"The deceased came to his death May 24, 1915, as a result of asphysiation due to going into the mine of the Smokeless Coal Company in attempting to rescue victims of the explosion. He died a hero and his courage was commendable."

EXPLOSION OF GAS AT THE ORENDA MINE

The Orenda mine is situated in the Twentieth Bituminous District, Somerset county, near Boswell, and is operated by the Merchants Coal Company.

An explosion of gas occurred at this mine on the forenoon of August 31, causing the death of 19 persons. The Department directed Inspectors T. D. Williams, Nicholas Evans, C. B. Ross and Joseph Knapper to report at the mine at once to assist Inspector F. W. Cunningham, in whose district the mine is situated. The extent of the catastrophe was not known and the inspectors were urged to make every effort to rescue the living men in the mine and recover the dead.

The report shows that the initial point of the explosion was at or near the entrance to No. 1 room on No. 8 dip entry, off No. 10 entry left, and that the gas that caused the explosion was ignited from a spark or flame produced by the trolley wheel as it traveled the trolley wire at or near said point. The spark or flame ignited the gas on No. 8 dip entry and the flame therefrom coming in contact with gas at the entrance to No. 1 room caused the explosion. There is no evidence to show that coal dust increased the violence of the explosion to any material extent The coroner's verdict shows that, with two or three exceptions, the loss of life was caused by the afterdamp.

The reports of the inspectors, correspondence in regard to the explosion, together with the report of the coroner's inquest, are printed herewith.

REPORT OF COMMISSION OF INSPECTORS

Hon. James E. Roderick,

Chief of Department of Mines.

Dear Sir: We, the undersigned Mine Inspectors, on the first day of September, 1915, made an inspection of that part of the Orenda No. 2 mine of the Merchants Coal Company affected by an explosion that occurred August 31, about 8 o'clock a. m., by which 19 persons were killed and several others slightly injured.

The object of the inspection was to ascertain if possible (as per your instructions of August 31) the cause of the explosion and to locate its initial point.

The "C" Prime or Cement seam of coal is being mined here, lying at a depth beneath the surface of about 1,000 feet over the left side workings where the explosion occurred. The coal is hoisted from a slope with an average grade of about 13 per cent.

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The ventilation is produced by a Sturtevant fan nine feet in diameter and five feet wide, located at an opening to right of slope. A reserve fan is also located at this point, and under normal conditions the first named fan produced from 179,980 to 200,000 cubic feet of air per minute, at 230 revolutions per minute against a water gauge of five inches. The main slope and traveling way were used as main inlets for the air current.

We entered the mine by way of the main slope opening and proceeded along said slope to No. 10 entry left. Following this entry we came to No. 7 entry left. Here we observed the first evidence of the force produced by the explosion, the evidence at this point being very light. Continuing along this entry we came to No. 8 dip entry. Following this entry we came to a point where two doors had been erected about 120 feet apart, forming an air lock between No. 10 entry left and the workings on Nos. 7 and 8 dip entries; these doors had been destroyed by the force of the explosion which traveled upwards in the direction of 10 entry left. On examining the entrance to No. 1 room off said No. 8 dip entry, we found a very heavy fall of roof. Explosive gas was detected on this fall about one foot above the level of the roof and about 13 feet from the trolley wire on the opposite side of entry. No. 2 room pillar had been drawn back to within about 150 feet of the entry. Nos. 3, 4 and 5 pillars were also being drawn. The fall produced by the removal of a portion of each of these pillars extended from the entrance of No. 1 room to the rear end of No. 5 pillar. Dinner pails, wearing apparel and safety lamps were found in Nos. 3, 4 and 5 room pillars and also in No. 6 room, which would indicate that the miners were in these places on the morning of the explosion. In fact we were informed by members of the rescue party that the bodies had been found in these places. We found a canvas check had been erected on said No. 8 dip entry between Nos. 3 and 4 rooms, also a canvas brattice in the first and second cutthroughs between said Nos. 3 and 4 rooms. All three of these canvases had been blown down, the direction of the force at this point being from the pillar fall downward toward No. 11 entry left. On examining No. 7 dip entry we found a door had been erected below No. 7 room, a center entry running parallel and between Nos. 7 and 8 dip entries had been bratticed off near a point nearly opposite the door on No. 7 dip entry, and both the door and the brattice had been blown downward in the direction of No. 11 entry left, the force having come through the cutthroughs from No. 8 to No. 7 dip entry.

A motor was found standing on the track in No. 8 dip entry between Nos. 1 and 2 rooms, with brake applied and a safety lamp hanging on the brake rod. The trolley pole was off the wire and the wire hanger was torn out opposite No. 1 room entrance. This motor had, come from No. 10 entry left and we were informed by miners who escaped, that it was its first trip in this entry on the morning of the explosion. Several safety lamps were found in the affected section (the same being worked exclusively with locked safety lamps) all securely locked, except the one said to have been carried by Assistant Mine Foreman McGuire, which was found with two other lamps at the face of No. 3 room pillar, while McGuire's No. 23.

body was found in a cutthrough leading from No. 3 to No. 2 room a short distance back from the face of No. 3 room pillar. We were informed that McGuire did not keep his lamp locked.

We were informed by Mr. John W. Taylor, who accompanied us and who was fire boss in this section, that about 3.15 a. m., August 31, he examined that part of the section where the explosion occurred and found gas highly explosive on rib fall in No. 2 room, 8 dip, about $2\frac{1}{2}$ feet above level of roof, also at entrance of No. 1 room on fall about 1 foot above level of roof, and about 5 feet from side of entry. He further stated that on examining No. 8 dip entry between a cutthrough leading to the right and the entrance to No. 1 room he found a mixture of explosive gas and air, the same showing plainly on his safety lamp, and that he placed a danger board below the second door forming the air lock, and reported this and the conditions as he found them on the fire boss record book, an examination of which showed this statement to be correct. We were informed that no blasting was carried on in this section.

We found that the force of the explosion was not violent and the damage to the workings affected was light, that the area traversed by the force was small when compared with the size of the workings connected therewith, and that the loss of life was caused by the spreading of the after-damp produced by the explosion, with two or three possible exceptions.

After carefully considering the direction of the forces produced and the conditions as they were found to exist in the various parts of the section affected by the explosion, we are agreed in the opinion that the initial point was at or near the entrance to No. 1 room on No. 8 dip entry off No. 10 entry left, and that the gas which caused the explosion was ignited from a spark or flame produced by the trolley wheel as it traveled the trolley wire at or near said point, the spark or flame having ignited the gas reported by Fire Boss Taylor on said No. 8 dip entry, the flame therefrom coming in contact with the gas reported on fall in entrance to No. 1 room, thereby causing the explosion referred to.

After a careful examination of all parts affected we are of the opinion that coal dust did not increase the violence of said explosion to any material extent.

Further we have agreed that two elements of danger existed in this mine, both having entered into said explosion, viz., explosive gas and electricity, and in order to guard against and prevent the occurrence of another disaster, we herewith offer the following recommendation:

That no electric current be used in any part of said mine where gas has been reported by fire boss.

Respectfully submitted,

THOMAS D. WILLIAMS,

Inspector of 6th Bituminous District. NICHOLAS EVANS,

Inspector of 24th Bituminous District. C. B. ROSS,

Inspector of 2nd Bituminous District. JOSEPH KNAPPER,

Inspector of 8th Bituminous District.

VERDICT OF CORONER'S JURY

That the victims came to their death from an explosion of gas and resulting after-damp in the Orenda No. 2 mine at Boswell, Pa., on August 31, 1915.

Cause of explosion unknown. We endorse the suggestions of the State Examiners, that no electric motor be used in that part of the mine where gas is found.

F. C. ELDON, GEORGE HOKE, E. E. MORRISON, RUSSEL ROAD, C. C. SCHUMAKER, FRANK FEESE.

REPORT OF F. W. CUNNINGHAM, INSPECTOR OF TWEN-TIETH BITUMINOUS DISTRICT

In addition to the report of the Mine Inspectors who were appointed by the Chief of the Department of Mines to examine the Orenda No. 2 mine and ascertain, if possible, the cause of the explosion, I deem it necessary to give further details in order that the reader may have a better idea as to the condition and operation of the mine.

As soon as I received the report of the explosion, which was 2 p m., I proceeded to the mine by automobile and was on the property at 2.45 p. m. and immediately entered the mine in company with Richard Maize, a former State Mine Inspector. We found that temporary ventilation had been restored in a vague way and that many bodies had been recovered. Mr. Maize and I explored the rooms and pillars, which up to this time had not been examined, and we found Martin McGuire at the face of No. 3 room pillar and others throughout the workings. The exploration was completed and all bodies were on the surface by 9 o'clock p. m.

The mine is ventilated by 12 splits of air. The system of ventilation requires that the pillar work on each entry be ventilated by a separate split of air in order that no workman is required to be in any air that comes in contact with pillar workings or old falls, the air going direct over the falls to the return airways. This system also guards against the electric wires being in any return air from gobs, which are the only portions of the mine that give off explosive gases, the coal seam being free from gas. The above system was strictly in force on my last inspection in June, 1915, and in No. 8 dip there had been no pillar work up to that time, and by the fire boss's reports the first gas was detected on August 9. The place was kept idle for a week or ten days and no trace of gas could be detected at the time work was resumed. However in Nos. 7 and 8 dips off No. 10 left the ventilation was not strictly up to the system adopted, but instead the coal was being hauled out the top of No. 8 dip to No. 10 left, and while the electric wires were technically in the intake air, the air that went into the pillar workings was supposed to return out through the drain entry at the top of No. 1 room off of No. 8 dip. I suppose it did, but all the air did not go that way, because the fire boss detected gas in the air on No. 8 dip on the first side of No. 1 room going towards No. 7 dip. The system of ventilation in No. 8 dip was not the system that the management of the mine were going to adopt, but they were working to get the track up from No. 11 left to haul the coal that way and discontinue hauling it to No. 10 left, in order to do away with any chance of having the electric wire in the return air from pillar workings or any workmen being in return air from pillar workings.

The mine foreman's ventilation report shows that there was 8,000 to 12,000 cubic feet of air passing per minute in No. 8 dip, on his last measurement, the week before the accident, and I am of the opinion that if the same volume of air had been passing on the morning of the 31st, the explosion would not have occurred.

All pillar work in the mine is done with locked safety lamps and a few electric portable lamps, the solid work being done with open lights. The first working places using open lights are on No. 11 left where the entries only are being worked, and beyond No. 11 left to the face of the main haulage entries they are all worked with open lights, there being no pillar workings beyond No. 11 left.

The fire boss station is located at No. 8 right, about one mile from the entrance of the mine, and from this station Martin McGuire, the assistant in this section of the mine, notified the mine foreman on the surface that gas had been reported in No. 8 dip and was fenced off and a danger signal displayed on the fence. The mine foreman informed Mr. McGuire that he would be in and see the place as soon as he could get there, and while the mine foreman was in the fire boss station countersigning the fire boss's reports the explosion occurred, between 7 and 8 o'clock in the morning.

From the evidence of some of the survivors it appears that the workmen had gone to No. 8 dip and were waiting at the danger signal for Assistant Mine Foreman McGuire, who was a little late in getting there. He went to this part of the mine on a motor trip out No. 10 left and had the motorman stop his motor outside of No. 8 left until he had examined the place, and it appears that he examined at No. 1 room where the gas had been reported by the fire boss and evidently found it clear, for the motorman dropped a trip of empty ears through the door to No. 7 dip, and was on his way down No. 8 dip to collect and pull the loaded cars, but it appears by the position of the motor that he only got as far as No. 1 room on No. 8 dip when something occurred. The motor was standing between Nos. 1 and 2 rooms with the brake applied and the trolley off and it appears that the trolley wheel ignited the gas, and it was a few seconds before the explosion occurred. He and the brakeman on the motor were found some 50 to 75 feet ahead of the motor, evidently having been running to get out of the path of the flame when the gas was first ignited at No. 1 room. Mr. McGuire was found in No. 3 pillar, probably the first place he had examined, and it is evident that he was examining at the edge of the gobs along the pillar or fracture line. It is also possible that Mr. McGuire did not find any evidence of gas as far as he could or did go on the falls, but when the empty trip of cars were sent down No. 7 dip with a pretty good speed they forced the air back in the pillar workings of No. 8 dip and forced the gas out of No. 1 room on No. 8 dip to the trolley wire, and when the motor went down No. 8 dip the sparks from the trolley wheel ignited the gas.

The accompanying sketch shows that the explosion was confined to a small area on account of dust not entering into or contributing to it to any extent.

MAP OF THE BITUMINOUS REGION

A map of the bituminous coal region of Pennsylvania has been prepared under the supervision of the Department of Mines and is issued with this report. It will also be supplied separately upon request.

The map shows the boundaries of the thirty bituminous inspection districts and the location of the mines. An index is also furnished in which the names of all the mines are given, as well as the names of the Department district inspectors.

In the present arrangement of the inspection districts, as they appear on this map, an effort has been made to equalize the work of the inspectors. It will be noted that some of them have as few as 20 mines under their supervision, while others have as many as 90. The reason for this is that the mines in the small districts are the most dangerous and consequently require more frequent inspection.

It is the hope of the Department that the present division of the great bituminous region will prove advantageous and helpful to the service, and that the districts may remain without further adjustment for at least the next ten years.

WORK OF THE MINE INSPECTORS

The work of the inspectors has been very satisfactory during the year. They have made every effort to secure strict compliance with the Mining Laws, and the result has been such as to commend their work to the Chief of the Department of Mines.

During the year they spent 5,128 days inspecting mines; $87\frac{1}{2}$ days inspecting machinery and plants; $353\frac{1}{2}$ days investigating accidents; 29 days attending inquests; $1.568\frac{1}{2}$ days at office work; $18\frac{1}{2}$ days inspecting maps and plans; 476 days in consultation on mining matters; $60\frac{1}{2}$ days in consultation on legal matters; $143\frac{1}{2}$ days traveling on duty; 63 days on sick list; 140 days legal holidays; 87 days attending court; $1\frac{1}{2}$ days at mine fires; 357 days on Mine Foremen's Examining Boards; $81\frac{1}{2}$ days on account of deaths in families; $18\frac{1}{2}$ days on account of sickness in families; 269 days on vacation; 59days on private business; a total of 8,975 days, or 299 days a year for each inspector.