

J. F. Davies

REPORT OF EXPLOSION

**CONSOLIDATION COAL COMPANY, MINE NO. 153
VAN LEAH, JOHNSON COUNTY, KENTUCKY**

By

**Joseph F. Davies
District Engineer**

DEPARTMENT OF THE INTERIOR

BUREAU OF MINES

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At about 8:40 a.m. on July 17, 1935, a gas explosion occurred in No. 153 Mine of the Consolidation Coal Company at Van Lear, Johnson County, Kentucky, resulting in the death of nine men, three others in the vicinity escaped uninjured.

No other explosion has occurred in this mine.

Location and Ownership:

The mine is located about one mile northeast of Van Lear, Johnson County, Kentucky, and is served by a branch from the Big Sandy Division of the Chesapeake and Ohio Railroad. It is operated under a receivership by the Receivers for the Consolidation Coal Company, with offices at Fairmont, West Virginia and New York City.

Company Officials:

D. A. Reed	General Manager of Operations	Fairmont, W. Va.
F. F. Jorgensen	General Manager of Production	Fairmont, W. Va.
B. M. Rogers	Divisional Manager	Van Lear, Ky.
William Gunning	Mine Superintendent	Van Lear, Ky.

The Mine:

There are three openings to the mine with underground workings connecting with workings of Mine No. 154. Two are slopes and one is a shaft. Through one of the slopes, coal is raised to the tippie by a conveyor, the other is equipped with a hoist and is used as a supply and man-way. The regular mine cars are taken up and down this slope, which has a

pitch of 16 degrees and is 400 feet in length. Men walk in and out. The shaft which is about 150 feet deep is used as an intake airway.

Production and Employees:

The daily average production is 2200 tons. The maximum daily production was 2500 tons. From January 1, 1935 to July 1, 1935, there were 218,000 tons of coal produced.

A total of 473 men are employed; 430 underground and 43 on the surface. There were 273 loaders and 157 shift workers including 12 bosses.

The life of the mine is indefinite.

Surface Plant and Equipment:

The tibble is of steel and concrete and is provided with preparation equipment.

The bath house is of brick with a concrete floor. It is provided with chain and basket lockers. There are ample showers and toilets located in separate rooms. An attendant is on duty at all times.

An outside First-Aid dressing station is housed in a separate brick building. It presented a neat, clean appearance.

The mine office and lamp room are housed in a frame building which does not conform to the neatness of the rest of the mine property.

Fan:

A 6 x 14 foot centrifugal fan is located at the top of the air shaft which is located about 300 feet from the man-way slope. It is belt driven by a 75 H.P. electric motor. It is run 86 R.P.M. and is operated blowing. Its rated capacity is 100,000 cubic feet of air per minute at 1 inch water gauge. The fan is protected by explosion

doors. It is reversible. A blinker light indicator is used to show the fan is running.

Explosives Magazine:

The storage magazine for explosives is of brick construction, is located in a hollow, and is isolated.

Two distributing magazines; one for detonators, the other for explosives, are located about 75 feet apart and are about 500 feet from the slope mouth and 200 feet from any building. They are of brick and tile construction. Explosives and detonators are carried by the men into the mine and on regular man trips. The explosives are carried in canvas bags provided with shoulder straps. The detonators are carried in cylindrical wooden boxes. Explosives are stored in covered wooden boxes near the working places underground.

Check-in System:

An in-and-out checkboard is maintained in the lamp-room. Numbered brass checks are used for checking in and for identification. The cap lamps are numbered, but no strict account is kept of the lamp numbers as issued.

Underground Conditions and Methods.

Coal Seams

The coal seam is known as Miller's Creek No. 1. The thickness of this seam varies from 36 inches to 47 inches, but in this mine averages about 43 inches.

It is a hard, bright bituminous coal with marked "Splint Coal" characteristics, and is free of impurities. The coal bed dips toward the East. It lies flat but with undulations.

The analyses of coal samples collected in the mine adjacent as given in Volume I of Series IV of the Kentucky Geological Survey and in Bureau of Mines T. P. 308 follow:

	Kentucky Geological Survey	Bureau of Mines
Moisture	4.85	6.9
Volatile Matter	35.95	34.9
Fixed Carbon	56.33	55.9
Ash	2.90	2.3
Sulphur	0.47	0.6

The volatile ratio is calculated to be .38, using these analyses. To prevent propagation of an explosion by coal dust having a volatile ratio of .38 would require approximately 50 to 55 per cent added incombustible.

Roof and Floor:

The coal is overlaid by massive sandstone. In portions of the mine, it forms the immediate roof, but in others, slaty shales intervene and form the immediate roof which requires careful timbering. Slips, rolls, and pots are common in these shales. The roof in the entire explosion area is composed of these shales and was heavily timbered, practically throughout.

The floor is a fire clay. It varies in thickness from two to nine feet. It forms an irregular floor and presents difficulties to undercutting. In portions of the mine, it forms a hard firm floor, but in others, it is soft or friable.

Mining Methods:

A room and pillar plan of mining has been used. No pillars have been extracted in the recent work because of difficulties from heaving bottom and bad roof. The mine is laid out with regard to butts and faces of the coal.

Main entries are carried 4 or 5 abreast and in most of the mine, 2 line rooms are carried on each side to provide additional airways. The main haulways are known as East and West Mains, from which face headings are run North at intervals of 1800 to 2000 feet. Room entries are usually turned right and left at 250 foot intervals. The room entries are driven 14 feet wide and are brushed; the parallel air courses are driven 25 feet wide and are not brushed. In some instances, as in 1st Right off 5 North face, where the explosion occurred, a double entry is driven at a 500-foot interval, both entry and air course are brushed and rooms turned from both. Rooms are driven 25 feet wide, leaving 10-foot room pillars. Break-throughs are made at 60-foot intervals. Chain pillars are approximately 25 feet by 60 feet. Barrier pillars approximately 250 feet thick are left on each side of the mains. Blocks of coal varying from 135 feet to 150 feet are left between the headings and line rooms.

Roof and Timbering:

The roof in the explosion area is of a slaty shale which forms a weak, friable roof. On the entry cross bars were placed at 5-foot intervals practically its entire length. On the air course, cross bars ~~were used~~ were used with areas where the roof was a little firmer, posts were used. In the rooms, 2 rows of posts were set on each side of the track. Two safety posts are required to be set on all faces, not more than 7 feet back. Prepared wedges are used.

Ventilation and Gases:

The mine is ventilated by means of a 6-foot by 14-foot centrifugal fan, (Connellsville Manufacturing Company). The fan is operated

blowing and an air measurement indicated that 73,500 cubic feet of air per minute passed into the mine. At the main return to Mine 154, a measurement indicated 68,940 cubic feet passing. These measurements were made about three weeks previous to the explosion. There are 3 major splits of the ventilation system embracing both mines. At that time an air measurement indicated 10,000 cubic feet of air per minute passing into the 5th North section of Mine No. 155. This last measurement indicated the volume of air into this section to be less than that required for the normal working force in this area. The fireboss testified at the investigation that on July 9th, or eight days previous to the explosion, he measured 2100 cubic feet of air per minute passing through the last open break-through in the 1st Right entry; the entry in which the explosion occurred. This testimony would indicate that this area was inadequately ventilated at that time.

All stoppings are constructed of hollow tile with a few exceptions of some of the older ones being of brick.

Overcasts are of brick or other fireproof construction.

Doors are of substantial construction. They are made to open to both sides from the center of the track. Doors are single.

Old workings are ventilated by permitting air to drift through them. Much of the worked out areas are filled with water especially in Mine 154. The mine is rated as non-gassy by the Kentucky State Department of Mines. The Kentucky State Mining Law defines a gassy mine as: "A Gaseous Mine is one in which the percentage of explosive gas exceeds one-half of one per cent at the return of any one split in a dusty mine and exceeds one and one-fourth per cent at the return of any one split

in a non-dusty mine." The law does not define dusty or non-dusty mine.

Fire-Bossing:

A pre-shift fire-boss examination is made only of advancing entries and air courses and these only on days the mine works.

The fire bosses' report book was examined and these records show fire-boss inspections to have been made on the following dates in July: 1, 7, 8, 12, 20, 21, 22. These records show gas found in 6th North S Right on July 7th and 8th. These are the only records of gas being found for several weeks previous to the explosion.

Haulage:

All gathering and haulage is by means of electric locomotives, there being 3 tram and 17 gathering locomotives used. All are of the trolley type.

The mine cars are of end-gate type and are of composite wood and steel construction. They are tightly constructed and well maintained. All are provided with effective brakes. A single link and pin type of coupling is used. There are 525 cars in use. They are rated at 1½-ton capacity, but are usually loaded to 2½ tons.

The track is laid to 48 inch gauge. Rails of 40 pound weight are used on main haulages, 30 pound on side entries and 20 pound in rooms; on entries wood or wood and steel ties are used, in rooms steel ties are used. Switch throws of a parallel type are used on all switches. Recessed man holes are provided at each switch and at 90-foot intervals on most entries. On the traveled side, away from the trolley, 40 inch clearance is maintained and is kept reasonably free of materials. On main haulages, block signals, some automatic, some hand operated are used.

Other traffic is routed and controlled by a dispatcher. Phones are placed at side tracks and main intersections.

Electricity Underground:

Power at 2200 volts a.c. is brought to 2 sub-stations. One is located on the surface, the other on the Main East near 5 South. Two 150 K.W. Westinghouse motor generator sets at each station supply 275 volt current to the trolley circuit. These sub-stations have standard type switchboards, circuit breakers, and insulation mats. The alternating current is brought into the underground sub-station through a bore-hole. Direct current is fed to the trolley circuit by stranded copper feeder cables carried on insulators in the roof near the rib on the trolley side. Cut out switches are provided to shut off power from various sections of the mine, but automatic circuit breakers are provided only at sub-stations. Trolley wires are guarded at switches and places where men are required to pass under. Both split hose and board guards are used. Boxes of sand and carbon tetrachloride type fire extinguishers are provided at the sub-stations.

Pumps:

There are 5 main pumps used, some are triplex, others centrifugal. There are 25 field or gathering pumps. All are electrically driven. One gathering pump was located on the 1st Right entry at Room 15 as indicated on the large scale map accompanying. This was a "Fairmont" plunger pump, gear driven by a 5 H.P. motor. Power was taken from the trolley circuit through starting box.

Lighting:

Every person underground was required to wear a portable electric cap lamp. The Edison type was provided.

Regular incandescent lamps were located at switches, sidetracks,

intersections and other points on the haulage and at pumps.

Undercutting:

All of the coal is undercut before being shot down. There are 13 electric mining machines used, all are of non-permissible type. Undercutting is done at night or on idle days. The undercuts vary from 6 to 7 feet. The cuttings are not loaded out before shots are fired. The miner drills, loads, and shoots at any time during the shift.

Explosives and Blasting:

Monobel of a strength equivalent to No. 11 and in sticks 1 by 3 inches is used in the coal. Gelobel is used in rock blasting. Miners are issued up to 7 sticks with 4 detonators per shift. Electric detonators are issued with legs shorted, the short being removed when ready to fire. Firing cables are 100 feet in length, and are of various types as the miners buy or provide their own. Firing is done from 3-volt dry cell batteries with recessed terminals. One shot is fired at a time. Sand dummies are used for stemming.

Conditions Prior to Explosion:

The 1st Right entries, the area in which the explosion occurred, is a pair of entries turned right off the 5 North Face Headings. Rooms are turned from each of the entries. The inby entry is known as the air course, the outby is known as the entry and haulway. The air course is the intake airway and the entry is the return. On the air course, seventeen rooms were being advanced. On the entry sixteen rooms were being advanced. Approximately 40 men were employed in this pair of entries on days the mine worked. It was said that 4100 cubic feet of air was passing into the air course with 2100 cubic feet of air passing through the last open break-through at the

face of the entries on July 9th, or 8 days previous to the explosion.

Water accumulated in sufficient quantities to warrant the placing of a pump on the entry at Room 18. This water when accumulated formed a pool extending along both entry and air course.

Several days previous to the explosion, the bottom at many places in the area began to heave and break, breaking or loosening timbers which resulted in roof falls. This condition continued to grow worse and on the day previous to the explosion, it was decided to remove all track and equipment inby of rooms 23 on entry and air course.

The heaving of bottom had seriously damaged the tile stoppings in all of the break-throughs inby of rooms 18, and it was said these were temporarily covered with canvas to maintain ventilation.

On the day previous to the explosion a crew of men had removed track and equipment from inby of room 23 on the entry side and some of the track from rooms on the air course side inby of room 23, but had not removed switches or main track.

It was said that no gas inspection had been made of this area at any time during the disturbed conditions. A statement was made at the investigation that on the day previous to the explosion, a rail had accidentally come in contact with the trolley wire just inby of room 23 on the entry and had burned the wire in two.

On the morning of the explosion, a section foreman and 4 men were sent to the 1st Right to continue the removal of equipment and track. This foreman called the mine foreman about 8 o'clock and advised that unless more men were provided, much of the track materials would be lost as conditions were growing worse. He was told to bring 4 additional men

over from another part of the mine. This he did and evidently they had been in the area only a short time when the explosion occurred. There were only three other men in the mine, Irvin Mullins, an engineer with Mr. Crane, fire-boss were on 5 North face haulageway just inby of the Main East headings and Mr. Wilson, a pumper, was a short distance outby of the 1st Right intersection, on the 5 North Face haulageway.

Story of the Explosion

Immediately following the explosion, one of the three men who was in the vicinity of the explosion area telephoned to the mine superintendent outside and advised that an explosion had occurred in the 1st Right entries off 5 North Face. This information was telephoned to the office at Van Lear from which office calls for assistance were sent to John F. Daniel, Chief, Kentucky State Department of Mines at Lexington, Kentucky; to the Jenkins office of the company and to the Inland Steel Company at Wheelwright, Kentucky.

Mr. Fred Bedalle, Safety Engineer and Mr. Homer Bell, Mine Inspector of the Consolidation Coal Company were at Jenkins and immediately proceeded to Van Lear with rescue crews and equipment.

Mr. H. B. Humphrey, Assistant Mining Engineer, U. S. Bureau of Mines was conducting training at Wheelwright and as soon as he learned of the explosion, advised J. F. Davies, District Engineer at Norton, Virginia. Mr. Humphrey after assisting with the assembling of the State owned rescue equipment, which is maintained at Wheelwright, Kentucky, proceeded to the mine.

Messers Davies and Ferraro proceeded to the mine with all of the rescue equipment from the Norton, Virginia Safety Station, Davies

arrived at 2:20 p.m. and Ferraro with truck and equipment at 2:50 p.m.

Mr. B. M. Rogers, Division Manager and William Gunning, Mine Superintendent, immediately organized crews and proceeded into the 1st Right entry, but because of smoke, heat, heavy falls and low oxygen, they were forced to retreat.

The door at the Main East was covered with canvas to minimize leaks and the three damaged stoppings between 5 North haulage and return airway were covered with canvas, a canvas stopping was placed across the 1st Right haulway and one across the 5 North haulway so as to force the air into 2 Right and down the two line rooms which were the intakes to 1st Right.

Because of fear of a fire being in the explosion area, a curtain of canvas was placed across the 1st Right air course inby of the 2nd line room to limit the flow of air into the area.

Extremely dangerous roof conditions existed in these two line rooms and it was deemed advisable to provide a safer, shorter travel way by placing a line brattice in the 1st Right entry from the intersection at 5 North Face haulway to the inby side of the 2nd break-through between the 1st Right entry and air course. A crew equipped with self contained oxygen breathing apparatus made an exploration trip along the 1st Right entry to see if a fire existed or to note any indications of fire in the area. They traveled to the second break-through and a short distance beyond, returned and reported the air clear of any smoke or other indications of fire. The building of the line brattice was then done.

The placing of timbers and frame work being done by men wearing All Service gas masks. This brattice afforded a passageway in fresh air and under safe roof and of a height that permitted men to walk erect,

also shortened the distance to travel about 600 feet. This afforded ample fresh air at the intersection of the second line room and the 1st Right air course. From this point, the advancing of fresh air was done carefully and systematically with gas mask crews making short exploration trips and when necessary, placing of brattices in crosscuts. The advance was carried on as rapidly as possible with the bad roof and heavy falls being the greatest obstacles. Traces of gas was noted at the mouth of Room 5 and the percentages increased until at the mouth of Room 15 where a marked increase in percentage of methane was encountered and possibly an explosive mixture. This condition existed just in the advance of fresh air until Room 23 was reached when it cleared very rapidly and the face of the air course was reached with only slight traces of gas found. The area was cleared and 7 of the 9 bodies removed by 11:30 a.m. of July 18th. The two remaining bodies were found under a heavy fall at one of the places where it was thought they would be and removed to the outside by 10 o'clock on the morning of July 19th. Six of the bodies were found under falls.

All of the bodies showed evidence of heat, some were burned by flames, evidently none were seriously mutilated by forces.

No fires were encountered.

Property Damage:

It was necessary to clean up several falls and place timbers in order to recover the two locomotives, several mine cars and track materials. One mine car and some track materials will probably not be recovered.

One door and eight main stoppings were destroyed. Three main

stoppings were seriously damaged. All of the stoppings in the 1st Right entries were destroyed, however, six of these 13 were either destroyed or seriously damaged by the squeeze before the explosion.

Nine persons were killed.

Forces:

Maximum forces were evidently developed immediately following ignition and moved in all directions from an area between Rooms 15 and 16 on the entry. Forces evidently moved both eastward and westward along both entry and air course and moving into the rooms off each. These forces evidently dropped very rapidly as the larger area of the rooms afforded expansion.

The forces moving westward moved through confined area of both entry and air course, a drop in pressure was afforded these forces by the line rooms and again at the intersections of the 1st Right entries with the 5 North Face Headings. The forces moved in both directions along the 5 North Face return air course and haulway, and destroyed stoppings between the haulway and intake air course and moved into the intake air course. The pressures dropped very rapidly after reaching these areas.

Evidence of Heat and Flame:

Much of the evidence of flame was destroyed on the entry by the almost continuous roof falls. The evidence in Rooms 17, 18, 19, and 20 off the entry was however not much disturbed. The heaviest coking and evidence of intense heat and flame was found in Room 18 and to a slightly lesser degree in mouth of Room 17 and in Room 19. Evidently ample oxygen was available as no soot streamers were found. Coke was found on timbers and in crevices and on ledges and floor in Rooms 17, 18, and 19 off the

entry. The heavier deposits being on inby sides of posts with very slight and scattered deposits on the outby sides of posts. In Room 18, there was coke formed in situ over much of the roof area from a short distance off the entry to inby the first crosscut and extending through the crosscut into Room 19. Very slight coking was evidenced on the air course between Rooms 15 and 17. All of the bodies showed evidence of heat, however, the two bodies found on the air course at Room 15 indicated actual flame, their clothing having actually burned and with serious body burns.

Other Conditions found following Explosion:

A locomotive of the "Crab Type" with trolley was found on the air course between Rooms 15 and 16. The control was in "off" position, the reverse lever set to move towards free, the brakes were released and whether the trolley was on the wire could not be determined as the wire was down, but the wheel was against the roof. The covers were outby the locomotive. The body of the motorman (Derwood Litz) was lying, head outby on the switch throw at Room 15 and the coupler's body (Virgil Clay) was lying in the track in Room 15 about 5 feet in the room. A box of unburned safety matches with tobacco and cigarette papers were found in his pocket. A light weight cotton shirt was completely burned except the collar band and cuff bands.

In the crosscut, marked (9) on the large scale map, parts of a "Fairmont" plunger type pump were found. This pump was said to have been running at the time of the explosion. It was gear driven by a 5 H.P. motor, the power being taken from the trolley through a starting box. This pump motor with wiring is one of the probable sources of ignition.

The King-bars across the room necks of Rooms 17 and 18 on the air course were up, but displaced and the cross bars originally resting

on them were dislodged and carried inby by the forces.

The Third body (Roy Murray) was found on the entry at the crosscut marked (11). The body was covered from below the waistline up by a fall of rock. In the shirt pocket was found a cigarette lighter, cigarette papers and tobacco, all neatly wrapped in paper.

On the entry at the mouth of Room 19, a locomotive was standing with a fall of rock on it. The control was in the "off" position, the brake shoes were tight against the wheels and the trolley pole was hooked down and approximately 75 feet of the cable unreeled. Evidently the cable was hooked onto the trolley just outby of Room 17, the exact point could not be determined because of a heavy fall resting on the floor in this area. The motor shields were found inby the locomotive.

An empty mine car evidently undamaged by forces was found on the switch in the mouth of Room 20.

The bodies of William Kretzer, section foreman and of Shirley Hereford, brakeman were found completely covered with rock in the 13th crosscut. Just inby of these bodies in the crosscut a mine car was standing which apparently was being loaded with rails from the air course side evidently by Charles Kretzer and James Vaughn, whose bodies were found on the air course a short distance inby. Apparently both bodies were moved inby by forces.

The bodies of John Gool and Frank Tuszky were found under fallen rock on the entry just inby the 13th crosscut. Both bodies had evidently been moved inby by forces.

On the entry at the mouth of Room 23, a mine car containing switch

materials was found, apparently having been moved inby and off the end of the track by the forces. A spike bar and a saw were found just outby of this car.

On the entry, at the mouth of Room 22, a mine car loaded with steel ties was found.

Inby Room 24 on the air course only slight movement of light materials was evident.

The floor was heaved and broken in Rooms 23 off both entry and air course and to lesser degree in the vicinity.

Air Samples Collected Following Recovery:

Following the recovery of the bodies, air samples were collected in the explosion area. An air sample collected on the 1st Right air course just inby Room 6, which point is on the intake side of explosion area showed the following:

	Laboratory No. 59751	59752
Carbon Dioxide	0.31	0.33
Oxygen	20.48	20.44
Methane	0.15	0.14
Nitrogen	79.06	79.09

This sample was collected on the return air current from the entire 5 North Face Heading section inby of 1st Right. From these samples, the calculated quantity of methane passing in 24 hours was 8938.08 cubic feet.

Air samples collected at the same time on the return at a point on the 1st Right entry just inby of Room 6 showed the following:

	Laboratory No. 59753	59754
Carbon Dioxide	0.41	0.40
Oxygen	20.27	20.19
Methane	0.29	0.31
Nitrogen	79.03	79.10

This sample indicates the calculated quantity of methane given off in the explosion area was 12265.92 cubic feet in 24 hours.

Another air sample collected the day following the above samples showed:

	Laboratory No. 59757	59758
Carbon Dioxide	0.32	0.40
Oxygen	20.38	20.35
Methane	0.25	0.27
Nitrogen	78.98	78.98

This sample indicates that at the time a calculated quantity of 9539.12 cubic feet of methane was being liberated in the explosion area.

These two samples indicate that with serious derangement of ventilation in the area, it would possibly liberate enough pure methane to produce a methane-air mixture of 245,308 cubic feet, or 190,782 cubic feet, the methane in each being 5 per cent. Or according to the first sample calculated it would provide a gas mixture at 5 per cent to fill 14 rooms, 25 feet by 200 feet, 40 inches high or the second one, 11 rooms the same dimensions. These samples would indicate that by all means this area should be firebombed.

Dust Samples Collected Following Recovery:

Dust samples collected in the explosion area and vicinity; copies of the analyses reports of which are included in the appendix of this report, indicate that propagation by coal dust would most probably occur in the area where the coke was found. Where as propagation by dust would probably not occur under the circumstances beyond these areas. Samples 2-3-4-5 A and B which were collected at points indicated on large scale map are all within these areas. There was a wet area on

both entry and air course between Rooms 8 and 15 which very probably affected propagation through this area.

All of the samples collected in the vicinity except one (6A and 6B) showed appreciably high percentages of incombustible.

Evidently propagation by coal dust occurred over a small area, it probably being affected by very rapid drop in pressure and by dust relatively high in incombustible.

Summary of Evidence

The initial forces radiated from an area on the entry extending from inby Room 14 to outby Room 19. This would fix the point of origin somewhere between Rooms 15 and 18.

In this area there were three possible sources of ignition from electrical sources; viz: motor and wiring of pump, cable of locomotive hooked to trolley in the immediate vicinity outby mouth of Room 17, breaking cross-bars, causing fall to carry trolley wire onto rail just outby Room 17.

While no body was found in this area, it is remotely possible that the motorman of the locomotive (Roy Murray) found at Room 19 may have been in this area. He, it was said was an inveterate smoker of cigarettes. However, no matches were found on his person and with tobacco, cigarette papers and cigarette lighter neatly wrapped in his pocket, it would seem that unless he had other cigarettes and matches he would not have had a source of ignition.

There was no evidence of the flame being propagated by coal dust except a short distance inby on the entry and into Rooms 17, 18, and 19 on the entry side and possibly on the air course between Rooms 15 and 17.

Conclusions:

It is believed that a body of methane was liberated at some point, probably in Room 23 and entry in that vicinity. The gas moving slowly through the rooms outby the faces and possibly along the entry. Either because it was moving through the rooms, ignition did not result from arcing of the motor of the locomotive while it was moved along the entry, or possibly the locomotive was not moved beyond the point where it was found and had stood there while the gas moved past.

That the ignition occurred either at the pump on the entry at Room 15 or just outby the mouth of Room 17 on the entry.

It is believed the most probable source of ignition was the motor or wiring on the pump.

The forces developed were immediately reduced by expansion in the rooms on both entry and air course and at the mouth of the 1st Right by expansion into the open area in the vicinity.

Recommendations:

The following recommendations are offered with the view of preventing a recurrence of such a disaster:

1. That all active portions of the mine be thoroughly inspected daily by a regular, competent fireboss previous to each and every shift.
2. That when a disturbed condition exists in an area of the mine, which is apt to liberate methane, such as an active squeeze, a general heaving of bottoms, excessive caving of rocks or actual fracture of pillar coal, that area should be frequently, carefully inspected in all parts by a competent fireboss, while men are in

that area, and should be carefully examined for gas before any persons are permitted in that area.

3. That a more comprehensive report be made by the fireboss in the report book kept for that purpose.

4. That the fireboss reports be read and signed by the mine superintendent before the men enter the mine.

5. That regular systematic ventilation surveys be made at least once each month; such survey should consist of air measurements at strategic points, including each split and collection of air sample at each point. The results of analyses of the air samples should be interpreted in a report and should include calculated quantities of methane passing either per minute, hour, or day. Copies of these to be given to Division Manager, Safety Engineer, and Mine Superintendent.

6. That smoking should be positively prohibited in any closed light mine and that this rule prohibiting smoking should be systematically and definitely enforced.

7. That serious consideration be given to the adoption of the permissible type of electrical equipment.

8. That where roof falls are imminent, the power should be cut off of all power lines passing through the fall area.

9. That serious consideration be given to the use of automatic sectionalizing switches.

10. All open-type and non-permissible electrical machinery, if used, should be installed or operated in pure intake air only.

11. That consideration be given to instituting organized safety which will include regular monthly safety meetings in which only safety is

discussed and preferably this safety activity be associated with the Joseph A. Holmes Safety Association, a national organization devoted to safety in the mineral industries.

Acknowledgment:

The writer hereby expresses his sincere appreciation for the courtesies, assistance, and co-operation given by the officials of the Consolidation Coal Company.

Respectfully submitted,

Joseph F. Davies
District Engineer

APPROVED:
