# R E P O R T

on

PARRISH MINE EXPLOSION

RAILWAY FUEL COMPANY

NOVEMBER 23, 1920.

PARRISH, ALABAMA.

by

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Birmingham, Alabama.
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# I N D E X

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## Appendices

## INTRODUCTION.

An explosion occurred in the Parrish Mine operated by the Railway Fuel Company, located at Parrish, Alabama, about 8:45 A. M. November 23, 1920; and resulted in the death of twelve men and slightly injuring eight others. This mine had suspended operations for several days previous to the explosion due to labor troubles. One hundred forty-five men were in the mine at the time of the explosion and all (125) escaped unassisted with the exception of those killed and injured. Six men (names: Ulos Bently, John Jordan, Charlie Lamp, Reuben Phillips, Lee Chamblee, R. A. Chapman) were killed outright and six others (names; James Simmons, R. A. Rochell, I. H. Garrison, George Ball, H. Kyle, W. D. Parrish) died in the Birmingham hospital a few days later. Nine of the victims died as a result of burns, while the remaining three were suffocated by afterdamp.

Location:

The Parrish Mine is located in Parrish, Walker County, Alabama, about nine miles south of Jasper, Alabama, and forty-five miles northwest of Birmingham. The mine is situated in the Warrior Coal Field on the Birmingham-Columbus division of the Southern Railroad.

Ownership and Operators:

The Parrish Mine is owned and operated by the Railway Fuel Company, a subsidiary of the Southern Railroad Company, with offices in the First National Bank Building, Birmingham, Alabama. Mr. W. E. Leake is Vice-President and General Manager, and Mr. Daniel MacDonald is Mine Superintendent.

Geology:

The Parrish Mine is located in the Warrior Field which is a part of the Great Appalachian coal measures, and is working the Mary Lee seam, commonally called the Horse Creek seam. This seam is one of the principal workable coal beds in the Warrior Coal Fields. In some sections of the Parrish Mine, this seam occurs in two benches and will approximate eight feet in thickness; while in other parts of the mine only the top bench four feet in thickness is mined. At points where the coal is eight feet thick, a six inch slate parting occurs in the middle of the seam, dividing the seam into two benches. The bottom bench "pinches out " in some sections. Below are typical sections of the coal bed as found at this property: -

SECTION I.

Roof Proper - - - - - - - - - - - - - - - Hard Slate.

| | feet | inches |
|---|---|---|
| 1. Coal - - - - - - - - - - - - - - - - - | 1 | 9 |
| 2. Bone - - - - - - - - - - - - - - - - - | 0 | ½ |
| 3. Coal - - - - - - - - - - - - - - - - - | 0 | 9 |
| 4. Slate - - - - - - - - - - - - - - - - - | 0 | 1 |
| 5. Coal - - - - - - - - - - - - - - - - - | 0 | 5 |
| 6. Slate parting - - - - - - - - - - - - - | 0 | 4½ |
| 7. Coal - - - - - - - - - - - - - - - - - | 4 | 0 |
| 8. Floor - - - - - - - - - - - - - - - - - | Sandrock. | |

SECTION II.

Roof Proper - - - - - - - - - - - - - Hard Compact Slate.
Immediate Roof - - - - - - - - - - - Soft Slate ½ inch thick.

| | feet | inches |
|---|---|---|
| 1. Coal - - - - - - - - - - - - - - - - - - | 0 | 6½ |
| 2. Slate - - - - - - - - - - - - - - - - - - | 0 | ½ |
| 3. Coal - - - - - - - - - - - - - - - - - - | 1 | 10½ |
| 4. Bone - - - - - - - - - - - - - - - - - - | 0 | 1 |
| 5. Coal - - - - - - - - - - - - - - - - - - | 0 | 4 |
| 6. Slate Parting - - - - - - - - - - - - - - | 0 | 5 |
| 7. Coal - - - - - - - - - - - - - - - - - - | 0 | 4 |
| 8. Floor - - - - - - - - - - - - - - - - - - | Sandrock. | |

This parting divides coal seam into two benches, namely: top and bottom.

Under date, November 28, 1920, the seam at this property was sampled by J. J. Forbes at four representative locations and forwarded to Bureau of Mines Laboratories for analyses. The results of these analyses are herewith given on the "As Received Basis".

| Location | Lab. No. | Moisture | Volatile matter | Fixed Carbon | Ash | S. | B.T.U. |
|---|---|---|---|---|---|---|---|
| Face of Main North | 77605 | 3.18 | 31.31 | 50.10 | 15.41 | .92 | 11921 |
| Face of "A" Left | 77606 | 3.55 | 30.79 | 51.73 | 13.93 | .87 | 12027 |
| Face of 3rd Right | 77607 | 2.65 | 31.39 | 54.04 | 11.92 | .69 | 12633 |
| Face of Main South | 77608 | 3.59 | 30.13 | 52.86 | 13.42 | .68 | 12181 |

It will be noted by referring to the foregoing table of analyses that the moisture content ranges between 2.65% and 3.59%; the volatile matter 30.13% to 31.31%; the fixed carbon 50.10% to 54.04%; the ash 11.92% to 15.41%; Sulphur .68% to .92%; and the B.T.U's 11921 to 12633.

Roof:

The roof is a hard compact slate which stands remarkably well, thereby necessitating very little timbering thruout the entire mine.

Floor:

The floor is a hard and fairly smooth sandrock. The floor of the seam is irregular in some sections of the mine. The bottom bench of this seam "pinches" to about six inches of coal underneath slate parting, (See Geology). This condition necessitates very expensive brushing of the floor in entries for establishment of haulage grades. It is believed

Psychrometric Observations. Parrish Mine.

| No. | Date | Wet | Dry | Bar. | Hum. | Place | Remarks. |
|---|---|---|---|---|---|---|---|
| 1 | 11/28/20 | 60 | 63 | 29.95 | 84 | 4th Left entry | Standing water close to observation point. time 6:00 p.m. |
| 2 | 11/28/20 | 59 | 63 | 30.00 | 79 | 3rd Right entry | Time 6:45 p.m. Entry dry- return air. |
| 3 | 11/28/20 | 52 | 58 | 30.00 | 66 | Main N. Heading | Time 7:15 p.m. Mine intake |
| 4 | 11/28/20 | 54 | 60 | 29.90 | 68 | Last crosscut bet. Main N. heading & Main Right aircourse | Time 12:30 p.m. Split of intake for East side of mine-Dry-5000 cubic feet air. |
| 5 | 11/28/20 | 54 | 60 | 29.90 | 68 | Last crosscut bet. Main N. heading & Main Left aircourse | Time 12:45 p.m. Air split for West side mine-dry- 52000 cubic feet of air. |
| 6 | 11/28/20 | 63 | 64.5 | 29.92 | 92.5 | Last crosscut in "A" Left entry. | Time 10:20 a.m. Air sluggish unable to measure-Roof.Ribs.Floor dry. |
| 7 | 11/28/20 | 57 | 63 | 29.95 | 69 | 100' outby 4th Left in Main Left aircourse | Place dry-considerable dust- Time 2:00 p.m. air in circulation 5700 c |
| 8 | 11/28/20 | 62 | 63 | 30.00 | 95 | Foot of Manway, Main return from mine. | Time 7:30p.m. Air returning 47000 cubic feet. |
| 9 | 1/12/21 | 42 | 44 | 30.30 | 85 | Surface Mouth Slope | Time 10:00 a.m. Weather cloudy and chilly. |
| 10 | 1/12/21 | 47 | 49 | 30.30 | 86 | Bottom of hoisting slope. | Time 10:30 a.m. Main intake, quantity of air 45000 cubic feet. |
| 11 | 1/12/21 | 61.5 | 63.5 | 29.95 | 89 | Foot of Manway. | Time 10:15 a.m. Main return Quantity of air-47000 cubic feet. |
| 12 | 1/12/21 | 53 | 55 | 30.25 | 88 | Near Face of Main N. Heading. | Time 11:00 a.m. Quantity of air 20,000 cubic feet Split short distance inby. |
| 13 | 1/12/21 | 58.5 | 60.5 | 30.25 | 89 | Face of 4th Right | Entry face wet- Entry dry- Time 11:30 a.m. |
| 14 | 1/12/21 | 59 | 62 | 30.28 | 84 | Face of 3rd Right Entry | Time 12:10 p.m. Entry dry. |

that the explosion wave was practically "stopped" by one of these large grade cuts that was in proximity to the origin of this explosion.

Humidity and Dust:

This mine was found to be dry thruout with the possible exception of a few entry faces which were moist to wet on the days the investigation was conducted. There was no sprinkling system employed underground, nor any means used to humidify the intaking air current. Loose end cars are employed exclusively. Cars are "topped" considerably thereby permitting coal to fall from cars during transportation. The chief sources of dust that were observed are; (1) loading of coal in rooms and entries, (2) drilling, (3) undercuttingsf coal by machines, (4) dust thrown into suspension by moving trains, and (5) coal thrown from cars during transit.

Under date January 12, 1921, another inspection was made of the Parrish mine for collection of additional data and to observe conditions under actual operating condition and it was found that the Company had already commenced the installation of a sprinkling system underground. A sprinkling line had been extended in the Main North heading as far as the 4th Right entry with taps every 150 feet. The Company is planning to extend sprinkling lines into all the side entries with taps at entrance to each room. Below is given a number of psychrometric observations taken at various places in the Parrish Mine.

It will be noted from the foregoing observations that since the installation of the sprinkling line in the Main North heading that the humidities thruout the mine show a gradual increase. Readings 11/28/20 were taken six days after the explosion and before sprinkling line in Main North heading was installed, while readings 1/12/21 were taken after installation. A comparison of readings numbers 10 and 12 indicates that only 45% of the intaking air reaches the points of splitting at the top end of the Main North heading. Approximately 25000 cubic feet of air is lost by leaks in doors, canvas brattices and gob stoppings in a distance of 2500 feet.

Mining Methods:

The Parrish Mine is opened up by a slope driven thru rock and cutting the coal bed at 700 feet. The slope is driven on a pitch of approximately 28 degrees. The mine is worked by the usual room and pillar system, and is not laid out with reference to butts and faces as the coal seam does not have defined cleavage planes. The main entries are driven triple while side entries are double. Main and cross entries average 18 feet wide with 40' pillars. Rooms are worked 40 feet wide, 300 feet deep; with an intervening pillar of about 35 feet. The main entries and rooms are double tracked while side entries have a single track. The cover overlying the Mary Lee seam at Parrish ranges from 320 to 400 feet. All coal is undercut with mining machines. Cutting is done only in the coal; width of undercutting six inches, average depth of undercutting six feet. The coal is dry and there is considerable

Dust thrown into the mine atmosphere during progress of cutting, drilling holes for blasting and in loading coal. After coal is undercut, it is broken down by means of permissible explosives. Three to four lines of posts spaced at 4-foot center between tracks are used for supporting the roof in rooms, and practically no timber is used in entries.

Employment and Output:

Two hundred twelve men are employed underground and forty above producing an average daily output of 1150 to 1200 tons.

Explosives and Blasting:

Duobel permissible explosives are used exclusively for coal blasting and black blasting powder is employed for bottom brushing in sections of the mine where the coal seam "pinches" to four feet. As near as could be determined, the practice in blasting with permissible is satisfactory which was substantiated by observation and inquiry. A number of miners were interviewed as to quantity of permissibles used per hole and the answers invariably were within the prescribed one and one-half pounds. Holes are tamped with adobe stemming sent into the mine by the Company. Iron tamping bars are used for tamping holes. Shots are fired at any time during the working shift while all men are in the mine. As a general rule "bug dust" is not loaded out before blasting. Explosives are taken into the mine in gunny sacks under the supervision of contractors who are responsible for their proper distribution. There is laxity in placement

and handling of explosives underground. It was observed during progress of examination that explosives very frequently were placed on gob and along side of tool boxes. Further, crimpers are not being used extensively, but instead crimping is being done with knives. Miners invariably prepare shots with open carbide lamp.

Electrical Equipment:

Two motor generator sets having a capacity of 175 K.W. Each furnishes power for mine use. High tension power is purchased from the Alabama Power Company at 2200 volts a.c. and this in turn is "stepped down" to 250 volts d.c. for underground use. All underground haulage is preformed by trolley and storage battery locomotives. Coal is hoisted to surface by means of a 400 h.p. electric hoist equipped with hydraulic brake.

Lighting:

Open carbide lamps are used entirely underground. Electric lights are used only along the Main North haulage but not in side entries.

Ventilation:

For details as to method of ventilating the Parrish mine, refer to map which is a part of this report. The fan is of the Buffalo Blower type and was exhausting at the time of the explosion. It has a capacity of about 45000 cubic feet, and is situated approximately 35 feet to one side of the Main return. The hoisting slope is the intake and the Manway the Main return. The intaking air is split at last open crosscuts near

the face of the Main North heading, one split courses the west side and the other split the east part of the mine. Gob stoppings, canvas brattices and single doors were the means used to course and deflect air currents. Previous to the explosion, canvas brattices were employed quiet extensively for deflection of air currents into side entries. This practice afforded an excellent avenue for leaks, also extensive line brattice work was used in entries and rooms. It was found that line brattices in some parts of the mine were entirely too far from working faces, thereby preventing air currents from sweeping faces clear of possible gas accumulations. It is possible that the gas accumulation in the 4th Left entry which undoubtedly caused this explosion is directly traceable to inefficient line brattices and canvas brattices that were used for deflecting the air. Under date November 28, it was found that approximately 11000 cubic feet or 25% of total intaking air (45000 cubic feet) reached the last open crosscuts in the Main North heading, and again under date January 12, 1921, air readings taken at the top end of the Main North heading showed that approximately 20,000 cubic feet or 45% of the total intake reached to points of splitting. The management had done extensive repairing of the ventilating system after the first examination of the mine, November 28, hence the reason for the marked increase of the total intaking air, namely from 25% to 45 % reaching points of splitting. It is felt that far greater improvement in the ventilation of this mine could be effected by gunniting the faces of gob stoppings with a cement gun, the placement of double doors in various parts of the mine where practical, the

elimination as far as possible the use of canvas curtains, and finally increasing the number of air splits by construction of overcasts.

Haulage:

All underground haulage is performed by means of trolley and storage battery locomotives. The track gauge is 42 inches. Pine ties are used for room work while oak is employed on side and main entries. Sixty pound rails are used on the main haulage, 40 pounds in side entries, and 25 pound in all room work. Loose gate cars of wood construction weighing, when empty, 2000 pounds, and holding 4000 pounds of coal are used for handling the mine output. Roadways are ballasted with gob, consequently the road dust found along haulage entries is considerably intermixed with large pieces of gob. Considerable coal falls from moving cars and the mine atmosphere is charged with fine dust held in suspension during working hours. This condition will be very materially remedied after working faces, entry ribs, roof and roadways are thoroly sprinkled. It is further believed that dust held in suspension would be practically eliminated if loaded cars were sprayed at turnouts or passways.

Rock Dusting Methods:

There is no treatment of coal dust by shale or adobe dust, nor is rock dust barriers employed for limiting a possible explosion.

## Analyses of Mine Air Samples.

| Date | Bottle No. | Lab. No. | Time | $Co_2$ | $O_2$ | CO | $CH_4$ | $N_2$ | Location. |
|---|---|---|---|---|---|---|---|---|---|
| 11/28/20 | 354 | 13913 | 10:20 a.m. | .06 | 20.77 | 00 | .13 | 79.02 | Last crosscut in "A" Left Entry. |
| 11/28/20 | 355 | 13914 | -- | .08 | 20.85 | 00 | .02 | 79.05 | 100' outby from 4th Left in Main Left air-course. |
| 11/28/20 | 358 | 13915 | 1:30 p.m. | .08 | 20.79 | 07 | .01 | 79.05 | Dead end crosscut near face Main N. heading. |
| 11/28/20 | 319 | 13916 | 7:30 p.m. | .05 | 20.85 | 00 | .14 | 78.96 | Foot Man way, Main return @ 47000. |
| 11/28/20 | 35 | 13917 | 7:31 p.m. | .08 | 20.81 | 00 | .14 | 78.97 | Foot Man way, Main return. @ 47000 |
| 11/28/20 | 36 | 13912 | 7:33 p.m. | .08 | 20.65 | 00 | .15 | 79.12 | Foot Manway, Main return. @ 47000. |
| 12/10/20 | 384 | 13928 | 3:07 p.m. | .10 | 20.81 | 00 | .16 | 78.93 | Foot Manway, Main Return. @ 47000. |
| 12/10/20 | 34 | 13927 | 1:45 p.m. | .09 | 20.79 | 00 | .17 | 78.95 | Foot Manway, Main return. @ 47000/ |
| 12/10/20 | 385 | 13929 | 2:50 p.m. | .13 | 20.78 | 00 | .23 | 78.86 | Face Main South. No air movement. |
| 12/10/20 | 33 | 13930 | 2:04 p.m. | .08 | 20.82 | 00 | .17 | 78.93 | Face of 4th Right No air movement. |
| 12/10/20 | 390 | 13931 | 2:11 p.m. | .10 | 20.84 | 00 | .04 | 79.02 | Face of 4th Left entry. |
| 12/10/20 | 391 | 13932 | 2:30 p.m. | .08 | 20.70 | 00 | .25 | 78.97 | Face 1st Right No air movement. |

@ = Quantity of air in circulation.

Gas:

The State Mine Inspector's report for the year 1919 classifies this mine as one that generates explosive gas. The explosion which occurred November 23, 1920, was caused in all probability by ignition of an accumulation of gas. On the days the investigation of this explosion was conducted gas was found with approved safety lamps at the face of Main Right aircourse, in room No. 1 off 4th Left, and inby from room No. 1 in the 4th Left entry. Most of the gas is emitted from coal face but some comes from the floor. A number of mine air samples were collected November 28, 1920 and again December 10, 1920, the analyses of which are given in the foregoing table.

Samples Collected:

November 28, 1920, the samples collected are not altogether representative of the mine air as the mine had not resumed operations since the explosion; but samples collected December 10, 1920 are more nearly representative. It will be noted that the gas content of the full return (47000 cubic feet) from the mine, under normal operating conditions ranges from .14% to .17% methane. Further it will be observed that samples Numbers 33, 385, and 391 taken at the face of working entries have a methane content ranging from .17% to .25%. These samples are fairly representative of gas emitted from working faces. The average gas content of the main return from the mine is .15% with 45000 cubic feet of air or gas is being emitted at the rate of 70 cubic feet per minute or 100,800 cubic feet in 24 hours, so it is apparent if there is an

interruption in ventilation by doors being left open, leakage from stoppings or brattices, inefficient line brattices, or other agencies, a dangerous accumulation of fire damp results.

The investigator was unable to find a report of the fire bosses' daily inspections, so consequently it will not be possible to study the conditions of the mine for gas on the morning previous to the explosion. It is believed that there was no systematic inspection of the mine, only such places were examined by the fire boss where there was a likelihood of gas. This is a very dangerous procedure and should be discouraged.

Details of Evidence Obtained on Days of Investigation:

Under date of November 27, the Parrish Mine explosion, which occurred 8:45 a.m. November 23, and resulting in the death of 12 men, was investigated by the following party:

C. H. Nesbitt, Chief Mine Inspector, Alabama.

W. W. Kicker, Associate Mine Inspector, Alabama.

W. M. Leake, Vice President, Railway Fuel Company,

Daniel McDonald, Mine Superintendent.

T. L. Wood, Associated Insurance Companies.

together with J. M. Cobb and J. J. Forbes, Bureau of Mines.
This party proceeded into the mine about 10 A.M. and made an investigation which was the result of this explosion.

In order to obtain more detailed data leading up to the cause of the explosion, J. J. Forbes and Mr. McDonald made an examination November 28, 1920. The following facts were observed:

A re-enforced concrete overcast near the bottom of the hoisting slope was partially destroyed, due to the concussive wave of the explosion. Very little evidence of the explosion was observed along the Main North entry outby from the 3rd Left and Right entries off Main North entry. Canvas curtains used to deflect air current at 3rd Left and Right entries were blown towards Main North. Places where all the dead and injured were found was pointed out by Mr. McDonald, Mine Superintendent. An examination was made of a large rock-cut which was made for a grade, located in Main North entry between the 3rd and 4th entries, dimensions, 16 feet high, 22 feet wide and 250 feet long. At the time of the explosion there were about 8 men employed at the top end of this rock-cut engaged in laying track, all of whom were burnt to death by the explosion. It was also observed that there was very little dust on the ribs or along the road way in this cut and it is believed that this rock-cut had allowed the gas to expand and burn which fact prevented the possible spreading of the explosion throughout the entire mine.

The first evidence of coke was observed on the inby and outby sides of two props near the top of this rock-cut. The coke was steel gray and more pronounced on the outby sides. Gob stoppings between the main North heading and Main aircourses in this rock-cut were intact with the possible exception of two which were partially destroyed and blown in an eastwardly direction. In the Main Left aircourse, 75 feet outby from the 4th Left, trolley hangers were bent outby, indicating the explosive wave was outby. All stoppings with the exception of one between Main

North heading and the Right and Left aircourses inby from 4th Right and Left entries were blown in an easterly direction. A tool box in next to the last cross cut in the Main North heading showed evidence of being blown into this cross cut. A small cap was observed on an approved safety lamp in the dead-end cross cut near the face of North heading and again at the face of the Main Left aircourse. The evidence in the Main North entry , beyond the 4th Left entry showed that the explosive force was inby. There was very little evidence of heat or flame inby from 4th Right and Left entries.

Fourth Right Entry:

It was found that there was very little evidence of an explosion in the 4th Right entry. Line brattice in room No. 2 was intact, and the brattice across the entry used to deflect air into No. 2 room was blown down but was intact when this examination was made, line brattice in this room was about 120 feet from the face with no connecting cross cuts. Stoppings between these entries were partially destroyed, and blown towards aircourse. A mining machine was found at the face of 4th Right entry intact. It was learned that the two machine men (Nos. 4 and 5 on the map) who operated this machine lost their lives at points indicated. All the rest of the men who worked in 4th Right entry escaped through room No. 2 which connects the 3rd Right to the 4th Right entry.

Fourth Left Entry:

All stoppings between the 4th Left entries were blown towards the

4th Left aircourse. There was evidence of intense heat and flame, particularly in the 4th left entry and in room No. 1 off the 4th left entry. Considerable debris was piled against rib oppsite room No. 1. Line brattice used to deflect air into room No. 1 was intact when this investigation was made, but the mine superintendent advised that it was blown down and it had been partially burned. Heavy coking was observed on ribs in room No. 1 for a distance of about 25 feet. Line brattice in room No. 1 was a considerable distance from the face on the date of this examination. From all evidence gathered it seems that the explosion had its origin either in room No. 1 off 4th Left entry or from some point inby from Room No.1 in this entry. It was learned that Ulos Bently (No. 1 on Map) who worked in the 1st Right entry had been promised room No. 1 off the 4th Left entry. It is generally supposed that this man proceeded from his working place in the 1st Right on the morning of November 23 to either start working this room or examine it, and walked into a body of gas and ignited same with open carbide lamp which he wore. Bently's body was burned severely. The 4th Left entry had not been worked for sometime previous to the explosion and it is believed that the ventilation had been seriously impaired. to such an extent that gas emitted in the working places was allowed to accumulate.. There was no record found that would indicate an inspection of this section either on the morning preceeding the explosion or while the mine laid idle due to labor troubles. Mine officials advised that danger boards had been placed at the entrances to 4th Left entries and Bently (colored) carelessly disregarded the boards.

On the days of this investigation, an inch cap was found at the face of room No. 1 and inby from room No. 1 in the 4th Left entry gas had backed for a considerable distance from the face. Dust played little or no part in this explosion. The explosive force died away a short distance in the 3rd Right and 3rd Left entries and there was little or no evidence of the explosion in any of the side entries outby from the 3rd Left and Right entries.

## STORY OF EXPLOSION

The explosion which occurred in the Parrish Mine of the Railway Fuel Company, 8:45 a.m. November 23, caused the death of 12 men and slightly injured eight others. Nine of the 12 dead, died as a result of burns and three suffocated from the effects of afterdamp. This mine had been shut down on account of labor troubles for several days previous to the explosion. Messrs. Leake and McDonald were in the mine office when they first learned of this explosion. Mr. McDonald, immediately proceeded into the mine and took personal charge of the recovery work. He organized local rescue squads from his mine employees, while Mr. Leake took care of relief work on the surface. Chief Mine Inspector, C. H. Nesbitt, on learning of the explosion immediately dispatched one of his associate inspectors to the scene of the disaster. Very little time was dissipated, due to loss motion. The ventilation was temporarily restored by rescue squads where needed. The rescuers did not wear apparatus and consequently a few of them suffered from the effects of afterdamp. Ulos Bently, a colored miner who worked in

the 1st Right entry wandered without instructions to the 4th Left entry and ignited a body of standing gas which caused the explosion. Bureau of Mines Station at Birmingham was notified at 10 a.m. by the Chief Mine Inspector. Mr. Cobb, Station Foreman was doing active training work at Gadsden, Alabama, at the time of this explosion. He was communicated with at 10:30 a.m. and would have been unable to have reached the scene of disaster before four or five p.m. Mr. Leake, Vice President and General Manager of the Company telephoned the Bureau of Mines Station about 1:45 p.m. November 23, and advised that there would be no need of apparatus as all the men had been taken from the mine. J. J. Forbes reported to Birmingham Station by transfer from Car 2, 5:00 p.m. November 24, 1920. Regular trains had been delayed to carry the injured to Birmingham hospitals while the dead were taken to undertaking parlors in Jasper. Six men (Nos. 8, 9, 10, 11, 12 and 13 shown on the map) died from burns in Birmingham hospitals several days after the disaster. Two machine men, (Nos. 4 and 5 on the map) who were cutting the face of the 4th Right entry wandered from the face of the 4th Right entry and died from the effects of afterdamp. Two machine men (Nos. 7 and 17 on the map) were slightly injured by violence near the mouth of the 3rd Left entry. W. H. Martin who worked at the face of the Main Right aircourse, upon learning of the explosion, immediately started thru the last open cross cut between the main North heading and Main Right aircourse to assist R. A. Chapman to safety. It should be remarked that this was Chapman's first day in a coal mine. Martin met Chapman in the middle of the crosscut referred to and assisted him for approximately 250 feet along the Main Right aircourse.

Chapman called to Martin that he was getting so weak that he would be unable to travel any further. Chapman's body was recovered shortly after the explosion at place indicated by No. 6 on map. Chapman died from the effect of afterdamp as his body showed no signs of violence or burns. Martin traveled to point shown on the Map, No. 16, and was later rescued and taken to the Company doctor's office. He was possibly in a semi-conscious condition for several hours and when he was interviewed recently remarked that he was in perfect health. No one worked in the 4th Left entry and all who worked in the 4th Right entry escaped thru connecting room No. 2 with the exception of No. 14, (See map) , who was later taken from the mine slightly injured. This explosion was entirely local and did not propagate throughout the mine.

Conclusions:

(1) From the evidence collected leading up to the cause of this explosion, it is believed that his explosion originated either in room No.1 or a short distance inby room No. 1 in 4th Left entry and was caused by ignition of a body of standing gas. It is further believed that this accumulation of gas was due to ineffective ventilation caused by the use of canvas curtains, line brattices not being extended sufficiently close to working faces, and leaky gob stoppings. On the first examination of this mine, it was found that only 25% of the total (45000 cubic feet per minute) intaking air reached to points of splitting in the Main North heading and on a subsequent examination only 45% of the intaking air was accounted for at

points of splitting in Main North heading.

(2) This mine had been idle for several days previous to the explosion, due to labor troubles, and as near as could be determined no mine examinations were made by the fire boss. Moreover, there was no record whatsoever kept of the fire boss' inspections. Further, it was learned that the fire boss did not conduct a systematic inspection of the mine, only such places being examined where there was a likelihood of gas occurrence. Only one fire boss was employed and he was expected to return after breakfast and spend the balance of his shift in extending line brattices and doing such repair to the ventilating equipment as was necessary. It is thought that one fire boss could not efficiently attend to so important a dual duty. On a recent examination of this mine, the mine superintendent advised that three fire bosses were now employed to make mine inspections, and attend to ventilation up-keep.

(3) It is the investigators belief that dust played a very little part in this explosion. It should be borne in mind, however, that there was sufficient dry inflammable dust on ribs and ledges in some sections of the mine to have caused a great disaster. It is further believed that this explosion was stopped almost in its entirety by a rock cut in the Main North heading between the 3rd and 4th entries. Also, there was not any considerable amount of dust deposited on ribs and ledges in the 4th Left or 4th Right entries or in the rock-cut referred to previously. This section of the mine had only been developed a short while and the road ways were

ballasted with rock. These measures were contributory factors in limiting the propagation of the explosion throughout the mine.

(4) Ulos Bently, a colored miner, who worked in the 1st Right entry, had been promised, previous to the shutdown of the mine, a place in the 4th Left entry, but as near as could be determined, Bently did not receive any instructions either from the Mine Foreman or Mine Superintendent to proceed to this new working place on the morning of the explosion. It is generally supposed that Bently was anxious to examine this new place and in his anxiety, carelessly crossed a danger board which was laid at the entrance to the 4th Left entry and ignited an accumulation of gas with an open carbide lamp. Bently's body was found opposite the mouth of room No.1 in the 4th Left entry severely burned.

(5) It will be noted by referring to the analyses of mine air samples collected in the Main Return that this mine emits approximately .15% methane and with 45000 cubic feet of air returning per minute total gas emitted in 24 hours approximates 100,000 cubic feet. It can be readily seen that if there was even a partial interruption in ventilation, a dangerous accumulation of gas would necessarily result. The present fan is of a temporary construction and is barely large enough for the present mine needs. The Company realized this condition for sometime and had commenced the installation of a new fan having a capacity of 100,000 cubic feet.

(6) There was no sprinkling done prior to the explosion. The Company has partially installed a pipe line sprinkling system in the Main North heading, since the explosion. It is intended to extend pipe lines into side entries with taps at the mouths of each room.

(7) There was no rescue apparatus used by local rescue squads in the recovery work after this explosion and as a result several of the local rescuers suffered from the effects of afterdamp. It is felt that if rescue apparatus and trained men were available much more efficient work could have been accomplished.

(8) It was observed that shots were tamped with iron tamping bars and that permissible explosives were used entirely in blasting coal and that black powder was only used in brushing bottom. There seems to be laxity, however, in the proper handling of explosives under ground. It was observed that sticks of explosives were found on top of gob and along the side of tool boxes. This is a dangerous practice and should be discouraged. The practice of preparing shots while wearing open carbide lamps should be discouraged. Shots are fired at any time during the working shift when all men are in the mine. In the event an explosion was initiated by possible overcharged and misplaced shots, a grave disaster would undoubtedly result. It is thought, the Company should give this condition careful consideration and eliminate this existing hazard to a great extent, either by installation of an electrical shooting system controlled from the outside or the employment of shot-firers who would fire all shots electrically after the working shift and when all men are out of the mine.

Recommendations:

1. Sprinkling lines should be extended into all side entries with taps at the entrances to rooms. Sprinkling to be most effective should be prosecuted throughly and regularly in all sections of the mine including working faces. All dust being washed down from roof, ribs, timbers, and the dust on the floor maintained in a pasty mass.

2. Care should be taken to carry ventilation to all working faces and good overcasts, stoppings and doors should be provided wherever necessary, canvas being used only for taking the current to advance workings. The use of the cement gun for facing gob stoppings and doors would be of great assistance in the prevention of leaks.

3. The present practice of firing shots by fuse at any time during the working shift and when all men are in the mine should be changed to either an electrical shooting system controlled from the surface when all men are out of the mine, or the employment of competent shot-firers who would "fire" the mine by the use of electric detonators and blasting machines after all men had left the mine.

4. Would recommend only high grade men to act in the capacity of fire-bosses, and that they be required to perform mine examinations only, and further that a strict record be kept of such inspections.

5. Since dangerous accumulations of explosive gas are likely to occur, the adoption of closed lights is strongly recommended, preferably the permissible electric cap variety.

6. Would recommend the installation of rescue equipment and maintenance of trained rescue and first aid crews.

7. Great care should be taken to see that not more than one and one-half pounds of permissible explosives be used per hole; and that the present practice of tamping shots with an incombustible stemming be continued.

## ROAD DUST SAMPLES.

**Fineness:**

Coal dust that is too large to go through a 20 mesh sieve is considered not explosive, but coal dust that will go through a 20 mesh sieve is explosive and its sensitiveness to explosibility is increased by increasing the percentage of coal finer than 20 mesh, that is to say, coal dust all passing through 20 mesh and having a certain amount that will pass a 100 or 200 mesh is the more explosive in proportion to the percentage of 100 or 200 mesh dust present.

Pittsburgh coal dust that passes 20 mesh and has as much as 30% of 100 mesh dust produces a strong explosion, but when all passes 100 mesh and has 30% of 200 mesh, the explosion is violent and the violence increases as the percentage of 200 mesh is increased.

**Moisture and Ash:**

The ratio of the volatile matter to the fixed carbon is an index of the ease of explosibility of the dust - the higher the volatile matter the more easily is the dust ignited.

The samples of road dust from this mine have an average ratio of about .39, and, since the total incombustible (moisture plus ash) does not exceed 48.5%, the samples all fall within a zone of explosibility when compared with Pittsburgh coal dust that has a ratio of .40.

To render this road dust non-explosive, there should be added either sufficient rock dust to bring the total inert material up to 80%

when there is as much as 2% explosive gas present or sufficient water should be added to bring the moisture up to 15 or 20%. Where coal dust has little shale mixed with it, the dust should be made wet until it is a pasty mass.

Taking Road Dust Sample No. 77613 as being representative of normal road conditions, it would be necessary to add either 35% rock or shale dust or 14% moisture.

It is probable that the rib dust will have much less ash than the road dust, and, in this event, the ribs should be either washed down with water or treated with rock or shale dust.

Conclusion:

The high percentage of ash in the road dust samples was largely responsible for the explosion being confined to the locality of its origin.

If rock or shale dust is adopted, it should be applied to the roof, ribs and bottom at the rate of at least two pounds per lineal foot of entry. If water is used, the dust should be kept washed from the ribs and be kept in a pasty mass on the roads and in all working places the ribs, roof and bottom should be made wet for 50 feet back from the face just before firing shots.

Approved:

J. W. Paul,

J. W. PAUL,
Chief of Coal
Mining Investigations.

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# DEPARTMENT OF THE INTERIOR
## BUREAU OF MINES

### DUST-ANALYSIS REPORT

Test No. _____ Lab. No. 77610

Sample of Road dust (through 20-mesh screen). Can No. 58836

Operator Railway Fuel Co., Mine Parrish

State Alabama. County Wlaker. Bed Mary Lee.

Town Parrish, Alabama.

Location in mine Along the roadway of the main N.Heading 20' outby from 3rd. Rt. entry and (50' outby from big Rockcut, 250' long-20' high-25' wide)

Method of sampling Standard. Gross weight, lbs. _____ Net weight, gms. 532.7

Date of sampling 11/28/20 Date of Lab. sampling 12/9/20 Date of analysis 12/21/20

For B. of M. section _____ Collector J. J. Forbes.

| | Air-dry Loss | Coal (Air dried) | Coal (As received) | Coal (Moisture free) | Coal (Moisture and ash free) |
|---|---|---|---|---|---|
| Proximate Analysis | Moisture 1.4 | 1.08 | 2.47 | | |
| | Volatile matter | 24.42 | 24.08 | 24.69 | 39.12 [a] |
| | Fixed carbon | 38.02 | 37.48 | 38.43 | 60.88 |
| | Ash | 36.48 | 35.97 | 36.88 | |
| | | 100.00 | 100.00 | 100.00 | 100.00 |
| Ultimate Analysis | Hydrogen | | | | |
| | Carbon | | As Received | | |
| | Nitrogen | Grams | | Per Cent. | |
| | Oxygen | On 20-mesh | 680.4 | 56.06 | Rejected |
| | Sulphur | Through 20-mesh | 532.7 | 43.94 | Analyzed |
| | Ash | Total Wt. of sample | 1213.1 | | |
| Calorific value determined | Calories | | | | |
| | British thermal units | | | | |

| | Cumulative per cent. |
|---|---|
| Screen test, through 20 mesh | 100 |
| through 48 mesh | 53.9 |
| through 100 mesh | 33.3 |
| through 200 mesh | 20.2 |

Area from which sample was taken (sq. ft.) _____

Date, December 22, 1920. (Signed) H. M. Cooper., *Chemist.*

[a] This figure is the ratio of volatile combustible to total combustible.

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# DEPARTMENT OF THE INTERIOR
## BUREAU OF MINES

### DUST-ANALYSIS REPORT

Test No. _____ Lab. No. 77611

Sample of Road dust (through 20-mesh screen). Can No. 188

Operator Railway Fuel Company. Mine Parrish

State Alabama. County Walker Bed Mary Lee

Town Parrish, Alabama.

Location in mine Along 3rd Rt. Heading off Main Rt. air course and between Rooms 2 and 3.

Method of sampling Standard. Gross weight, lbs. _____ Net weight, gms. 801.5

Date of sampling 11/28/20 Date of Lab. sampling 12/9/20 Date of analysis 12/21/20

For B. of M. section _____ Collector J. J. Forbes.

| | Air-dry Loss | Coal (Air dried) | Coal (As received) | Coal (Moisture free) | Coal (Moisture and ash free) |
|---|---|---|---|---|---|
| Proximate Analysis | Moisture | 1.6 | .95 | 2.55 | |
| | Volatile matter | 22.00 | 21.64 | 22.21 | 39.75 [a] |
| | Fixed carbon | 33.35 | 32.82 | 33.67 | 60.25 |
| | Ash | 43.70 | 42.99 | 44.12 | |
| | | 100.00 | 100.00 | 100.00 | 100.00 |
| Ultimate Analysis | Hydrogen | | | | |
| | Carbon | | As Received. | | |
| | Nitrogen | | Grams | Per Cent. | |
| | Oxygen | On 20-mesh 421.0 | | 34.44 | Rejected |
| | Sulphur | Through 20-mesh 801.5 | | 65.56 | Analyzed. |
| | Ash | Total Wt. of sample 1222.5 | | | |
| Calorific value determined | Calories | | | | |
| | British thermal units | | | | |

| | Cumulative per cent. |
|---|---|
| Screen test, through 20 mesh | 100 |
| through 48 mesh | 60.5 |
| through 100 mesh | 31.1 |
| through 200 mesh | 18.5 |

Area from which sample was taken (sq. ft.) _____

Date, December 22, 1920. (Signed) H. M. Cooper., *Chemist.*

[a] This figure is the ratio of volatile combustible to total combustible.

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# DEPARTMENT OF THE INTERIOR
## BUREAU OF MINES

### DUST-ANALYSIS REPORT

Test No. _____ Lab. No. 77612

Sample of Road dust (through 20-mesh screen). Can No. 708

Operator Railway Fuel Co. Mine Parrish.

State Alabama. County Walker, Bed Mary Lee.

Town Parrish, Alabama.

Location in mine 4th Right Heading.

Method of sampling Standard. Gross weight, lbs. 6 Net weight, gms. 174.0

Date of sampling 11/28/20 Date of Lab. sampling 12/9/20 Date of analysis 12/21/20

For B. of M. section _____ Collector J. J. Forbes.

| | Air-dry Loss | Coal (Air dried) | Coal (As received) | Coal (Moisture free) | Coal (Moisture and ash free) |
|---|---|---|---|---|---|
| Proximate Analysis | Moisture | 7.2 | 1.00 | 8.11 | |
| | Volatile matter | 22.10 | 20.51 | 22.32 | 39.84 [a] |
| | Fixed carbon | 33.37 | 30.98 | 33.71 | 60.16 |
| | Ash | 43.53 | 40.40 | 43.97 | |
| | | 100.00 | 100.00 | 100.00 | 100.00 |
| Ultimate Analysis | Hydrogen | | | | |
| | Carbon | | | | |
| | Nitrogen | | As Received. | | |
| | Oxygen | Grams | | Per Cent | |
| | Sulphur | On 20-mesh | 283.0 | 61.92 | Rejected |
| | Ash | Through 20-mesh | 174.0 | 38.08 | Analyzed. |
| | Total Wt. of sample | | 457.0 | | |
| Calorific value determined | Calories | | | | |
| | British thermal units | | | | |

| | Cumulative per cent. |
|---|---|
| Screen test, through 20 mesh | 100 |
| through 48 mesh | 44.0 |
| through 100 mesh | 19.0 |
| through 200 mesh | 6.2 |

Area from which sample was taken (sq. ft.) _____

Date, December 22, 1920. (Signed) H. M. Cooper., *Chemist.*

[a] This figure is the ratio of volatile combustible to total combustible.

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# DEPARTMENT OF THE INTERIOR
## BUREAU OF MINES

### DUST-ANALYSIS REPORT

Test No. _____ Lab. No. 77613

Sample of Road dust (through 20-mesh screen). Can No. 700

Operator Railway Fuel Company. Mine Parrish

State Alabama. County Walker Bed Mary Lee.

Town Parrish, Alabama.

Location in mine 950 ft. from Main slope in "A" left entry.

Method of sampling Standard Gross weight, lbs. 6 Net weight, gms. 506.5

Date of sampling 11/28/20 Date of Lab. sampling 12/9/20 Date of analysis 12/21/20

For B. of M. section _____ Collector J. J. Forbes.

| | Air-dry Loss | Coal (Air dried) | Coal (As received) | Coal (Moisture free) | Coal (Moisture and ash free) |
|---|---|---|---|---|---|
| Proximate Analysis | Moisture 1.4 | 1.13 | 2.49 | | |
| | Volatile matter | 26.85 | 26.48 | 27.16 | 37.62 (a) |
| | Fixed carbon | 44.52 | 43.91 | 45.03 | 62.38 |
| | Ash | 27.50 | 27.12 | 27.81 | 72 |
| | | 100.00 | 100.00 | 100.00 | 100.00 |
| Ultimate Analysis | Hydrogen | | | | |
| | Carbon | | | | |
| | Nitrogen | | As Received. | | |
| | Oxygen | | Grams | Per Cent. | |
| | Sulphur | | On 20-mesh 610.0 | 54.64 | Rejected |
| | Ash | | Through 20-mesh 506.5 | 45.36 | Analyzed. |
| | | | Total Wt. of sample 1116.5 | | |
| Calorific value determined | Calories | | | | |
| | British thermal units | | | | |

| | Cumulative per cent. |
|---|---|
| Screen test, through 20 mesh | 100 |
| through 48 mesh | 57.1 |
| through 100 mesh | 35.0 |
| through 200 mesh | 20.2 |

Area from which sample was taken (sq. ft.) _____

Date, December 22, 1920. (Signed) H. M. Cooper., *Chemist.*

[a] This figure is the ratio of volatile combustible to total combustible.

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