FINAL REPORT OF ROOF FALL ON MAN-TRIP
Berwind NO. 11 MINE
NEW RIVER AND POCAHONTAS CONSOLIDATED COAL COMPANY
CAPELS, McDOWELL COUNTY, WEST VIRGINIA

AUGUST 6, 1948

By

John Zeleskey
L. L. Wylam
Coal-Mine Inspectors

Originating Office - Bureau of Mines
Mount Hope, West Virginia
Alex U. Miller, Supervising Engineer

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

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INTRODUCTION

A fall of roof rock on a man-trip caused the instant death of 5 persons and injuries to 8 others in the No. 11 mine of the New River and Pocahontas Consolidated Coal Company at Capels, McDowell County, West Virginia, about 12:50 a.m., August 6, 1948.

At the time of the accident, 47 men, including the brakeman and locomotive operator, were on the man-trip, which was proceeding at a speed of about 4 miles per hour toward the shaft bottom. Thirty-four of the men on the man-trip escaped uninjured, and two received only slight injuries and were not hospitalized. Of the two more seriously injured, one died after admittance to the hospital.

The investigation of the accident revealed that it was caused by a roof fall on the out-going man-trip in motion on the 4 south main haulage road. The roof at the location where the accident occurred was not timbered.

J. L. Gilley, Federal coal-mine inspector, learned of the accident about 5:45 a.m., August 6, 1948, from an official at the No. 11 mine. After obtaining official confirmation of the accident, Mr. Gilley notified the Mount Hope office of the U. S. Bureau of Mines. At 6:00 a.m., Mr. A. U. Miller, supervising engineer at the Mount Hope office, dispatched to the mine L. L. Wylam, Federal coal-mine inspector at Welch, W. Va., and John Zeleskey, Federal coal-mine inspector, who was making a routine inspection of the Eccles No. 5 mine, Eastern Gas and Fuel Associates, Coal Division, Eccles, West Virginia. The two Bureau of Mines representatives proceeded to the scene of the accident immediately, arriving there about 8:30 a.m. after the bodies and the injured were removed from the mine. The investigation of the accident was conducted on August 6, 1948, by company officials, the two Federal coal-mine inspectors, State coal-mine inspectors, the administrative assistant to the Chief of the West Virginia State Department of Mines, and by three members of the mine safety committee. Later at the conference, after the investigation was completed underground, the Safety Director of District U.M.W.A. was also present.

GENERAL INFORMATION

The No. 11 mine of the New River and Pocahontas Consolidated Coal Company is at Capels, McDowell County, West Virginia, and is served by the Norfolk and Western Railway. The names and addresses of the operating officials are as follows:

President	Charles E. Dunlap	1120 Commercial Trust Building, Philadelphia 2, Pa.
Vice President	Charles Berwind	1120 Commercial Trust Building, Philadelphia 2, Pa.
General Supt.	P. P. Kerr	Berwind, W. Va.
Safety Engineer	C. L. Wilson	Beckley, W. Va.
Superintendent	N. R. Decker	Berwind, W. Va.
Chief Engineer	W. A. Boisture	Berwind, W.Va.
Mine Foreman	Ralph Mulkey	Capels, W. Va.

This company owns and operates 12 other mines in West Virginia.

Employees and Production

The average employment at this mine was 535 men; 70 worked on the surface and 465 worked underground. Of the 465 underground employees, 295 worked on the first shift, 130 worked on the second shift, and 30 on the third shift. The mine is operated 6 days a week and 8 hours on each shift. The average daily production was 1,800 tons of coal; about 65 percent of the coal was loaded by hand and the remainder was loaded by a mobile loading machine. The tipple was operated one shift.

Openings and Nature of Coal Beds

The No. 11 mine was opened by two concrete-lined shafts 360 feet deep and 200 feet apart. The main shaft had two hoisting compartments and was used for intake air. The auxiliary shaft is divided by a concrete curtain wall into two compartments, one of which was used for intake air and hoisting purposes, and the other for return air. In addition, an unlined return-air shaft 625 feet deep is near the back of the mine. Also, an intake slope approximately 1,165 feet in length was used as an intake airway near the back of the mine.

The No. 11 mine was developed in the Pocahontas Nos. 3 and 4 coal beds; however, the No. 4 coal bed has been abandoned temporarily because of faulty areas encountered. The thickness of the Pocahontas No. 3 coal bed was 48 inches in the present working area, including a 3-inch bone parting in the center. The coal is low-volatile bituminous, soft, and friable. The coal bed dips about 3 percent southwest. The immediate roof in the Pocahontas No. 3 coal bed in this mine is a treacherous layer of shale (draw slate) from 8 to 12 inches in thickness. The overlying roof contains many slips and frequently caves if not adequately supported. The main roof draw rock shale (slate) is about 10 inches in thickness; and above this draw rock, the roof consists of black shale and draw rock. The floor is smooth hard shale.

COAL ANALYSIS

The following proximate analysis of a sample of run-of-mine coal from this mine, as shown in Bureau of Mines Technical Paper 626, "Analyses of West Virginia Coal", page 99, is as follows:

Composite Samples

	Proximate Percent
Moisture	1.9
Volatile Matter	15.2
Fixed Carbon	77.8
Ash	5.1

The ratio of volatile matter to total combustible matter of this coal is 0.163 and is an indication that the coal dust in this mine is of an explosive nature.

MINING METHODS, CONDITIONS, AND EQUIPMENT

Mining Methods

The room-and-pillar method of mining was followed, and pillars were extracted systematically by the open-end method on a full retreat system. The main entries were driven in sets of 6 and 12, and room entries were driven in pairs at intervals of 360 feet. Entries were driven 14 feet wide and rooms either 16 or 20 feet wide. Crosscuts were made at intervals of about 80 feet. The coal was undercut near the floor of the coal bed to a depth of 7 feet by four permissible-type track-mounted under-cutting machines and by two permissible-type shortwall machines. The boreholes in the coal in the mechanical loading places were drilled with permissible-type hand-held electric drills and in the hand-loading places with breast augers. Percussion drills were used for drilling holes in rock in entries. Coal was loaded by hand into mine cars and by mechanical means. Two scraper loaders were used for loading rock in airways and in grading haulageways.

Timbering

Minimum standards for systematic timbering were adopted. The timbering rule requires cross bars to be set on 3- or 4-foot centers to within 2 or 3 feet of the face in the working places. Two safety posts are required near the face. Along haulage room entries, the timbering rules require cross bars to be set on 4-foot centers under normal roof and on closer centers where the condition of the roof requires additional support. Along the main haulage entries, sawed wooden cross bars are required to be set on 4- or 5-foot centers under normal roof and on closer centers where the condition of the roof requires additional support. Also, much timbering has been done on the main haulage entries by means of steel I-beams and steel rails supported by rock and concrete piers and by steel pegs inserted in holes of ribs; however, there are many locations with high exposed places along the main haulage roads where no timber or steel I-beans have been set.

Ventilation and Mine Gases

The ventilation was induced by two fans operated exhausting and continuously. The fans were installed on the surface in fireproof housings and were offset 15 feet or more from the nearest side of the shaft openings. Both fans were reversible, protected by pressure-relief doors, and equipped with pressure-recording gages, water gages, and automatic signalling devices. At the time of the last Federal inspection in March 1948, the fans were circulating approximately 413,000 cubic feet of air a minute at a water-gage pressure of 4.1 and 6.5 inches, respectively. A split ventilating system, consisting of 35 air splits utilizing air crossings and of regulators to minimize the necessity for doors, was being used. The main, intermediate, and room-entry haulageways were ventilated by intake air. Overcasts and permanent stoppings between the main intake and return airways and stoppings in room entries were constructed of masonry, wall hitched into the ribs. The few doors that were used were erected in pairs to form air locks. Line brattices were used to conduct the air to the faces of working places. The West Virginia Department of Mines classes the mine "gassy", and 9 of the 15 air samples taken during the March 1948 Federal inspection contained methane in excess of 0.25 percent. Six fire bosses were employed. Preshift, on-shift and weekly examinations were made by certified officials, and records were kept of these inspections. The working places and the haulageways were also examined twice or more during each working shift.

Drainage

The mine, with the exception of some of the isolated locations and some of the back entries, was dry.

Dust

The mine, including the haulageways, was free of excessive accumulations of coal dust. Dust produced during cutting and loading operations at the working faces in the mechanical loading sections was allayed with water from sprays mounted on the machines. Also, the tops of the loaded mine cars were sprayed with water enroute to the shaft bottoms. Coal dust produced during mining operations in the hand-loading places was not allayed at its source. All working places were rock-dusted to within 40 feet of the faces. Entries, including the haulageways and back entries, were rock-dusted throughout. The haulage roads were free of spilled coal, and clean shelter holes were provided at regular intervals.

Haulage

Main and side-entry tracks consisting of 60-pound rails laid on wooden ties and 40-pound rails installed on steel ties were used in rooms. The track gage was 48 inches. The haulage tracks were well alined and ballasted, the rail joints were fastened properly, and derail switches were installed on all grades. At least 36 inches of unobstructed clearance space was provided along the haulageways.

The 3-1/2 ton capacity end-gate-type steel mine cars were maintained in relatively good repair. The cars were not equipped with brakes, but the speed of trips on grades was controlled by placing skids under the wheels. Haulage operations were controlled by a dispatcher by means of telephones. Haulage along the main lines was accomplished by one 15-ton, two 13-ton, and two 10-ton trolley-pole locomotives; and sixteen 8-ton flameproof-type, cable-reel locomotives were used for gathering purposes. All haulage was done on intake air, except in the face regions. Men were transported in ordinary mine cars. Suitable man-trip waiting stations were provided where needed, but, as stated in the March 1948 Federal coal-mine inspection report, the trolley and feeder wires were not guarded at some of these stations.

Lighting

Fixed incondescent lights operated on a circuit separate from the mine circuit were installed on the shaft bottom; and similar lights operated from the mine trolley circuit were installed at irregular intervals along the main and secondary haulage roads, at some of the main-line switches, pumps, and section first-aid stations. The wiring to electric lights was suitably installed on insulators.

Permissible-type electric cap lamps were used by all underground employees for individual illumination. The underground officials and machine operators used permissible flame safety lamps. These lamps were checked by the fire bosses on each shift before they were taken underground, and all lamps were left in the lamp house when not in use. Smoking was prohibited underground, and weekly searches were made for matches and other smoker's articles.

Electrical Equipment Underground, Including Mechanical Loading Equipment

All mining machines, loading machines, rock-dust distributors, and drills were of the permissible-type. The scraper loaders and the cable-reel locomotives were equipped with flameproof-type motors and compartments. All other electrical equipment, including trolley locomotives, compressors, and pumps, were of the open type.

Electric power was taken underground by means of armored cables through a drill hole and through the man-and-material shaft; the underground trolley and feeder lines were well installed. The power wires, including trolley and feeder lines, were in intake air. Cut-out switches were installed at or mear the point where branch lines left the main circuit. Secionalizing switches were provided at suitable intervals along the haulage roads. The electrical equipment was inspected periodically by the mine electrician. Cable splices were made underground by operators of equipment by using splicing rings and friction tape. Machinery underground was operated electrically by 250-volt direct current, except three pumps (one 1,000-gallon and two 500-gallon capacity), which were operated by 2,300-volt alternating-current motors. These pumps were located near the bottom of the down-cast air shaft. The transformers and substations were on the surface.

Explosives

A permissible explosive, Monobel C in 1-1/8- by 8-inch cartridges, was used for blasting coal; and Gelobel A, a permissible explosive in similar size cartridges, was used for blasting rock. Number six-strength electric detonators were used, and the shots were fired singly on shift immediately after charging by authorized shot firers or certified officials. Tests for gas were made by the shot firers and section foreman immediately before and after each shot was fired on shift. Normally, five holes were drilled in the face of the coal. The boreholes in coal were about 2-1/2 inches in diameter, approximately 6 feet in depth, and drilled horizontally. Primers were made up near the working faces, and the holes were stemmed with incombustible material (either clay or rock dust). Wooden tamping sticks were used and the amount of explosives in a borehole did not exceed 1-1/2 pounds. The explosives and detonators were taken into the mine in well-constructed, double-compartment explosives cars and were transported underground by electric locomotives preceeding the man-trips about ten minutes. The daily supplies of explosives and detonators underground were stored in separate, well-constructed section boxes. The section boxes were in dry and well-rock-dusted places and were more than 25 feet from power lines and roadways.

Mine Rescue

About 12 men at this mine have received mine rescue training at various times, but none of them had additional training in recent years. A State-owned mine rescue station is located at Hemphill, W. Va., about one mile from the No. 11 mine. Six all-service gas masks are kept at this mine, and are available in case of an emergency.

Fire Fighting

All buildings within 100 feet of the mine openings and vital structures were of fireproof construction. A fire-fighting organization for the surface or underground was not maintained, nor were fire drills held; however, each operator of equipment was instructed in the use of chemical fire extinguishers and other fire-fighting equipment maintained at the mine. The surface fire protection consisted of fire hydrants and standard hose, water in barrels, buckets, sode-acid and carbon-tetrochloride extinguishers, and rock dust in the various buildings. Also, a large capacity water reservoir is located near the plant; water for this reservoir is pumped from the mine.

The underground fire-fighting equipment consisted of an 800-gallon track-mounted water tank equipped with a high-pressure pump and 50 feet of 2-inch hose and a rock-dust distributor equipped with a hose. A small pyrane fire extinguisher was provided on each loading and cutting machine, a supply of rock dust (at least 5 bags) was near both sides of each door, and water lines were available in the mechanical-loading section and along the main haulage roads in some of the sections. Also, rock dust in bags was available in each section.

PREVIOUS FALLS ON MAN-TRIPS IN THIS MINE

A fatality, caused by a fall of rock on a supply crew while shifting supplies on the main line, occurred in this mine on June 26, 1943. A fall of roof on a man-trip killed 2 men and injured 3 others in this mine on the morning of August 25, 1943. This fall occurred along the main haulage road without warning and struck the 13th car on a 30-car trip.

MINE CONDITIONS IMMEDIATELY PRIOR TO ACCIDENT

The mine was operated normally and no unusual conditions, insofar as could be ascertained, had been reported.

STORY OF THE ACCIDENT

Previous to the accident on August 6, 1948, about 12:30 a.m., which was about the regular quitting time for the shift in this section, a man-trip consisting of 14 ordinary mine cars containing 47 men, including the motorman and brakeman, proceeded from the 5 south and Nos. 1, 2, 3, and 4 rights off 2 main parallel toward the shaft bottom. At about 12:50 a.m. on the same day, on the 4 south haulage road between 2 main and 2 main parallel, a fall of rock fell on the 6th, 7th, and 8th cars of the man-trip, causing the instant death of 5 persons and injuries to 8 others; 2 of the 8 persons were only slightly injured and were not hospitalized. Thirty-four of the men on the man-trip escaped uninjured. Of the 2 more seriously injured, 1 died after being admitted to the hospital. The rock that fell on the man-trip consisted of one large piece of rock measuring 12 feet wide; 26 feet, 10 inches in length; and 10 inches in thickness. This rock, after falling, had broken into two pieces 10 and 16 feet in length, respectively, and several small pieces. This large piece of rock fell on the edge of the 6th car and completely covered the 7th and 8th cars of the man-trip. The 6th car back from the locomotive contained 5 men, 3 of whom were injured; the 7th car contained 5 men, 4 of whom were injured and 1 was instantly killed; the 8th car contained 5 men, 4 of whom were instantly killed and 1 was injured. The men in the remaining cars of the man-trip were not injured and assisted in giving aid to the injured and in the removal of the dead and injured men to the surface.

The company rule required that not more than five men be assigned to each car on the man-trip. The rule was complied with at this particular time. It was stated that on Sunday, August 1, 1948, a crew of six men scaled the top along the 4 south heading, and the loose roof outby the location where the accident occurred was taken down; this was substantiated by date marks of the fire boss. The entry at the location of the accident was 13 feet, 9 inches wide and 6 feet high above the rails where the roof fall occurred. The haulage road was practically level and reasonably clean, with adequate clearance on both sides of the track.

Six fire bosses were employed who make preshift examinations before the men enter the mine. During the conference after the investigation, the mine officials stated that the fire bosses patrol and examine the roof along the main and secondary haulage roads twice each day; and where man-trips are operated, the haulage roads are patrolled and examined 30 or 40 minutes prior to the passing of these trips on both shifts. It was also stated that an average of 30 men were employed each day at this mine to scale and take down loose roof over the haulage roads.

INVESTIGATION OF CAUSE OF ACCIDENT

The exposed area which fell was not supported by any kind of timber because the roof was considered good by the mine management. During the investigation, it was stated that on August 6, 1948, at 12:30 a.m., or 20 minutes before the accident occurred, a fire boss examined the roof along 4 south haulage and that he did not observe any unusually dangerous roof condition. The man-trip motorman, who was also the main-line motorman, stated that he made 10 or more trips along this haulageway during the working shift in addition to operating the man-trip and did not observe any unusually dangerous condition of the roof at this point. Some of the men who were riding the front end of the man-trip and who escaped injury stated that they also failed to notice anything to indicate that a fall was about to occur as the trip was going by and that the roof fell suddenly and without any warning. The man-trip was operated at a speed of not more than 4 miles per hour.

CAUSE OF ACCIDENT

The roof above the second draw rock or the immediate roof is black shale, which stands fairly well for short periods of time, but eventually fractures and falls. The changing atmospheric conditions encountered on intake airways particularly affect this roof. Slips forming kettle bottoms are prevalent in the first and second draw rock. Large kettle bottoms are also encountered, although not so persistently in the main roof. These pieces of roof are very treacherous, and if not supported by timbers, they will fall without warning. The roof of the main entries has been taken down or it has fallen to various heights. In some locations, the roof has fallen 20 or more feet high. Some steel rail timbering has been done near the shaft bottom and along some of the main haulage roads; however, the roof along some of the main haulage roads was still in need of timbering where the roof was considered good. While patrolling and scaling is of considerable value in taking down small pieces of loose roof, it will not prevent falls of roof unless the roof is adequately supported by means of timber or steel I-beams. While the claim was made that a fire boss examined the roof along 4 south haulage road 20 minutes before the passing of the man-trip, it is doubtful that the examination was sufficiently thorough to detect weaknesses in the roof such as that causing the accident. If the roof was examined, in all likelihood it was merely a visual examination. It is not customary for the fire bosses to test the roof along the haulage roads unless the roof appears to be doubtful from visual inspection.

The investigation of the accident revealed that the primary cause was the failure to expedite the completion of roof timbering along the haulage road in the 4 south section. Work was in progress to timber the roof along all main haulage roads in the mine. Also, a primary cause was the failure to adequately examine the roof by the sound-vibration method. Furthermore, the management failed to realize that from a safety standpoint, no roof should be considered good, but should always be treated os hazardous. It is safe to say that no coal-mine roof is so good it does not need support, expecially when the roof is "sweating", causing expansion from warm moist intake air. Appended to this report is a sketch showing the route of travel of the man-trip involved and the location where the accident occurred.

CONCLUSIONS

1. Serious and disastrous accidents can occur when provisions of the State laws, company rules, and the Federal Mine Safety Code are violated.

2. This accident clearly illustrates the need for constant vigilance and care along haulage roads.

3. Wooden timber of the right type, properly placed and set, could be used to good advantage in lieu of steel timbering, if difficulty is encountered in procuring the steel.

4. It is probable that if the roof along this haulage road had been adequately supported from the outset, the problem of controlling it would be less difficult at the present time.

5. No roof should be considered good in any coal mine especially when it contains slips, rools, pots, cutters, clay veins, horsebacks, draw slate, alternating slate and rock, water crevices, and crop roof.

6. Changing atmospheric conditions in intake air should be considered as a warning for additional roof testing and timbering because of the effect of these changing conditions on the roof.

7. It is advantageous to have the roof over the haulageways tested at frequent intervals with suitable roof-testing rods by the vibration method.

8. Examining roof along haulage roads by observation is inadequate unless the roof is timbered properly. Visual observation does not constitute a thorough examination.

9. This accident illustrates that substantially constructed, steel-covered man-cars are of breat advantage for transporting men underground but such a precaution should not be regarded as a substitute for adequate roof support.

10. Unpredictable roof will fall if not supported.

Recommendations

Recommendations concerning the safe operation of this mine were made in reports of previous Federal inspections, the last inspection having been made during March 1-8, 1948. Therefore, recommendations in this report are limited to conditions related to this accident.

Recommendations Based on the Federal Mine Safety Code For Bituminous-Coal and Lignite Mines of the United States

Article III - TIMBERING

Section 1a. The minimum standards of timbering should be complied with by workmen and officials, and additional timbering should be done wherever it is necessary to afford adequate protection.

Section 3c. During work on any shift, the mine foreman in charge of the shift or his designated assistants should examine, or cause to be examined by a competent person, the roof over passageways where men travel for dangerous conditions. Where found, such dangerous conditions should be corrected promptly by removing loose roof or ribs, by adequate timbering, or the duplication of timbering where necessary.

Supplemental Recommendations Not Specifically Covered by the Federal Mine Safety Code

1. Mine roof along the haulage roads should be tested thoroughly by the sound-vibration method. Such tests should be made more frequently during each working shift with suitable roof-testing rods.

2. A greater effort should be made to expedite timbering the roof over the main haulage roads.

3. Patrolling of main haulage roads should be done more frequently so that the workmen entering the main haulage roads can be warned of the existing conditions.

4. Substantially constructed, steel-covered man-cars of the small-capacity type should be provided for transporting men underground.

5. Additional examinations of the roof consisting of both visual observation and testing should be made either by the officials or competent authorized persons on each shift during the months when atmospheric conditions are changing.

6. Unpredictable roof over the haulage roads should be adequately timbered.

ACKNOWLEDGMENTS

The writers acknowledge the courtesies extended and the help given by the officials and employees of the No. 11 mine, New River and Pocahontas Consolidated Coal Company, and members of the United Mine Workers of America, who gave, without reservation, all information requested in connection with this investigation.

The cooperation of Mr. John Hansford, Administrative Assistant in Charge of Mine Rescue and Safety, West Virginia Department of Mines, Charleston, West Virginia, and his staff of inspectors is also hereby gratefully acknowledged.

Respectfully submitted,

/s/ John Zeleskey

John Zeleskey,
Coal-Mine Inspector.

/s/ L. L. Wylam

L. L. Wylam,
Coal-Mine Inspector.

APPENDIX B

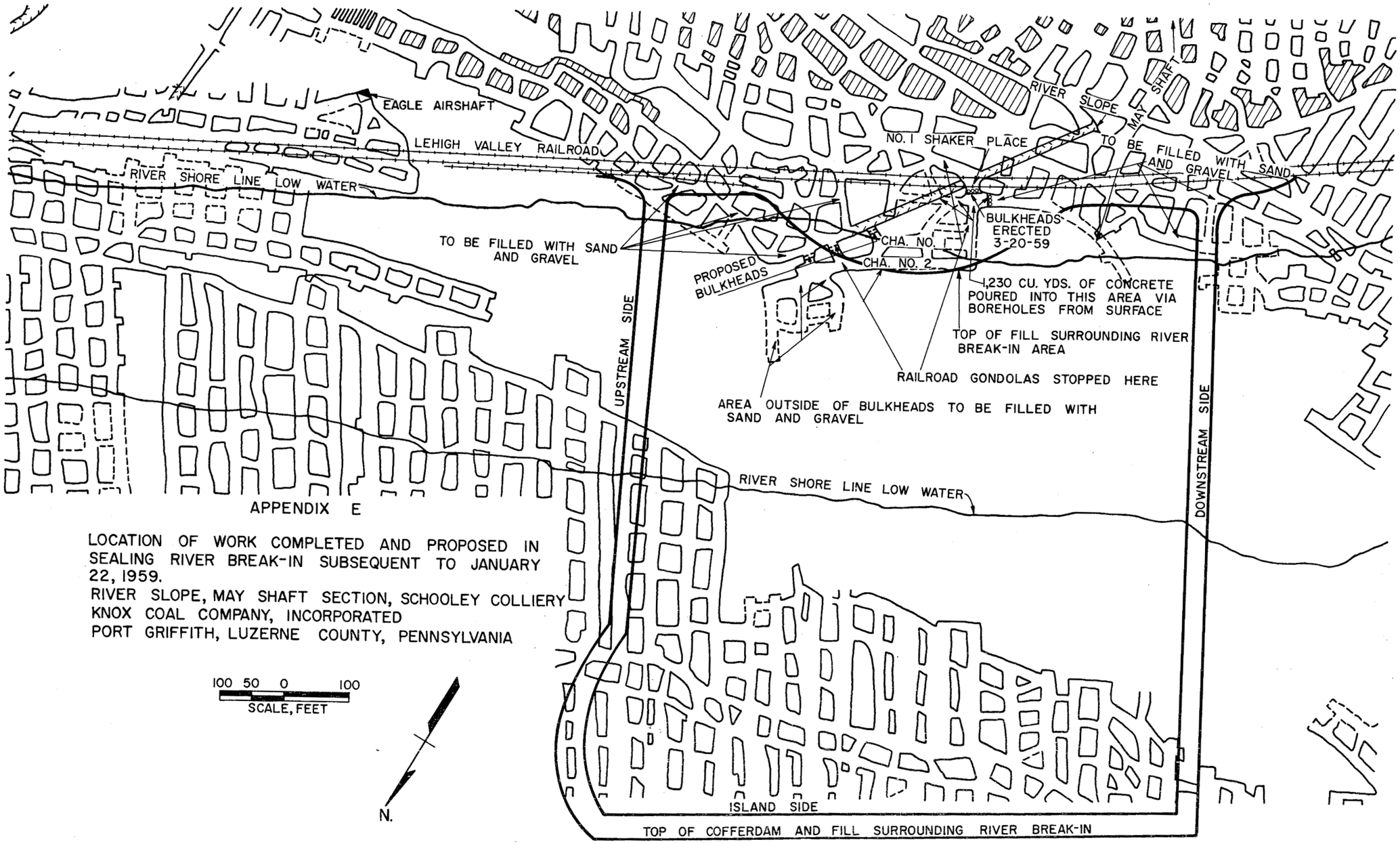
MINE NO. 11
NEW RIVER AND POCAHONTAS CONSOLIDATED COAL COMPANY
CAPELS, McDOWELL COUNTY, WEST VIRGINIA

List of Men Killed (or Died) on Man-Trip
August 6, 1948

NAME	AGE	Killed or Died	Occupation	Number of Dependents
Alex Flournoy	50	Killed	Coal Loader	2
Haywood Saunders	36	Killed	Coal Loader	-
R. F Cooper	45	Killed	Coal Loader	?
Emmett Pompey	47	Killed	Coal Loader	3
E. E. Mullins	41	Killed	Track Man	4
George Arnold	41	Injured	Timberman	-
McKinley Broadnax	52	Injured	Trackman	1
*Magarene May	44	Injured	Coal Loader	5
R. G. Jenkins	48	Injured	Coal Loader	2
C H. Hall	59	Injured	Coal Loader	2
John H. White	48	Injured	Coal Loader	4
Roosevelt Chambers	45	Injured	Coal Loader	1
C. J. Smith	20	Injured	Coal Loader	1

*Died in hospital

No formal hearing or inquest was held. Mr. E. L. Chatfield, Inspector-at-Large, State Department of Mines, reported that it was not necessary.



APPENDIX E

LOCATION OF WORK COMPLETED AND PROPOSED IN SEALING RIVER BREAK-IN SUBSEQUENT TO JANUARY 22, 1959.
RIVER SLOPE, MAY SHAFT SECTION, SCHOOLEY COLLIERY
KNOX COAL COMPANY, INCORPORATED
PORT GRIFFITH, LUZERNE COUNTY, PENNSYLVANIA