200	1.3
Total	128,560,540	100.0

TABLE 11. FUELS USED IN THE ST. LOUIS AREA

Competitive fuels in the St. Louis area are coal, fuel oil, and natural gas. Comparative costs of fuels used in manufacturing, at 1947 prices, were as follows per million Btu: bituminous coal 19 cents; fuel oil 43 cents; natural gas 21 cents.

This comparison takes no account of differences in efficiency of fuel or the desirability of one fuel over another. A high proportion of fuel oil is used in the St. Louis manufacturing area because of the large refinery output of fuel oil in the Wood River district.

St. Paul-Minneapolis market,— The area that centers in St. Paul and Minneapolis uses three million tons of coal a year, more than onethird of which is shipped from Illinois mines.

The quantities of fuel used in manufacturing and their percentage distribution as of 1947 are shown in Table 12.

The comparative cost of fuels at 1947 price levels were as follows per million Btu: Bituminous coal 43 cents; fuel oil 52 cents; natural gas 19 cents.

Peoria, LaSalle and Rock Island markets.—At present the manufacturing districts of Peoria, LaSalle and Rock Island are of minor importance as fuel users. Two factors should be considered in appraising their future markets: (1) By 1975 population of the country is expected to increase by 30,000,000,

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	Millions of B.t.u.	Percent
Coal, M tons	7,941,220	37.8
Coke, M tons	1,320,800	6.4
Fuel oil, M barrels 725.3	4,293,776	20,3
Nat. Gas, Mill c/f 6,746.2	6,746,200	32.2
Mfg. gas, Mill c/f	200,000	0.9
Mixed gas, Mill c/f557.8	501,900	2.4
Total	21,003,896	100.0

TABLE 12. QUANTITIES OF FUEL USED IN MANUFACTURING AND THEIR PERCENTAGE DISTRIBUTION UNDER 1947 CONDITIONS

and (2) industries will draw more and more heavily on water supplies. Industrial plants which need large quantities of water will choose between sites on the Great Lakes and sites on the inland waterways system. The Illinois Waterway offers certain advantages of location and a long season of navigability.

Choice of fucls for manufacture may sometimes be influenced more by convenience than by cost of fuel. Money paid for fuels are, with a few exceptions, only a small percentage of a manufacturer's bill for wages. Therefore, the manufacturer has no strong incentive to economize or give a cost preference in his choice of fuel. Only for primary metals, stone, clay, glass and paper manufacture are the fuel bills significant.

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We have fuel consumption and costs in detail only for 1947. Therefore, fuel consumption and cost in manufacturing industries must be estimated on a basis of the number of persons employed and changes in their average weekly earnings from 1947 to 1952. These are as follows:

Employment......up 2 percent Cost of coal......up 18 percent Weekly carnings of wage earners....up 36 percent

You'll discover good merchandise advertised in this good publication.

Enal cost

Using changes in the cost of coal and earnings as a basis of estimated total fuel costs and wages, we arrive at the following for 1952 (figures are given in thousands):

1947 1952	1947	1952
-----------	------	------

ruer costs		
all industries	2,376,801	2,807,625
Wages and salaries		
all industries	39,689,527	53,977,757
Percent of wages	6.0	5.2

TABLE 13

SUMMARY OF PRINCIPAL LOCAL MARKETS IN ILLINOIS AND ADJACENT STATES

ST. LOUIS MARKET	(tons)
Manufacturing	2,794,000
Electric utilities	4,662,000
Domestic fuel	1,750,000
Coke oven	700,000
Total	9,906,000

CHICAGO INDUSTRIAL AREAS	
Electric utilities	
Manufacturing	6,152,000
Coke manufacture	14,600,000
Domestic heating	

Total	 37.	150,000

PEORIA	
Domestic heating	99,000
Manufacturing	1.270,000
Electric utilities	2.329,600
Total	3,698,600
MOLINE-DAVENPORT-ROCK ISLAND	
Domestic heating	264,000
Manufacturing	383,000
Electric utilities	500,000
Total	1,147,000



Fig. 5. Location of important electric utility plants, 1944.

COMPETITIVE POSITION OF NATURAL GAS IN ILLINOIS

The natural gas consumption in Illinois in 1953 is summarized in Table 12. The coal equivalent of natural gas is calculated at 9,300,-000 tons. Most important figure in this table is the quantity and price of natural gas sold on an interruptible contract basis. A price of 24 cents per million B.t.u. is approximately equivalent to coal at \$5,00 a ton. Presently nearly one-third of the natural gas used in Illinois is so marketed. If underground storage of natural gas proves successful and is extended, it appears prob-

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Users	Million B.t.u.	Use By	Revenues By	Revenues By	Price per Million
		Percent	Use	Percent	B.t.u.
Residential sales				1.00	
(exclusive of space heating)	34,630,941	14.22	\$44,337,844	28.47	1.28
Residential space heating	66,182,049	27.18	55,522,614	35.65	.84
Commercial sales	22,109,984	9,08	16,421,951	10.55	.74
Industrial non-interruptible	42,421,579	17.42	20,535,221	13.19	.48
Industrial interruptible	77,798,965	31.96	18,719,630	12,02	.24
Other	305,660	0.14	187,767	0.12	.63
Total Sales	243,449,178	100.00	\$155,725,027	100.00	.64
Total					
Sales Reported	243,453,803				
Wastage	4,695				
Coal Equivalent	9,300,000 1	ons			

TABLE 14. NATURAL GAS IN ILLINOIS, 1953

able that the supply of gas now sold on an interruptible basis at a low price will be channelled into the domestic space heating and the markets now supplied by low priced gas will revert to coal. In this case it is probable that midwestern coals would gain the industrial market and the low volatile eastern coals would lose the domestic fuel coal market to natural gas.

NO RAPID SHIFT TO ATOMIC POWER.

Transition to nuclear power will

not be sharp because "overall demand for power is increasing so fast that coal and fluid hydrocarbons will probably be consumed in greater and greater quantities for the rest of this century."

This quotation is from John W. Landis of the Babcock and Wilcox Company, which is operating a fullscale atomic energy division.

"Most optimistic advocates of nuclear power do not forsee more than 20 percent of the nation's electrical energy coming from nuclear fuels before 1975," Landis continued. Limiting factor may be

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Tons	Days Worked	Tons at 250 Days Worked
Western Kentucky	187	28,000,000
Indiana	180	22,500,000
Illinois	161	64,000,000
Total		114,500,000

TABLE 15. COAL SUPPLY

speed with which utility companies can gain practical operating experience. It is impossible to evaluate fully a new type of power plant until long-term operating and maintenance costs are available.

Discussing the future of the atomic age, Foote estimates that, by 1975, about 2 percent of the nation's electrical power, or 28 billion kw.-hr., will be produced by nuclear reactors. This will necessitate production of dangerous radioactive fission products amounting to 10,000 pounds annually, or roughly several thousand times the amount of radium in all the hospitals and laboratories of the world. No practical solution exists for utilizing, handling or disposing of such vast amounts of radiation, he says.

One solution proposed is burial underground in tanks guaranteed not to leak for several hundred years. But even transportation to the burial area is a sizable problem. The elaborate precautions that must be taken in a hospital with merely a few milligrams of radium are trivial compared to the immense precautions required in handling tons of such radioactive material.

Unfavorable winds following an accident at a reactor might carry contamination to a large city, resulting in damage claims exceeding the assets of even a very large corporation, Foote observes. The suggestion has already been made that the Government set up indemnity insurance for damage exceeding ten million dollars.

Chairman Reak: Thank you, Dr. Voskuil, for that very interesting paper on the trends in the coal market, and your predictions of the future for this industry, which we all hope are correct, and which might come sooner than you might anticipate.

I am sure some of us would have some questions that we would like to ask the Doctor on this paper. We will have them now, if you have any, please.

Looks as if they are all satisfied, Dr. Voskuil.

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I will now turn this meeting back to Mr. MacDonald.

Chairman MacDonald: Thank you, Mr. Reak, for a most able performance in conducting and guiding these papers this afternoon.

It has been an excellent presentation, and I know these gentlemen have enjoyed it.

You have been a fine audience, with excellent reception. It is a compliment to the speakers, by reason of the courtesy given and the lack of interference from any part of the room.

I want to call your attention to the dinner meeting tonight. It will begin at six-thirty. We have a splendid program. We will endeavor to start on time.

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For this evening's meeting, as toastmaster we will have Mr. George C. McFadden, who will function on behalf of President Harold L. Walker, as listed on our program.

Gentlemen, if there is nothing further, we will adjourn at this time, to meet again in this room at six-thirty.

The meeting is adjourned.

(The meeting was adjourned at four o'clock.)

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FRIDAY BANQUET SESSION

November 12, 1954

The Convention reconvened at 7:45 p.m., George C. McFadden, on behalf of President Harold L. Walker, presiding.

Chairman George C. McFadden: Members and Guests: Our President, Harold L. Walker, would probably do a pretty good job if he were here. But since, as you know, he is in India, I will endeavor to carry on in his behalf.

We have one very special guest in the room, and I would like to ask Miss Brail [Mrs. Loring], who came all the way from Atlanta to be with us, to stand. (Applause)

(The Assembly applauded as Chairman McFadden then introduced the guests seated at the speaker's table.)

Chairman McFadden: We have, as our guests tonight, students from the University of Illinois and from the Missouri School of Mines. I would like to ask each student to stand as his name is called.

(The Assembly applauded as Chairman McFadden introduced the students.)

Chairman McFadden: Thank you very much, gentlemen.

We now come to a very special part of our program. We are going to call on Mr. John E. Jones, who has a special message. Mr. Jones. (Applause) Mr. John E. Jones (Old Ben Coal Corporation, West Frankfort, Illinois): Mr. Chairman, Members and Guests: It is my high honor, privilege and somewhat of a sad duty to have been appointed by you to bid a farewell to our mutual friend, after his twenty-five years of untiring and active service as our Secretary-Treasurer.

First, I will read you a letter from our absent President, who, as our Chairman told you, is in India. As you all know, it is about this hour tomorrow morning in India now, but I am quite sure his thoughts are with us.

"Mr. B. E. Schonthal Secretary-Treasurer Illinois Mining Institute

"Dear Mr. Illinois Mining Institute:

"You are the 'Illinois Mining Institute' in heart and it is my privilege to address you in that manner. I deem it a great privilege to write this commendatory letter on the event of your retirement from the Secretary-Treasurership of the Institute. to express my humble and grateful appreciation of your untiring efforts in serving the Illinois Mining Institute for twentyfive years. The Institute will miss your guidance, enthusiasm and encouragement in the days ahead.

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"You are the Illinois Mining Institute because you have nursed it from an almost defunct nucleus of a few mining men to its present status of the biggest and most important mining institute in the whole of the United States. In carrying out the duties of your office, in planning its financial policy, in planning the annual program, in the precise and far-sighted planning of the Institute's policies and aims to serve the Illinois Mining Industry, and other activitiespresent and projected-in these and every other activity, I recognize and admire your meticulous knowledge and ripe experience. These serve to impress upon me all the more, as if it were necessary, the void which will be left by your resignation and which will indeed be impossible to fill.

"I will not attempt to enumerate any further the benefits that the Institute has obtained by your hands and your mind. I cannot, however, resist making a humble reference to the friendliness and affection which you have had for each and every member of the Institute and to young students of Mining Engineering.

"I am now half-way 'round the world and I resent that I cannot be present to preside, as President, at the 1954 Annual Meeting, which is your twenty-fifth meeting as an officer of the Institute.

"In conclusion, Sir, I humbly pray to God Almighty to shower His choicest blessings on vou and your family and favor vou with many more years of happy and useful work.

- "I beg to remain. Sir,
 - "Yours respectfully.
 - s/ Harold L. Walker President Illinois Mining Institute"

Now, it was, as Mr. Walker says, and as your Chairman says, just twenty-five years ago when you elected Bale to be Secretary of our Institute.

I was your President then in 1908-'09, and I am indeed proud to be one of the triumvirate of that time, a most important link in the chain of events to make the I.M.I. the leading State mining institute in our nation. I the President, Bale the Secretary, and Helen Brail the worker. I cannot understand why it is that Helen and I do not get our share of the applause. (Laughter)

The result has been the growth of our Institute from three hundred members to twelve hundred members-an increase of four hundred per cent: the fine financial status, vou heard in our business session this morning: and last, but not least, the beginning of our annual printed proceedings just twenty-five years ago. These proceedings, so well directed by Bale and Helen. are of great importance to you, whatever may be your niche in the mining industry. They have an important place in your libraries and textbook value in our are of schools.

Your job, Bale, has indeed been well done. In commemoration thereof, the members have each written you a letter, including their various expressions of appreciation. They are bound in two volumes which I have in my hand. The letters are alphabetically in order, as to the surname initial of the writer, so arranged that following your first reading at leisure, you can readily find the letter of any one or more for reference.

There is one, however, that is not in alphabetical order. The let-

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ter written to you by Mrs. Hugh Murray is the first one. Mr. Hugh Murray was the first Secretary of our Institute. He was first elected in 1892, just sixty-two years ago.

You will recall our many visits with Mr. and Mrs. Murray in their home in Equality prior to 1942.

While not fully ethical to read your correspondence, I will, however, digress and read this letter to you. It is very appropriate, indeed, for the first one in the book.

"Mr. B. E. Schonthal 28 East Jackson Blvd. Chicago, Illinois

"Dear Mr. Schonthal:

"When I learned that you are resigning as Secretary of the Illinois Mining Institute after twenty-five years of very active service, 1 again thought, 'though the workers change, the work goes on.' As you know, my husband was the first secretary of the I.M.I.-made so at their first meeting, February 17, 1892, 1 am reminded of this date from the 'Early History of the Illinois Mining Institute' in your 1929 'Proceedings' written by our mutual friend, John E. Jones. It has always been a pleasure to hold in memory that Mr. Jones brought vou, Mr. Thomas Moses, Mr. Fred Weissenborn and other old friends of the coal mining industry to our home in Equality, Illinois. Mr. Murray was highly pleased at being made an honorary member and also being remembered on his 86th birthday, by a shower of greetings and many visits by members of his beloved I.M.I. Also, he enjoyed the 'Proceedings' each year, and, I want to assure you again my appreciation of your keeping me on your mailing list.

"I was very pleased that Mr. Jones, Mr. Moses and others of the I.M.I. were with us in our last service for him—Mr. Jones speaking of his early coal mining activities in Illinois, including public services as an officer with the State Mining Board. Mr. Moses paid tribute to his qualities as a man one sentence I'll always cherish: 'In all my dealings with Mr. Murray, I've never known him to sacrifice principle for personal gain.' And this spirit, my dear Mr. Schonthal, carried on by you, has helped make the I.M.I. what it is today.

"As you know, he passed away June 5, 1942, at the age of 90. His death occurred while you were celebrating the I.M.I.'s fiftieth anniversary on your boat trip on the 'Golden Eagle.'

"I want you to know that he followed your devoted efforts to the L.M.I. with a great deal of pride and more than ordinary interest. I'm sure that, in spirit, he joins me in complimenting you for your outstanding work for a full quarter of a century, and in wishing for you many more years of enjoyment—and—boosting for the I.M.I.

"Very sincerely,

s/ Mrs. Hugh Murray"

That letter of Mrs. Murray's is an expression of appreciation that is impossible for me to improve upon.

Thanking the Institute for the honor of presenting this to you. Bale, I am very happy indeed to be the person to present this gift from us all, one that I know you will always cherish.

The Assembly arose and applauded at length as Mr, Jones presented to Mr. B. E. Schonthal the two volumes of communications from his many friends.

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Mr. B. E. Schonthal: Now I don't know what to say. (Laughter) In the words of my grandson, "This is too much!" (Laughter)

Again, I dont know just what to say, except I want you to know that I do appreciate this very, very much. As I said this morning, it has been fun. Without fun, work is a chore, and this has not been a chore.

I am filled with mixed emotions on this whole thing, because I feel as though I belong. I am going to belong for a long while, and I have a new job now, that of Honorary Secretary, and I want to be around here for a long, long while.

Thank you very much. (Applause)

Chairman McFadden: Thank you, Mr. Jones and Mr. Schonthal.

I would like to announce that the registration today is 531, exclusive of the life and honorary memberships. There were 105 new members registered today.

Our guest speaker needs no special introduction today, because this is a return engagement. I give you Dr. Kenneth McFarland, of Lincoln Hall. (Applause)



Mr. Ben Schull, Director of the Department of Mines and Minerals, presenting the memorial medallion to Mr. Schonthal, retiring secretary-treasurer of the Institute, who served for 25 years.

Photo by courtesy of Coal Age.

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THE "U" IN BUSINESS

By DR. KENNETH McFARLAND Topeka, Kansas

During the 1930's things got to the place where it sometimes didn't make much difference what we did, because it wouldn't work anyway. During the 1940's the situation was so completely reversed that it sometimes didn't make much difference what we did because it would work. Now, in the 1950's, we are in between these two extremes. The thing that is working now is the *Rule Book*.

The consumer is now "calling the shot." The law of supply and demand is again now operating. In order to succeed under the Rule Book one must be familiar with the basic rules it contains. Unfortunately, many thousands who are now engaged in business, vocations and professions came onto the scene during the lush '40's. They must now play under a set of rules with which they are totally unfamiliar. One of the big jobs in any business now is to start teaching the personnel from the ground up, and acquainting the people with the basic "facts of life" in the practical world of affairs.

Rule No. 1 is that a person cannot succeed by merely knowing something—he must also be something. The human equation can never be substituted for knowledge, skills and facts. However, skills and techniques cannot be substituted for the human equation. When the Rule Book is working, one must possess both of these factors to achieve eminently in any line of endeavor.

I think we can all agree that no personality can be characterized as "big" unless its possessor has an honest and sincere respect for the dignity of human personality.

Sometime ago, Red Motley, of New York, and I went out to Los Angeles to address a sales rally. The committee said in the invitation, "We are going to have the biggest sales rally in the world." Red and I did not take too much stock in this statement until we arrived at the Shrine Temple in Los Angeles. They actually had 7,000 salesmen in the auditorium, and they turned away 1,300 more at the door.

Backstage, before the Los Angeles meeting started, the committee was tremendously enthused. Its members said to Red and me. "Seated out there in front of that curtain are thousands of guys who call themselves salesmen and they never sold anything in their lives. They never had to. They came on the scene in the lush '40's and they have been taking orders ever since. Now they must sell. It's not just

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their welfare that is involved. The welfare of the whole economy now depends on selling. The time has come when the salesman must know the rules. A lot of these younger men not only do not know the rules, but they *never heard of them*. The purpose of this meeting is to hammer the old fundamentals. Won't you men go out there tonight and tell all these people that they must remember to be *courteous*; they must remember to have good manners; they must remember the basic rules!"

That is a very worthy purpose of a meeting, to be sure. However, courtesy and good manners are not things that you memorize and remember. On the contrary, they are things that you are. These qualities do not come under the heading of information: they come under the heading of understanding. If you actually understand that every person you contact honestly is just as good as you are-then you would never need to remember to be courteous to him. It would not even otcur to you to do anything else. This is the big idea which unlocks the doors to its possessor when all the know-how in the world would leave the doors closed to him.

Do vou speak of your "most important accounts"? If by that you mean your biggest accounts, you had better take another look into the situation. Business is made big by satisfying a lot of *little* people. Each one of the little people must feel sure that he is getting the best deal possible. It is only under these circumstances that a business can grow and continue growing. When the Rule Book is working every person becomes very important.

Another singular characteristic of the personality that succeeds under the Rule Book is his willingness to devote his time to running his own business, and his refusal to knock the business of his competitor. Succeeding under the Rule Book is a full time job. It takes all one's time to run his own business. There is no time left for belittling the competition. There isn't even any time left to fight back against people who are critical because you may be doing better than they are. Did you every try to be jealous of someone whom you know is not doing as well as you are? One just can't get going on that kind of a deal. But, if you know the other person is doing better than you are, then you can really "let it out big" when it comes to criticizing them. Always give your malicious critic credit for being a person who appreciates the fact that you are doing better than he is.

Finally, the big personality takes time to be human because he realizes it is only to serve a human need that anyone ever works in any job that is legal and legitimate. Everyone used to know this back before the boom days. The philosophy of free enterprise was worked out on slogans such as that adopted by Paul Harris and the Rotary Club -"He profits most who serves best," and "Service above self." We all understood those things pretty well clear up until the 1940 decade. Then we got so far removed from reality that we would sometimes get up in the morning, take a deep breath, and say, "My! What a wonderful morning! Now, what delightful thing can the public do for me today?" That plan might have worked all right in the 1940's. but in the 1950's we better start the day by saving, "What delight-

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ful thing can I do for the public today? If it is a little more delightful than anyone else may think of, then I may have a pretty good day." *That is free enterprise*.

The above plan is the everlasting one given us by the greatest Man that ever lived in this world. I mean the Man of Galilee. It makes no difference whether you go to church or whether you don't. That has nothing to do with my statement. I am giving you an objective fact. The Man of Galilee was the greatest salesman that ever lived. He took a totally untrained staff of twelve who had never sold anything, and made the greatest sales force the world ever saw. After he trained a salesman, that salesman would die before he would quit selling the product! He was the greatest Teacher. He never got to be in a classroom, but history has no record of any other such Teacher. He was the greatest Speaker. He never got to make his speeches in air conditioned auditoriums and lovely rooms such as this. He made the speeches down along the sea shore and out on the mountain side, but they were the greatest speeches the world ever heard! He was the greatest Philosopher; the greatest Executive, the greatest Statesman, the greatest Humanitarian. By any objective standard. He was the greatest Man that ever lived. The question, as we close this evening, is, "How did He get that way?" Do you remember what He said to his followers? "He who would be chief among you must become the servant of all."

There you have the everlasting truth that is the basis of free enterprise. I am glad the free enterprise system is based upon a truth so enduring as that. I am glad that the Rule Book is working, and that that is the rule. It is all any redblooded American has a right to ask. I sincerely congratulate you upon your realism in banding together in an organization of this kind in order to make your industry serve better in the competitive world in which we are again living.

In closing, may I give you a sort of semi-benediction, which again contains the everlasting formula, because it was said of the Greatest Man:

The meek and the gentle, the ribald and the rude, He took as he found them, and did them all good.

Chairman McFadden: Thank you very much, Dr. McFarland, for your constructive message.

Now I have the pleasure of turning the meeting over to the hardest working Vice President that the Institute has ever had, and your next President, Mr. J. W. MacDonald.

Vice President MacDonald: Mr. Chairman and Gentlemen, Members of the Illinois Mining Institute and Friends: If, perchance there is any part or portion of today's program and activities of which you approve, that has, in all likelihood, been due to those suggestions that were made by our President, Harold L. Walker, before he left for India. To him is due such credit as may have developed from the day's activities.

Now, as retiring Vice President, 1 first want to thank our Past Seccretary, Bale Schonthal, for his fine cooperation and help which he extended me and Mr. Walker.

I will also state that for the help which will be required in the years ahead, I would extend equal

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thanks and recognition to our new Secretary-Treasurer, who has been a wonderful help, George M. Wilson.

Gentlemen, if you would help him, let each and every one of us do what we can to expand and develop this organization so far as locating and securing additional members for the group.

I do not want to take up any more of your time. Some of you are leaving immediately. Some will be driving back home tonight. Those of you who do not return today will be on your way tomorrow. I would like to close with these two short words that we use in and around the mines—"Be careful."

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The meeting is adjourned.

(The meeting thereupon adjourned at nine-ten p.m.)

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HISTORY OF UNDERGROUND FIRES AND EXPLOSIVE ACCIDENTS IN FRANKLIN COUNTY (Illinois) COAL MINES, 1903-1954

By JOHN E. JONES

Address Before Post No. 4, National Mine Rescue Association Benton, Illinois November 6, 1954

The word "history" usually refers to the distant past. In the subject you have assigned to me, it applies only to fifty years. We can very well term our meeting today in 1954 the fiftieth anniversary of shaft-mined coal in Franklin County, because the Leiter mine at Zeigler, sunk in 1903, produced a total of 4240 tons in 1904.

The tardy development of Franklin County coal mines was due to the greater depth of coal as compared to adjacent productive coal fields. Perry County to the west was stripping coal more than fifty years ago, only five miles west of where the same coal seam was later found to be 650 feet deep in Franklin County. Coal in Perry County was mined by drift and shaft before the Civil War. In 1904 Perry County had 19 shipping mines, produced 1,240,024 tons of coal and employed 1872 men.

Coal was also being stripped in Williamson County, south of Franklin County, only twelve miles due south of where coal was later found to be 450 feet deep at West Frankfort. Williamson County, 50 years ago, had 25 shipping mines which produced 3,027,377 tons of coal and employed 3,468 men. The state's production in 1904, according to the 23rd annual coal report, was 37,077,897 tons and the coal mines employed a total of 54,774 men.

Some of you will recall that the last decade of the 19th century and the first of the 20th century were among the two worst for American mine disasters. The two factors chiefly responsible for explosions were fire-damp and black blasting powder. It was the transition period when pick work declined and the less laborious task of blasting increased.

There are a few of you present who can recall that period and the increased number of explosions from 1890 to 1910 from the use of black powder. States such as Iowa, which have practically no gas hazard, began to have explosion disasters. In some sections of the interior coal field, coal mining resembled quarrying. The quantity

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of black powder used for one blast would occasionally be one 25-lb. keg and frequently one keg would break down only enough coal for one man to load in one day.

In the five-year period, 1882-1886 (no mining machines reported), 74 tons of coal were mined to a keg of black powder, while in 1902-1906 (672 mining machines reported) only 41 tons of coal were mined to each keg of black powder. Some of you, 1 am sure, can recall the controversies during that latter period over stopping the ventilating fan at shooting time.

Franklin County began to mine coal during the period of explosion disasters and before Illinois had evolved a mine operation system to cope with explosion hazards. Operating practice used the open light and the blasting system to loosen a maximum of coal with a minimum of drill holes. Few appreciated the hazard of fine coal dust in its power to propagate an explosion. Fifty or more years ago, the miners had little respect for explosive gas: they often ignited it to remove it even during working hours, or to frighten a new employee or a visitor. Likewise, they prepared "shots" for coal blasting inefficiently and hazardously. But they had served an inadequate apprenticeship, frequently getting that essential two years of experience in two weeks of instruction in a well equipped cellar and fraudulently swearing to many years of mine experience elsewhere.

The explosion disasters of half a century ago, from blasting and gas, was of great concern among labor, operators and state officials in Illinois and throughout the nation. Those experiences hastened national as well as state action, resulting in the United States Geological Survey's study of mine explosions and explosives. Their Pittsburgh Testing Station was opened December 3, 1908. The Technology Branch was raised to the status of an independent bureau in the Interior Department by the Act of May 16, 1910, which created the U. S. Bureau of Mines "to make diligent investigations of the methods of mining, especially in relating to the safety of miners, the use of explosives and the prevention of accidents, and other matters relating to mining."

Our state, too, was greatly concerned. Shortly prior to the Shot Firing Act, in force July 1, 1905, a shot firing system was in use so that, fortunately, Franklin County inherited that safety feature. The practice required a specially trained shot firing crew which worked at the end of a mining shift so that a minimum number of men were exposed to the explosive hazard. Formerly, miners had done their own shot-firing.

Although my history here is largely confined to the 58 underground blasting, fire and explosion accidents in Franklin County that caused one or more deaths each, I must begin with the first explosion that caused death. This was a boiler explosion on January 14, 1904, at the West Frankfort Big Muddy Coal Company mine, in which the hoisting engineer lost his life. Sinkers were through the coal seam and going further to complete the shaft sump. They heard the explosion and the debris coming down the shaft. They pressed themselves against the shaft walls. Fortunately, the debris fell in the center and they were not seriously injured. The annual printed report of 1901

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Mine sequence	Sinking Began	First Name	Last Name	Closed
1st	1903	Leiter Coal Co. #1	Bell & Zoller Coal & Mining Co. #1	1950
2nd	1903	W. F. Big Muddy Coal Co. #1	Peabody Coal Co. #19	1936
3rd	1904	Benton Coal Co. ∉1	C. W. & F. Benton #1 Mine	1923
4th	1906	Zeigler Districts Colliery Co. #1	Old Ben Coal Corp. ∦10	1924
5th	1906	United Coal Co. #1	Old Ben Coal Corp. #12	1929
6th	1906	Big Muddy & Carter- ville Coal Co. #1	Franklin Coal and Coke #2	1923
7th	1906	Sesser Coal & Con- struction Co.	Old Ben Coal Corp. ∉16	1923
8th	1906	W. P. Rend Coal Co. #1	Old Ben Coal Corp. ≢19	1923
9th	1907	Hart Williams Coal Co.	Benton Coal Mining Co. #2	1923
10th	1907	Dering Coal Co. #18	Peabody Coal Co. ≢18	1947

TABLE 1. FIRST TEN MINES IN FRANKLIN COUNTY

suggests lack of boiler water, but the sinkers tell me that drying dynamite on top of the boiler caused the explosion.

The boiler explosion was in the second mine in the county, sunk by Hart and Williams of Benton, who also sank the third and ninth county mines.

In 1907 five mines began production in the county. The chronological numbers, year sinking began, first and last company names, and the year they closed are given in Table 1. The first mine, Bell & Zoller No. 1, operated 46 years; the second mine, Peabody No. 19, operated 32 years; the fourth mine, Old Ben No. 12, operated 22 years; the tenth mine, Peabody No. 18, operated 40 years. The other six operated from 16 to 18 years, all six closed in the 1923-24 coal depression that followed shortly after World War I.

Franklin County's first mine disaster, which caused more than one death, was on April 3, 1905, when a terrific explosion from gas and black powder occurred in the Zeig-

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ler Coal Company mine. However, I will first report the accidents from black powder blasting.

The first black powder explosion in the county is reported for February 17, 1906. It happened in the Benton Coal Company (Old Mine) mine while the two shot firers were in the mine. One was killed and the other badly injured. One half of the mine was badly wrecked by explosion propagated by the coal dust. The origin of explosion is given as an over-charged black powder shot.

The practice then, and for many years, was for miners to prepare their own shots. The shot-firers inspected holes and coal to be blasted within two hours or so of quitting time. Inspection was to ascertain that coal was undercut properly. that unmined portions had not been left by the air punching mining machine or the electric chain breast mining machine, especially the round corners vertically under the end of each rib hole. Occasionally it was found that the inside end of a rib hole was too far over the solid, chiefly above an unmined round corner. As some of you who are present fully appreciate from experience, the proper squaring of each rib mined corner was more difficult than the rest of the mining and was sometimes neglected. Proper mining and proper alignment of the powder were both essential since the powder could be too much on the solid, resulting in a windy shot, or too much over the mining, giving a poorly sheared coal rib and leaving hazardous ribfall conditions.

Powder force is equal in all directions, irrespective of theories otherwise by the miners of old. It tends to work towards weakness and that is the reason for undermining or shearing. When there is no such weakness, the direction of the drill hole is the weakest path and the shot simulates the action of a cannon. This behavior of the shot and the inflammable nature of black powder resulted in fire and explosion hazard in the county's mines even when all regulations were apparently closely followed.

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Because of the fire hazard, fire runners were employed to enter the mine immediately following the exit of the shot firers. These fire runners worked in pairs and carried extinguishers, but occasionally fires were too far under the fallen coal to be readily extinguished, requiring a crew of men to throw back the coal and extinguish the burning coal quickly or to seal off the burning area.

The practice of blasting our thick coal seam, usually 7½ feet thick below the top coal, continued a practice used in blasting the thinner coal seams in the state: three holes, one center or buster hole and the two rib holes, all three holes near the roof. This was a practice in thick coal rarely used elsewhere than in this, the Interior Coal Field.

Explanation in detail of all efforts towards correction would make this study too lengthy, but I must mention the snubbing contract, evolution from squib and its copper needle to blasting barrel, where needed, then to fuse and to electric blasting as we improved gradually in those early days from black powder to permissible explosives; also powder commissions and better permissibles.

Three other black powder explosions occurred in 1908 and one in

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Mine	Date of Explosion	Remarks		
Benton Coal Co. Benton, later termed the "Old Mine"	February 17, 1906	1 shot-firer killed and 1 badly injured. Explosion caused by charged black powder shot and propagated by coal dust. One side of mine wrecked.		
W. P. Rend Coal Co. Mine No. 1 Rend City	November 5, 1908	4 shot-firers killed. Same as 1906 explosion. Mine badly wrecked.		
Benton Coal Co. November 9, 1908 (Old Mine)		3 shot-firers killed. Same as 1906 explosion. 3 shot-firers on other side of mine not hurt.		
W. P. Rend Coal Co. Mine No. 1	December 12, 1908	3 shot-firers killed, Same as November 5, 1908, explosion.		
Dering Coal Co. February 16, 1909 Mine No. 18 West Frankfort		4 shot-firers killed. Mine badly wrecked. Mine flooded for 18 months because of mine fires. Bodies were not found until the water was pumped out. The evidence, after 18 months under water, was still plain as to location and cause of the explosion.		
Franklin County Coal Co. (Possum Ridge), Mine No. 5, Freeman	August 8, 1923	1 shot-firer killed. Much force in local area, The last mine to use black powder in Franklin County,		
		6 accidents, 16 deaths.		

TABLE 2. DEATHS FROM BLACK POWDER EXPLOSIONS

1909, among those first ten mines, very much like that first one in 1906, The sixth and last black powder explosion was in 1923 in the only mine to continue use of black powder in the county. Data upon all six are shown in Table 2.

An important and successful effort to correct the explosions caused by blasting was begun in 1909 by D. W. Buchanan, an experienced underground mining man and president of the first Old Ben mine that was then being located for West Frankfort. He made a trip to Great Britain to investigate development of their permitted coal blasting explosives, inspect how they were used at the coal face and to learn their progress. The DuPonts had done likewise and were endeavoring to produce a similar safe explosive. This was prior to permissible coal blasting explosives in the United States.

When that first Buchanan mine reached coal, a DuPont explosive other than black powder was available and no black powder was permitted. Some new explosives, from more than one manufacturer, eventually became permissibles from their satisfactory compliance with requirements of the Bureau of

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Mines Testing Laboratory near Bruceton, Pennsylvania.

The rapid change from black powder to permissible explosives materially lessened the explosion and fire hazards originating from blasting. Some face fires resulted from those early explosives, usually prior to their permissibility, but we suffered no serious windy shots. The only one I know, I also experienced. At that early period, very little was known about immediate emission of methane after blasting. In an effort to learn this detail, I often accompanied shotfirers. On one occasion, as the shotfirer and I were safe against the coal rib of the room next to the room we were blasting, a windy shot occurred. Coal, props and other loose material colliding against solid surfaces made a great noise, but most outstanding was the great light, similar to daylight, that seemed to last for many seconds. We were not seriously physically disturbed, but thought our end had come. I remember listening for the reaction, a report from propagation elsewhere, somewhat realizing that often the place of origin is the least disturbed. It was a great relief that all was silence. This was very early in the history of permissible explosives. They developed quickly and proved successful in preventing the ignition of coal dust, although they were usually blasted in a non-permissible manner in our county, that is, the shot-firers used a greater quantity to each drill hole than was prescribed by the Bureau of Mines.

These six explosions which originated from black powder are the total from windy shots that caused fatalities.

There have been nine accidents

and eleven fatalities from the use of permissible explosives. All fatalities were from the blast itself, because the victim was at or close to the explosive when it detonated, or from flying coal. One such accident caused three fatalities on February 22, 1941, in Orient No. 1. A haulage grade was being made by blasting bottoms. Men were inspecting the result of some completed shots when other shots in the immediate vicinity detonated, through misunderstanding on the part of the crew.

In September of 1927 the Safety Mining Company was organized and in 1930 the Benton Cardox Central plant was established. Theirtrucks delivered charged shells to mines and returned empty shells. For a short time before this service. the mines using Cardox had individual charging plants at the mines. Cardox is ranked permissible by the Bureau of Mines. At first the miners used it for on-shift blasting but later changed to off-shift blasting, following the same shot-firing system that they used with permissible explosives.

The chief hazard from Cardox is from flying shells. A flying shell is the result of giving the charged shell too much work to do, so that the shell is propelled out of its drill hole like a cannon ball instead of breaking down the coal. Occasionally they fly and yet break down the coal efficiently, but such flying action is more limited because part of the force is spent in breaking coal. Twice as many drill holes, or slightly more, are needed for Cardox than are ordinarily used for permissible powder.

The shot-firer must respect the possibility of a flying shell, which

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Mine	Date	Remarks	
West Frankfort Coal Co.	September 30, 1912	Loader killed by fuse detonators and box of permissibles.	
W. P. Rend #1 Rend City	January 5, 1915	Loader had detonator in cartridge and ready to go to face with it when, for un known reason, it exploded.	
Franklin County Mine, Benton, Ill.	November 10, 1925	No report. One killed.	
Franklin County Mine, Benton, Ill.	October 7, 1928	Loader, while drilling a shot that failed ignited detonator from a friction sparl	
C. W. & F. Coal Co. #2, West Frank- fort	November 13, 1930	Loader was alone, trying to force stuck cartridges to back of hole. Evidently a friction spark detonated the cap.	
Franklin County #7, Royalton	September 1, 1939	Coal was shot through a pillar, 1 killed.	
C. W. & F. Coal Co., #1, Orient	February 22, 1941	Three men of a grading crew killed while inspecting shots that had worked. Other shots were detonated through a misunder- standing.	
C. W. & F. Coal March 7, 1945 Co., ∉1, Orient		Shooter fatally injured by piece of coal flying 35 feet.	
C. W. & F. Coal Co., #1, Orient	March 25, 1951	Accidental jack-hammer-drilling into a loaded drill hole where haulage grade was being made, 1 killed.	
		9 accidents, 11 deaths	

TABLE 3. DEATHS FROM PERMISSIBLE EXPLOSIVES

may fly in a straight line or be deflected by rails, ribs or timbers. Regulations insist the shot-firer must get around two corners.

Fatalities from Cardox blasting come under two causes, that of flying shells and that of accidental discharge. Four accidents from flying shells have each caused one fatality; accidental discharges have caused two. One occurred when a blast failed and the shot-firer, without fully disconnecting the cable from his battery, went to the drill hole to make better contact on the shell. As he did so, with shell pulled to hole entrance, it detonated against his face. The other occurred when two shot-firers were working together, each blasting an entry of a pair of entries, with their batteries located in the last and same crosscut. Unfortunately, one used the wrong battery just as his partner was working with the shell at the working face in his entry.

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Mine	Date	Remarks
Bell & Zoller #1	February 22, 1929	Triprider struck by flying shell.
Old Ben #8	January 3, 1931	Shooter struck by flying shell.
Old Ben #8	February 26, 1931	Shooter failed to disconnect battery.
Old Ben #14	March 7, 1935	Shooter used wrong battery.
Bell & Zoller #1	June 13, 1935	Shooter struck by flying shell,
Bell & Zoller #2	May 19, 1942	Shooter struck by flying shell.
		6 accidents, 6 deaths.

Cardox has been wholly replaced by Airdox (also a permissible) in Franklin County and is used onshift legally, without question. It has less breaking pressure and requires a greater number of drill holes per place than Cardox. However there is still some hazard from flying shells and workers are warned to get around two corners during blasting.

There have been three breathing apparatus fatalities, two in Zeigler Coal Company mine No. 1 and one in By Products Coke Corporation mine No. 18, West Frankfort.

On December 24, 1908, a party with Draeger oxygen helmets were fighting a mine fire in the Zeigler mine. Deceased was overcome by heat and became unconscious. The party tried to bring him out at once but were unable to bring him all the way.

On January 29, 1909, a party with the same helmets and in the same mine were in poisonous gas. Deceased thought his helmet was too tight and, upon loosening it, breathed poisonous gas.

On July 28, 1920, a fire seal was opened so an oxygen apparatus team could inspect location of a mine fire. The company's district superintendent, who had oxygen appparatus experience, insisted on going with the team on their second trial. The first one had been unsuccessful because one member had collapsed in his apparatus. He had been brought out and revived. The superintendent collapsed on the second trip, but at a very long distance from the seal location. He was carried back to fresh air but was dead upon arrival.

There have been two mine fire deaths. The first was in the Bell and Zoller mine No. 1, Zeigler, A. worker was leaving the mine via the escapement stairway. A fire started in the fan house at that time and fumes were blown down the shaft by the blow fan. He was found dead at that shaft bottom. Had the fan been exhausting, he would not have been in such a fatal location.

On October 9, 1942, in the Peabody No. 18 mine at West Frank-

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fort, a main line motorman lost his life in a mine fire. He found that he had lost part of his loaded trip upon arrival at the shaft bottom, and thought he knew where it was. It was much closer, however, and he crashed into it about 1000 feet from the shaft and around a turn with his trip of empties. He was pinned tight in his cab as electric arcs ignited timber, and a big fire of wood, coal and pit cars was soon burning, augmented by the high air velocity. His trip-rider tried to loosen him but failed, and the motorman told him to run for his life.

The dense smoke drove men off the shaft bottom. The deceased was reached from intake aircourse travel several hours later. The fire was extinguished by rock dust painfully carried in bags by crews into the caving area. Timbers weakened and roof fell and the hand application of rock dust was difficult but eventually succeeded. Had this fan been an exhaust fan, some 70 men, in their working places a mile on farther in the mine, would have been asphyxiated, being inby the fire on that air current.

So far in this address, I have reported sixteen deaths from black powder, eleven from permissibles, three from breathing apparatus, two from fires, and six from Cardox: a total of 38 deaths in 26 accidents, an average of 1.46 deaths per accident. One can certainly appreciate the risk taken by shot-firers in those early days.

We've had a total of 58 accidents and 434 deaths from explosives, breathing apparatus, fires and explosives to July 1st, 1954. This leaves 32 explosion accidents to account for the remaining 396 deaths, an average of 12.4 deaths to each explosion that originated from gas ignition.

The first mine disaster in the county was on April 3, 1905, at 7:10 a.m., when a terrific explosion from gas and black powder occurred in the Zeigler Coal Company mine. Forty-eight men were reported killed from the explosion and three were asphyxiated during the attempted rescue work. William Atkinson, the State Mine Inspector of this, the seventh district, was called at once at his home in Murphysboro. Arriving below on the improvised sinking tub, he asked for two men from the group at the shaft bottom, busy then hoisting bodies, to accompany him in examination. All three, state inspector, mine examiner and miner, died from afterdamp not far from the shaft bottom. Pioneers now living say the count of 51 was not accurate, that the number of dead was actually 56.

My father was one of a commission to the mine. Upon his return he told his three sons that, had stone dust been used, it would have stopped coal dust propagation of the explosion. He knew of stone dusting in mines in Wales.

The origin of that first disaster is not certain, but investigators were substantially in accord that it was gas. The mine was new, and one of the first worked-out rooms was used to store black powder which, if not the origin of the explosion, added materially to the explosion force. Many fires resulted, some of which were sealed off.

The report to Governor Charles S. Deneen from the four members of the State Mining Board and the six State Mine Inspectors shows many mining law violations, including that of ventilation. They

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also report non-operation of the fan from 11:30 p.m. Friday, March 31st, to 5:30 p.m. of the day the rescue party entered the mine. While the fan was idle, ventilation to the few men who were at work was supplied by three air compressors. Although this may have been apparently adequate for men and animals in the mine to breathe, it is hardly possible that it was adequate with regards to gas. For a detailed report upon this disaster, see the 1905 Annual Coal Report.

Mine	Date	Cause	Killed and Injured	Remarks
Zeigler Coal Co. Mine ≢1	April 3 1905	Gas and black powder explosion propagated by coal dust	48 killed 3 asphyxiated during recovery	See foregoing detailed report
Dering Coal Co. Mine #11 West Frankfort	Sept. 7 1907	Gas ignited by naked light	4 killed 18 injured	A body of gas was being sealed by the night shift who used open lights. The last seal was nearly completed when gas came over it and was ignited.
Zeigler Coal Co. Mine #1 sealed, fe and sulp of gas bu	Jan. 10 1909 or two di hur were it lack of	Gas and mine fire rill holes were poured or for f oxygen locali	26 killed 1 injured 1 escaped drilled to the min ced in an effort to zed the explosion.	Explosion occurred while men were attempting to open the partially sealed mine in which there was a mine fire. The mine was not wholly e below, through which water, steam extinguish the fire. The mine was full
Zeigler Coal Co. Mine #1 with aut This pro quickly gas. Lac	Feb. 9 1909 comatic o ompt rele restored k of oxy	Gas and mine fire explosion doors ease of pressur air current, thr gen localized t	3 killed 13 escaped s to raise under p e saved the fan. us enabling the 13 he explosion.	Explosion occurred while men were attempting to open sealed mine in which there was a fire. The fan house had recently been equipped ressure and then fall back into place. The automatic rescaling of the doors i men to escape. The mine was full of
Franklin County Coal Co. Sesser	Oct. 11 1909	Gas lit by naked light	1 killed	Explosion of gas by mine examiner, the deceased, carrying open light during his examination.

TABLE 5. DEATHS FROM GASENPLOSIONS

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Mine	Date	Cause	Killed and Injured	Remarks
Brazil Block Coal Co. Mine #11 West Frankfort	Nov. 21 1909	Gas lit by open safety lamp	1 killed 1 injured	Two mine examiners putting up curtain to remove gas, opened ar extinguished safety lamp to light it.
United Coal Mining Co. Mine #1 Christopher	Feb. 26 1910	Gas lit by naked light	1 killed	Shot-firer, upon entering working place with his open light, ignited the gas.
United Coal Mining Co. Mine 1 Christopher	Jan. 9 1913	Gas lit by naked light	1 killed	Miner lit gas in his room,
Southern Ill. Coal & Coke Co. Freeman	Feb. 19 1914	Gas lit by naked light	1 killed	Tracklayer entered blocked out place, with naked light.
Dering Coal Co. Mine #11 West Frankfort	Aug. 23 1914	Gas lit by naked light	2 killed	Two drivers on the night shift were delivering puncher machine bits. The fan had been stopped prior to the explosion.
Franklin Coal & Coke Co, Mine #1 Royalton	Oct. 27 1914	Explosion of gas from naked light as miner entered his entry face. Gas had been reported by the mine examiner.	20 killed 32 asphyxiated 1 injured	It was starting time, 357 men below and 50 were yet on top. Some had reached (all walked) and others were enroute to their working places; 80 or 90 were yet on the shaft bottom. Prompt reversal of the fan by the mine manager, making hoisting shaft the downcast, saved many lives. Coal dust propagated explosion, but it was limited to the northwest quarter of the mine. All men from elsewhere were soon safely conducted out of the mine.

establishment of the State Mine Rescue Stations in 1910. Trained crews with rescue equipment proved to be of great value in quick recovery.

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Mine	Date	Cause	Killed and Injured	Remarks
United Coal Min n. Co. Mine #1 Christopher	July 27 1915	Explosion of gas in old works by naked light	9 killed	Miner entered old works due to call of nature. Coal dust was ignited by gas but was soon extin- guished by the vast room for expan- sion and the high-ash dust content throughout the section. Dust came

from pulverized thick blue band and from blasting and its gobbing. The 300 men elsewhere were unaffected and no material damage by violence was done to the mine.

John A. Logan Coal Co. Logan	Dec. 13 1916	Explosion of gas by naked light	2 killed 3 injured	Ignition caused by loader with naked light entering old room adjacent to his place, to sound through to his partner to estimate thickness of the coal pillar.
By Product Coke Corp. #18 West Frankfort	July 26 1917	Ignition of gas by electric arc or naked light	I death	Explosion caused by gas coming from old rooms that were caving, and ignited at room neck as the motor trip was passing, either by electric arc or naked light of motor- man or trip-rider. The trapper 300

feet or more outby at the entrance to this entry was badly burned and died later.

Old Ben Coal Corp. #11 Christopher	Nov. 29 1917	Explosion of gas by naked light and propagated by coal dust	17 killed	This was Thanksgiving night and only about 25 percent of the night shift men were at work. A worker took a motor to the Main East entries to ride most of the way to start a pump. Evidently he un- knowingly passed an open door as
				he parked the motor. As he con-

tinued his journey up a steep hill on foot with his naked light on his head and his gastesting lamp in his hand, to examine the entry faces before applying the electric power, the gas was ignited. The gas had unknowingly collected there, due to the door being left open during that holiday.

It was a very dry mine and coal dust propagated the explosion into every section and up both shafts with a great force. The escapement stairway of steel was a tangled mass in its bottom 65 feet. Both cages in the hoisting shaft were wrecked. The automatic explosion doors at the fan worked successfully so the air flow was resumed quickly. The worker igniting the gas was the only one who knew of the explosion as he fell down in an effort to avoid the flame. He must have died in a few seconds, but the other 16 were killed instantly.

Attempted rescue work ceased on the third day on account of the fires and the gas which accumulated because the overcasts and stoppings were almost completely wrecked. The four last bodies had not yet been found but it was certain those men could not be alive after such great violence or in such high afterdamp content. We were compelled to seal the entire mine at once and did so around both shaft bottoms, largely because of several feet of loose "fill" in the mine yard and around the shaft top.

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	TABLE :	5. DEATHS F	ROM GAS EXPLO	SIONS (Continued)
Mine	Date	Cause	Killed and Injured	Remarks

Analyses of gas behind the scals showed that fires were extinguished after 49 days. The seals were opened and the bodies at once found and recovered. Reparation work was then begun.

Six hundred men were employed on the day shift, which added to the seriousness of such explosion hazards. Mr. D. W. Buchanan, president of the company, and I had often discussed rock dusting and closed lights to lessen such hazards when I was state mine inspector. He employed me as his safety engineer during that work. Our first act was a request to the U. S. Burcau of Mines for thorough inspection of our hazards and their recommendations for correction.

My interest in mine safety as worker, starting in 1898, and then foreman in various departments, engineer and state inspector, together with the excessive explosion hazards I encountered since 40 years ago here in Franklin County, prompted serious study at explosion correction. So, some 38 years ago I enrolled for the Burcau of Mines Experimental Mine Safety course during my vacation in 1916, a new course for Bureau men, including actual explosions in that new experimental mine. I was fortunate to be included. The course was under the direction of George S. Rice and his assistants. It was there I appreciated the statement of my father regarding stone dusting cleven years before. Also, the possibility of closed lights. The Mine Safety Appliances Company was then struggling for its beginning on 5th Avenue in Pittsburgh.

The Old Ben Mine No. 11 explosion is the explosion that, figuratively, was heard all over the coal mining world. Mr. Buchanan and I fully appreciated that, had closed lights been used, the gas would not have been lit with an open light, also that, had the mine been rock dusted, the explosion would not have propagated. The Bureau of Mines was consulted and agreed to study, analyse and give detailed report upon any mine the company chose in the county, upon explosion hazards, and to recommend corrections. Our mine No. 10, adjacent to No. 11 and having similar conditions, was chosen. The Bureau's engineers worked there for several weeks but before they completed their report, we had begun to use closed lights and rock dusting. The introduction of closed lights developed into serious local labor antagonism. The electric battery lamp was nick-named "Bug-Light", and so was L. It was quite deserving then for our candle power was very low, only two. Since then the light has gradually improved to over 100 candle power and, I think, electric cap lamps are now unanimously accepted.

The beginning of rock dusting was difficult, too. We began with scraping dust off the highways. Those were horse and buggy days, largely. That dust became wet at once in the mine. Then we tried line rock dust sweepings from quary buildings. That was too coarse. Mr. Buchanan then decided to install a mill, after learning our roof shale was a good, though expensive, source for shale dust. Rock dust mills, however, had not yet evolved. He bought a hammer mill to grind the shale lumps into $1\frac{1}{2}$ inch screenings and a flour ball-mill to grind the screenings into dust, 92% through 255 mesh. This was very good since the Bureau's requirements were 100% through 150 and 75% through 200 mesh. That mill cost \$40,000.00, and supplied shale dust for us and a few of our neighbors for nearly ten years, when lime rock dust became available in paper bags.

Very early in that period we supplied the Bureau with five tons of our Mine No. 10 coal and ten tons of shale dust. Immediately after the tests at the Experimental mine, they gave demonstrations before a large group of representatives from our coal field, consisting of miners, bosses, the state inspection department, operators, and members of the Old Ben Coal Corporation. The demonstration seemed conclusive as to the value of shale dusting, but Old Ben trod the path of development and application somewhat alone for a few more years after that demonstration in 1918.

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Mine	Date	Cause	Killed and Injured	Remarks
Bell & Zoller Mining Co. #1 Zeigler	Dec. 3 1917	Ignition of gas by mine fire	3 deaths 9 injured	Eighteen men were in the mine sealing a squeezed panel in which there was an inaccessible mine fire, a result of an explosion or two earlier that day. The first explosion was from gas lit by a naked light,

a boss endeavoring to prove that no gas was at that panel entrance location. The panel was nearly sealed when the gas at fire location exploded again. Both seals would have been completed in half an hour.

I was present, at the request of the state mine inspector, in an effort to save the mine, since the fire had to be scaled. It could not be reached. Following the explosion, the mine was sealed on top.

That was my third experience in a mine explosion, but the first one to experience a panic. Thereafter, in recovering bodies after explosions, I could readily appreciate confusion and mental suffering just preceding the silence of death.

Franklin Coal & Coke Co. #1 Royalton	Sept. 28 1918	Explosion of gas while scaling mine fire	20 killed 1 died later	Twenty-one men were in the mine section, including nearly the entire underground managing force. They were trying to seal a mine fire in a very difficult location. Open lights
0.4.00				were used. Coal dust entered into

this explosion to a very limited extent, if at all. The explosion was weak, more of a conflagration than an explosion, and the majority of the victims were asphyxiated.

Old Ben Coal Corp. 410 Christopher	June 6 1919	Gas ignited by naked light	3 deaths 1 injured	Mine was on open lights. Gas in very old territory was unknowingly slightly tapped by the mining machine. A pair of entries was
Christopher				being driven to pick up the old

section. Test drill holes preceded the mining. A deep undercut had long ago been made on the old territory side. The center prospect drill hole unfortunately stopped but a few inches from penetrating the extensive overhanging face coal on the old territory side. The machine men did not know they had tapped into the old territory when they had finished, the opening to the other side being about the size of a tennis ball.

Old Ben Coal Corp. #8 West Frankfort	Jan. 14 1921	Gas ignited by lighted match	1 killed 2 injured and died later 5 injured	The night shift being on a closed light basis did not have naked lights, and smoking was prohibited. The crew was cleaning roads. One member went into an old works
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panel entrance and gas was lit there. Coal dust entered into the explosion, but the explosion flame was extinguished at the first shale dust zones. Workers explained that the flame broke into millions of sparks and then extinguished.

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closed naked ibited.

Mine	Date	Cause	Killed and Injured	Remarks
Old Ben Coal Corp. #9 West Frankfort there, It v injured b	Sept. 6 1923 was a si uddy or	Gas ignited by naked light nall explosion. it at once. Inju	1 death His helper at the ned was fatally f	A main line tracklayer wanted a wood tie and couldn't find one. He went through the fence enclosure of old works and its "keep out" sign, with his open light, and lit the gas e fence was not burned, and he got his burned, partly by inhalation.
C. W. & F. Coal Co. #1 Orient towards to lives by a others in	Nov. 26 1923 op of th sphyxia this pai	Gas ignited by naked light is fall to estima ition. Neither r of panels esca	2 asphyxiated ate its size. Gas w one was burned. aped unharmed.	A pair of 16 room panels was nearly finished. Rooms 15 and 16 had recently caved. A hand loader with his naked light was climbing as ignited and he and buddy lost their The flame went over them. The 30
Industrial Coal Co. #19 West Frankfort	Jan. 2 1925	Gas ignited by electric are on naked light	2 deaths	Workers died after being fatally burned.
C. W. & F. Coal Co. #2, West Frankfort the face, o	Jan. 29 1926	Gas ignited by match examiner, Evi	5 killed dently gas exting	A pair of dipping development entries had suddenly started uphill. The faces were ventilated by a booster fan located out by the last open cross cut. Four men were near uished the flame in his testing lamp,
were killed from the e	d at one ntry fa	ce, and the fift	d the safety lamp h victim was kille	o and struck a match to light it. They d by a flying trap door some 500 feet
The mine were well tended 75	was on rock di feet int	closed lights. It isted to within o the rock dus	t had recently star about 60 feet o t.	rted to rock dust, and these two entries f their faces. The explosion flame ex-
Rock dust The state l	preven aw was	ted a very bad changed at one	disaster, since the from key locks o	here were 1300 men below. In flame safety lamps to magnetic locks.
Peabody Coal Co. #18 West Frankfort	Jan. 9 1928	Gas ignited by electric are or match	21 killed	The explosion originated in a 10- room pair of very hilly panels. The 20 rooms were working, some nearly finished. The mine was rock dusted on roof and ribs and by

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Mine	Date	Cause	Killed and Injured	Remarks	
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plosion flame was localized by the rock dust and great quantities of motor sand on the track.

Men in the mine numbered 670 of whom 91 safely escaped, 18 lost their lives in the panels, and 3 others were asphyxiated about 1000 feet from the panel's entrance.

Peabody Coal Co. #18, West Frankfort	Jan. 19 1928	Gas ignition	1 death	The mine was on closed lights. The Loader was fatally burned in this localized explosion.
Old Ben #8 West Frankfort	Dec. 1 1929	Gas ignited or box of perm.	7 killed	The mine was on closed lights. A night crew of six men was salvaging material from a panel that was starting to squeeze. An examiner

powder

exploded

to this panel. All seven were ininstantly killed. Those of the 6-man crew out by the panel died running towards it. From this evidence and that of direction forces, the origin of explosion was outside the

was examining in the section for the next day shift, but he was not close

From this evidence and that of direction forces, the origin of explosion was outside the panel. Coal dust was ignited. Explosion propagation was stopped by rock dust.

Valier	March	Gas	4 killed	The grade was very steep up hill at
Coal Co.	18	ignited by		these entry faces. Gas accumulated
Valier	1930	electric arc		from a door left open too long.
Old Ben Coal Corp. #14 Buckner	Nov. 13 1931	Gas ignited by electric arc	t death I injured	An upgrade room with gas at the face was marked out by the exam- iner. Later it was apparently cleared and the gas block removed. The mine was on closed lights

When two drillers had their post drill up and electric power turned on, the gas was ignited.

Deceased ran through flame and was fatally burned. Injured, he fell to the floor at once. He suffered briefly from breathing afterdamp.

Old Ben Coal Corp. #15 West Frankfort	Dec. 7 1938	Gas ignited by electric arc	1 killed	The mine was on closed lights. The mine examiner had failed to examin head end of a pair of entries, bu told the night material man whe was at the panel entrance that th pair of entries was O. K. for him to
Frankfort				was at the panel entrance that the pair of entries was O. K. for him

go in with his motor. He did so, and the trolley ignited gas on the entry near room #7. Coal dust propagated the explosion. Rooms were turned off of one entry only, and their pillars were being robbed. The entries were rock dusted by rock dust machine and bag traps.

You'll discover good merchandise advertised in this good publication.

	TABLE 5	5. DEATHS F	ROM GAS EXPLO	SIONS (Continued)
Mine	Date	Cause	Killed and Injured	Remarks

This side of the mine ranged from damp to very wet, so that the coated rock dust would not with certainty be dispersed into a cloud. This panel was damp. This factor of uncertainty originated the system of 50-lb, bag traps of rock dust. They are put close to the roof but not to touch walls or roof, thus avoiding absorption of moisture from wet surfaces or from dampness from higher temperature of the air current than those surfaces. Therefore the rock dust remained sufficiently dry in the bags to be readily dispersed by the air wave preceding an explosion.

It was the rock dust in the first dozen or so bags of the many hundreds continuously installed along all trackless entries (and many on haulage entries) that extinguished this explosion flame. The coated dust was too flaky or too damp to disperse.

State and Federal officials were at once notified and, with Old Ben Company and miner representatives and safety engineers from other companies, made a thorough inspection and agreed that the immediate dispersal from the roof bag-traps stopped further wreckage of the mine and saved the lives of the others.

No heralded mention, however, was made since only one man was killed. Had the 66 men in the mine that night been killed, lengthy reports would have been made upon what should be done. It seems just as logical to me to tell what *was* done that was successful as to tell or theorize upon what should have been done.

Old Ben Coal Corp. #8 West Frankfort	July 24 1947	Gas Explosion propagated by coal dust	27 killed	This day-shift mechanical loading erew of 21 men were extracting entry barrier pillars on retreat work. The extra men were present due to some repair work being done
fermation -			and the second second	on the loading machine. As re-

treating continued, old works increased, ventilation continued to edges of caved workings thousands of feet in by the working portions.

Gas was ignited, which ignited coal dust, but the explosion did not get out of the section, propagation being stopped by rock dust readily dispersed from the suspended 50-lb. bags. Rock dust on roof, ribs and floor was wet, the location being close to the downcast shaft, and hot summer weather on top. The 264 men elsewhere in the mine on that day shift were not affected and at once walked out (except those remaining to help) safely and were hoisted.

Sealing on account of fire in the section was compulsory the next day before further details could be studied and origin established. The mine was on closed lights. Evidently a door was left open too long and, because of the broken loading machine, inspection of territory was delayed for too long. Report is given in the 1947 issue of Illinois Annual Coal Report and by U. S. Bureau of Mines.

C. W. & F. Coal Co. #2, West Frankfort	Aug. 14 1947	Gas ignited by electric arc	3 deaths
Frankfort			

A night shift mining crew was undercutting in the territory affected. They entered to working face prior to the usual examination for gas. As machine operation started,

the gas was ignited by electric arcing. Rock dust stopped flame propagation in the section but force was felt over a much larger area. The mine was on closed lights and rock dusted.

See 1947 Annual Coal Report for detailed report.

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Mine	Date	Cause	Killed and Injured	Remarks
C. W. & F. Coal Co. #2 West Frankfort	W. & F. Dec. Gas 119 killed 7 pal Co. 21 explosion 4 injured 7 1951 propagated r fest by coal r rankfort dust d		There were two operating shifts. The mine is on closed lights, and rock dusting is by the coating method called generalized rock dusting. It failed to stop propaga- tion over a large part of the mine	

probably due to combination of insufficient rock dust, lack of dispersion of that applied, and abundance of dry coal dust.

The explosion occurred at 7:38 P.M. on the 2nd shift, about 40 minutes after the arrival of that shift's mantrips into the mine. Some contend that gas was ignited by electric arc and others from smoking.

A finished and squeezing part of a panel contained a large body of explosive gas. Air sweeping the edge of this territory returned to ventilate working territory. Men were at work at this edge vicinity, curtaining and timbering. Gas was ignited between the squeezing part and the working section.

Flame travelled nearly one mile in various directions from the entrance to the explosion origin, including loading machine crews in various sections of the explosion affected area. Men escaped unharmed from other sections.

A detailed report is in the 1951 issue of the State Annual Coal Report, and a typed detailed mimeograph report was published by the U. S. Bureau of Mines.

32 Explosions	396 Deaths	44 Injuries
	32 Explosions	32 Explosions 396 Deaths

TABLE 6. FATAL ACCIDENTS IN TERMS OF COAL PRODUCED

1st 100 Million Tons	2nd 100 Million Tons	3rd 100 Million Tons	4th 100 Million Tons	5th 100 Million Tons
Jan. 1, 1903 to June 30, 1922	July 1, 1922 to Jan. 29, 1929	Jan. 1, 1929 to Jan. 1, 1940	Jan. 1, 1940 to Jan. 1, 1947	Jan. 1, 1947 to July 1, 1954
100,871,719	96,813,372	107,655,565	100,157,369	65,140,894
223 Deaths	34 Deaths	20 Deaths	7 Deaths	150 Deaths

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Considering all the underground fatalities since shaft mining began in Franklin County, under the subject you assigned to me, they are as follows to July 1, 1954:

Black powder blasting	16
Permissible explosions	11
Cardox	6
Breathing apparatus	3
Fires	2
Gas ignition and	
explosion disasters	396

434

We improved greatly in guarding against the foregoing hazards in terms of 100,000,000 tons of coal production to the end of the fourth hundred million tons. It is during the production of the fifth hundred million that we have slipped badly. Our experience is shown in Table 6. In conclusion, I will digress briefly from the subject assigned to me to tell that fatalities from other causes in that period of years, 1903-July 1, 1954, totaled 713, the big majority from falls of rock and coal. The addition of 713 and 434 gives 1147 fatalities, an awful price in the production of 470,638,919 tons, in round numbers, one-half a billion tons of coal.

To conclude the chronology from my first table of ten mines, similar data are given for the other eighteen (Table 7). All twenty-eight are in the southwest half of the county, five of them now operating.

There are no mines sunk yet in the northeast half of the county. We still have more than a billion tons of coal available. In the first half century, we produced half a billion tons. At the same average rate of production, we have enough of this natural resource in the coun-

11th to the 28th mine incl.	Ycar sinking began	First name and number	Last name and number	Mines working or ycar closed
11th mine	1908	Carroll & Franklin Coal Co.	Black Star Coal Co.	1929
12th mine	1908	Sou. Ill. Coal & Coke Co.	Franklin Co. Coal Corp. #5	1950
13th mine	1910	Franklin Coal and Coke Co.	Franklin Co. Coal Corp. ∦7	1951
14th mine	1910	Wilmington Star Mining Co. #8	Old Ben Coal Corp. #8	1952
15th mine	1911	West Frankfort Coal Co.	Sou Ill. Coal Corp. #21	1937

TABLE 7. FRANKLIN COUNTY MINES

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11th to the 28th mine incl.	Year sinking began	First name and number	Last name and number	Mines working or year closed
16th mine	1911	United Coal Mining Co. #2	Old Ben Coal Corp. ∉14	Working
17th mine	1912	Christopher Coal Mining Co. #1	Old Ben Coal Corp. #11	1953
18th mine	1912	Chicago, Wilmington and Vermilion Coal Co.	C. W. & Franklin Coal Co. #1	Working
19th mine	1913	Old Ben Coal Corp. ≢9	Old Ben Coal Corp. #9	Working
20th mine	1915	Middle Fork Mining Co.	U. S. Fuel Co.	1925
21st mine	1916	Western Coal and Mining Co. #2	W. C. and Mining Co. #2	1928
22nd mine	1917	Modern Coal Co.	Brewerton Coal Co. #22	1934
23rd mine	1917	Franklin County Coal Mining Co.	Franklin County Coal Mining Co.	1930
24th mine	1917	Valier Coal Company	Old Ben Coal Corp. #22	Working
25th mine	1919	Bell and Zoller Coal Mining Co, #2	Bell and Zoller Coal Mining Co.	1951
26th mine	1919	Old Ben Coal Corp. #15	Old Ben Coal Corp. #15	1954
27th mine	1923	Chicago and Wilmington and Franklin Coal Co. #2	Chicago Wilmington and Franklin Coal Co. #2	Working
28th mine	1950	Franklin County Coal Corp. #15	Franklin County Coal Corp. #15	1952

TABLE 7. FRANKLIN COUNTY MINES (Continued)

ty for another century or more.

In closing, I must add that our county has been among the industry's pioneers in development of improved blasting, mining machines, mechanical loading and coal preparation. We are pioneers in continuous miners, electric hoisting, replacement of open lights by permissible cap lamps, and in the practice of rock dusting. Rock dusting has slowly but surely been developed to its present successful application, and its national adoption, by the Old Ben Coal Corporation with whom I have shared its trials and progress with safety as first consideration.

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PROGRESS OF ACCIDENT PREVENTION TRAINING IN ILLINOIS SINCE JANUARY 1, 1953

By MURRELL REAK

Assistant Director Mines and Minerals Presented at Fred Bailey Post No. 4 National Mine Rescue Association Benton, Illinois

November 6, 1954

The Department of Mines and Minerals is very much interested in the prevention of accidents and the welfare of the coal industry in Illinois. We are aware of the high cost of injuries, both direct and indirect. Often these costs determine whether or not the operations are being carried on profitably. Realizing that safety education is the best medium in our fight to reduce accidents, we have stepped up our safety program by assigning several of our State Mine Inspectors to teach Accident Prevention and First Aid training full time.

We are taking this training directly to the men and not waiting for the men to come to us, as has been the practice in the past to solicit such training at our Mine Rescue Stations. Since January 1, 1953, the Department of Mines and Minerals has assisted the U. S. Bureau of Mines in this training to a total of 1,182 employees at 8 different mines. Our own personnel has of this date completed the training of 292 other employees at 3 other mines. The accident rate at all of the mines where this training has been given has dropped tremendously.

Our course has been designed to touch upon the causes and the prevention of every type of accident that has occurred or can occur. The course is so flexible that it can be made to fit the conditions that apply to the particular mine where the training is being carried on, but at the same time cover the existing condition in the area where the mine is located. Men are interested in the mines they work at and not in mines located in West Virginia, Ohio or elsewhere. The course is divided into eight onehour sessions which allows ample time to discuss all types of accidents and matters of importance relating to such accidents.

Roof, rib and face falls have been a bugaboo of the coal mining industry since the inception of mining. The rate at which men are injured from these three causes has varied but little and the causes are practically the same today as 50 years ago. The importance of ade-

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quate roof support, be it roof bolting, conventional timbering, or a combination of both, the proper method of testing roof, the importance of testing roof, rib and face before beginning to work in the places are all fully discussed. As long as men are allowed to work under unsupported roof, we can certainly expect them to be injured.

By continually pounding and hammering at roof fall accidents by our instructors, company personnel, and through better cooperation of employees, we have had so far this year only three fatal accidents due to roof falls. At the same time last year 14 men had been fatally injured by roof fall accidents. We can all assume that from the cooperation given to prevent roof fall accidents, this degree of safety could not have been obtained otherwise. If we will just remember that every roof fall is a potential fatality, we will help to reduce this type of accident. So if these results can be done on one category, why not in others?

Haulage accidents rank second, and a thorough discussion of all haulage accidents is of great importance. An entire session is devoted to the causes and prevention of haulage accidents. Nationally, our haulage accidents show a downward trend. A great deal of this credit is due to the full cooperation of management, better selection of haulage personnel, using the type of equipment best suited for the job, keeping equipment in a state of good repair, and the installation of better dispatch systems by management. By stressing both employee and management responsibilities, we hope to materially reduce the rate of haulage accidents in our mines.

The explosibility of coal dust is clearly demonstrated to our classes by the use of a coal-dust explosion gallery. As a result of these demonstrations, we are able to point out more clearly the importance of better clean-up at the faces, the importance of allaying fine coal dust at its source by the use of water or wetting agents upon our cutting machines, use of water in drill holes, the importance of applying rockdust to render the remaining fine coal dust incombustible. Widespread coal dust explosions in the coal mines of Illinois will be a thing of the past if mines carry out the above provisions and adhere to the Coal Mining Act.

Gas ignitions are also discussed. The importance of good and uninterrupted ventilation, proper and frequent tests for the presence of methane, both off and on shift by competent men, with an approved flame safety lamp. The proper assembly and use of the flame safety lamp is clearly explained and a testing chamber for safety lamps is also brought to the class.

Mine fires are a constant danger in our mines. It goes without saying that it is preferable to prevent a mine fire than to control or subdue one, so the prevention of mine fires is very fully discussed. What to do to prevent a mine fire, what to do if we have one in a mine, the importance of knowing how the mine is ventilated, where fire fighting equipment is kept, how to barricade oneself in case of being caught underground by an explosion or mine fire are just a few things to know.

Blasting practices still result in numerous injuries to miners. Airdox for breaking down coal is being widely used and the use of explosives is gradually diminishing.

You'll discover good merchandise advertised in this good publication.

85

Men do not have the same respect for air-dox that they have for explosives. As a result, we are having many injured by air-dox blasting practices; namely, being hit by flying shells and flying pieces of coal, air lines bursting, bleeding shelts, repairing air lines or hose with the pressure on; and men are also being struck by flying coal due to shooting break-throughs. The preceding can be reduced to a minimum by keeping around a right angle corner, shutting off the air pressure before making repairs, removing all men where there is danger of a break-through or shooting through, and by shooters giving an audible warning that blasting is in progress.

Electrical accidents and the dangers of electricity are also discussed. By far, most of our fatalities due to electricity are caused by electrocution. Many lost time injuries are being caused by flashes from the nips, blowing up of cables, splicing of cables with the power on, contacting bare wires and short circuiting of machinery, and many other causes.

Miscellaneous accidents take a large toll every year and cause many lost time injuries. Eye injuries, being struck by flying objects, falling, lifting and just plain carelessness are among the chief causes. The importance of wearing goggles, safety glasses or plastic eye shields will reduce eye injuries about 90 percent. The importance of the preceding is brought out in these discussions. Proper methods of lifting are demonstrated to the classes, the importance of good housekeeping can eliminate many falls, and the guarding of all gears, sprockets, etc., is very important.

There is no need for widespread accidents and disaster to occur in our coal mines, and I firmly believe that in the years to come they will be almost entirely eliminated, with the exception of the human equation. Efficiency in our coal mines has been developed to almost the "nth" degree. The capacity of our machines to produce has about reached the limit, so if we hope to reduce the cost of coal mining and regain some of our markets, we must eliminate, or at least drastically reduce, the number of accidents as mentioned above. Reduced accidents will result in great savings, both in dollars and cents and human suffering, will lower the cost of production, and create better working conditions for our miners and more profit for our operators. Therefore, good labor relations betwen management and employees is imperative, and safety education for both management and employees will go a long way toward this solution.

Our Advertisers, who make this volume possible, will appreciate your inquiries.

RECENT GAS IGNITIONS IN COAL MINES

By HARRY F. WEAVER

Chief, Coal Mine Inspection Branch, U. S. Bureau of Mines Presented at the Fred Bailey Post No. 4 National Mine Rescue Association Benton, Illinois

November 6, 1954

I appreciate thoroughly your invitation to appear before this representative group of safety key men in the coal-mining industry-more so because of the timely subject that I have been assigned to discuss. I use the word "timely" advisedly, because a discussion of mine explosions and mine fires, their causes, and means of prevention is always timely. However, my subject is more opportune now, inasmuch as a study has recently been completed of the underground mine fires and ignitions in coal mines that have been investigated by the Bureau of Mines during the first 26 months that the Federal Coal Mine Safety Act has been in force, from July, 1952, through August, 1954.

As you all well know, Title II of the Federal Coal Mine Safety Act is designed to prevent those major disasters in coal mines in which large numbers of men are killed by mine fires, mine explosions, mine inundations, and mantrip and man-hoist accidents. There is no doubt that the provisions of the Act have been effective in reducing the probability of a major disaster. This is attested by the fact that there has been only one major disaster—a dust explosion initiated by black powder resulting in the death of five men—since it became effective. However, conditions being reported by Federal inspectors and the frequency of dust and gas ignitions and mine fires on record reveal that the possibility of such disasters is far from being eliminated.

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From July, 1952, when the Federal Coal Mine Safety Act became effective, through August, 1954, a period of about 26 months, the Bureau of Mines has investigated 49 gas ignitions that caused 12 fatalities and 77 nonfatal injuries and 64 underground mine fires that resulted in 5 fatalities and 23 nonfatal injuries. Thirty-nine of the gas ignitions and 55 of the fires occurred in mines employing 15 men or more underground which are covered under Title II of the Act. In addition, there were 2 ignitions of gasoline that seeped into the mines from surface pipe lines and 3 coaldust ignitions in which no gas was involved. Inasmuch as the foregoing covers only those occurrences investigated by the Bureau, there is no doubt that there have been many other minor ignitions and fires of which we have no record.

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Only the grace of God has kept many of these out of the disaster category.

In breaking down the 49 gas ignitions by igniting agents, we find that 21 were initiated by electricity, 10 by explosives, 5 by sparks from cutting bits striking hard material, 4 by matches or smoking, 4 by carbide lamps, and 1 each by a safety lamp in a compressed-air stream and a cutting torch; in 3 cases the igniting agent could not be determined.

A further breakdown of the 21 electrical ignitions, by far the major offender, reveals that 8 were caused by locomotive trolleys, 5 by electric drills, 4 by trailing cables, and 1 each by a poor feeder-cable splice, an electric light bulb, a controller, and an electric arc between a cutter bar and a roof bolt due to lack of frame grounding.

I believe it is pertinent to note that 38 of the 64 underground mine fires investigated were also caused by electricity—16 of these were ignited by overheated trailing cables or poor trailing-cable splices.

It is recognized that the primary cause of these gas ignitions is inadequate ventilation. For with adequate ventilation, there would be no accumulated gas to ignite. Therefore, adequately controlled continuous positive ventilation in proper volume is the first essential in reducing gas ignitions. Next, but of almost equal importance, is the elimination of sources of ignition, and of first importance in this respect, on the basis of the foregoing data, is the proper installation and maintenance of electrical circuits and equipment. Poorly made temporary splices in trailing cables, inadequate overload protection. and running over cables are all too

common. Failure to make proper and suitable tests for gas where electric equipment is operated has been another important contributory cause of these ignitions.

My subject has been restricted to gas ignitions, but I hope you will excuse me if I expand in part beyond my topic, because it is difficult to divorce underground ignitions from mine fires entirely, inasmuch as both have a common major source-electricity.

Technical electrical surveys by Bureau electrical engineers have revealed that few if any of our coal mines have adequate overload protection against short circuits in remote areas of the mine. Some, unknowingly, have virtually no protection at all, although they have installed circuit breakers and fuses that are supposed to provide this protection.

These conditions exist because of inadequate current-carrying capacity of the conductors caused by cables of insufficient cross-sectional area, poor splices or too many splices, lack of proper rail bonding, etc., and length of circuits which build up the resistance to a point that a dead short circuit could occur at any place inby a certain distance from the circuit breaker, and insufficient current would flow to trip the protective device. Many of you have seen this occur.

The proper procedure to overcome these hazardous conditions is to have a technical survey made of all electrical circuits periodically, and when high-resistance is indicated, proper steps should be taken to make corrections. However, there are other signs that can be readily observed to forewarn of dangerous conditions. For example, low-volt-

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age conditions in working areas may give a clue as to the existence of inadequately protected power circuits. Overheating of cables, sluggish operation of equipment, and excessive dimming of lights during periods of high-power demand indicate low voltage. Where power is supplied from more than one substation, observations should be made to determine whether there are periods when power is interrupted from a nearby station but not from a distant station or stations. This condition may be indicated by insufficient power for operation of equipment and by very dim lights that are connected to the power circuit. When such conditions are observed, steps should be taken to determine the cause and remedy it.

In the past, the Coal Mine Inspection Branch of the Bureau had not been allotted enough technically trained men to make widespread electrical surveys of coal mines, except in response to requests from certain operators for this service. However, with the recent addition of 10 electrical inspectors to our force, we hope to expand this service in the near future. An outline of procedure in making uniform electrical surveys in all areas is now being prepared, and, following special training, these men will be available to assist the electrical engineers to make surveys in mines where a coal-mine inspector observes indications of possible substandard electrical installations. In the event that a survey reveals conditions that present an imminent danger of a mine fire, the inspector will promptly issue an Order to withdraw men until the danger has been abated in accordance with the requirements of the Federal Coal Mine Safety Act.

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In the meantime, many mine explosions and mine fires will be averted and many lives saved if the industry will voluntarily take prompt steps to determine the adequacy or inadequacy of its electrical installations and make corrections where necessary.

I hope I have not painted the picture black or appeared to be threatening. This is not my intent. I only hoped to present the facts as they are and impress on you where and how the most can be accomplished in reducing these potential disasters in the coal-mining industry. The industry is to be commended for its cooperation and the great strides that have been made in making the mines safer, but much remains to be done and can be accomplished in reducing coalmine ignitions and fires if the facts are brought to light and all concerned will work together toward a common goal.

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CONSTITUTION AND BY-LAWS

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

ARTICLE 1.

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 I. 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, 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 Presi-

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ident at least thirty days before the annual November 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, Vice-President and Secretary-Treasurer shall be elected by ballot, annually, at the regular November meeting and shall hold office for the ensuing year.

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

To make effective this change, at the regular November meeting in 1938, in addition to the four Executive Board members who shall be elected for the three year term, there shall also be elected by ballot eight other Executive Board members, four for a two year term and four for a one year term.

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 vicepresident.

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 vice-president shall preside in the absence of the president and perform all the duties of the president in his absence.

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 newspapers 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 November meeting of the Institute.

Section 5. The Executive Board shall perform the duties specifically prescribed by this constitution; it shall supervise the expenditures

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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. Regular meetings shall be held in June and November 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.

AMENDMENTS.

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 semi-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.

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