Reports

Marianna Mine

THE EXPLOSION AT MARIANNA

One of the most disastrous explosions of recent years occurred November 28, about 10.30 in the morning, at the Marianna mine of the Pittsburg-Buffalo Company, located at Marianna, Washington county.

It seems almost incredible that a disaster of this kind could occur at the Marianna, as it was deemed by all persons who had ever seen it to be a model and safe mine. As soon as the report could be verified, the department notified all the inspectors located near Pittsburg to repair at once to the scene of the explosion and give such advice and help as might be necessary to rescue any of the entombed miners who might be living and properly to care for those that had been killed.

Mr. Henry Louttit, the inspector of the district, was at the mine when the disaster occurred. A number of other inspectors arrived at the mine on the afternoon of the same day, but as the casing leading to the fan was destroyed and the top of the outlet shaft and the head frame were badly wrecked, it was several hours before the ventilation could be even partially restored.

I arrived at the mine Monday noon and found that all the employes in the mine had been killed but one. About one hundred of the bodies had been taken from the mine and it was supposed that there were still from thirty to fifty remaining. At that time it was feared that the coal had taken fire and this belief was strengthened by the fact that considerable smoke was encountered while exploring the mine. It was a great relief to the management, the inspectors, and the other persons who knew what the danger from fire meant at that time, to find that there was no fire in the coal or in any of the timbers in the mine. All the entries of the mine that could be explored were examined by the inspectors and a few capable superintendents by Monday noon, and a number of the remaining bodies were located.

Owing to the dangers, both real and imaginary, that are connected with an exploration of this kind, it is hardly necessary to say that it required great courage on the part of these men to enter the mine. They knew that if fire had ignited the coal or even the timber it would be necessary to reach the fire and extinguish it before the ventilation could be restored. In the effort to do this, the Draeger helmets were of the greatest assistance, as without them the explorers could not have remained in the presence of the poisonous afterdamp and lived. In this connection it may be said that every company operating a gaseous mine should have at least a dozen practical young mining men drilled in the use of these helmets, so that at a moment's notice they could be put on and the men thus be enabled to get to work at once after an explosion or a mine fire. A sufficient number of helmets should be placed at a central point or at points convenient where they could be readily taken to the scene of the disaster. While the helmets were not the means of saving any lives at the Marianna, (unless it was the life of the man found near the shaft) nor would they have saved any lives at the Harwick, Naomi

or Darr disasters, it is possible that occasions may arise when they will be instrumental in saving lives. At any rate, they are invaluable for exploring purposes, particularly at the time of mine fires.

The work of restoring the ventilation was pushed as rapidly as possible and the bodies located and removed to the surface. By Wednesday morning all the bodies had been removed to the surface, except those covered by the debris and those in part of the dip workings which were covered with water. In the afternoon of Wednesday, Inspector Louttit, Mr. Walter R. Calverley, superintendent of the Berwind-White Coal Mining Company, Mr. F. B. Dunbar, one of the superintendents of the Monongahela River Consolidated Coal and Coke Company, Mr. A. C. Beeson, superintendent of the Marianna mine, Mr. John H. Jones, president of the Pittsburg-Buffalo Company, and the Chief of the Department of Mines descended the Rachel shaft in a bucket, three persons being taken down at a time The bucket was lowered and hoisted by a small temporary engine that had been installed for that purpose. All the bodies were taken from the mine by the same means. A thorough examination was made of all the entries not flooded with water, but no effort was made to locate the initial point of the explosion or to follow its course. We simply made an examination of the general conditions. Although the ventilation had been but partially restored, only a small amount of gas was found at the faces of any of the entries.

We spent about six hours in exploring the mine and were more than astonished to find so small an amount of gas, which was found only at the face of a few entries that were driven over two hundred feet in advance of the last cut-through. This was proof to my mind that the Marianna mine was not a very gaseous mine and that the cause of the destruction of life and property was nothing else than the dreaded coal dust held in suspension in the air, which was ignited by a small explosion of gas, an electric spark or a blown-out shot.

Heretofore when an accident like the one at the Marianna mine occurred it has been the custom of the coal company to send mining experts into the mine to examine it and make a report for submission to the jury at the inquest. The Department of Mines has also at such times sent a number of inspectors to the mine to investigate the cause of the accident and make a report to the Chief, to be submitted at the inquest.

When arranging with Mr. John H. Jones, President and General Manager, for the dates when the inspectors could enter the Marianna mine to make a final examination, he was asked when his experts were to examine it. He seemed surprised at the question, and said he did not think it necessary to have any experts employed in this case, as he was positive that the State inspectors could find no fault with the way the mine had been conducted and he was willing to abide by their decision. My advice to ask a half dozen or more superintendents to make an inspection in the interest of the company was declined, as he held to the opinion that as the company had always lived up to the letter of the law, having even accepted suggestions from the Department in regard to the operation of the mines, such an inspection was unnecessary.

After a personal inspection of the mine, I decided that it would be advisable to have an investigation made by a commission of expert, intelligent and disinterested engineers, in addition to the inspection by the inspectors, and to that end I requested Mr. George Whyel, Mr. G. E. Gay and Mr. L. W. Fogg, mining engineers, all of Uniontown, to make this investigation. I stated to them that it was very important to ascertain if possible the cause of the disaster, and requested them to make an investigation as soon as possible and to report the result to the Department of Mines. I selected Mr. Whyel as chairman of the commission and suggested that they arrange with the general manager of the mine in regard to the time for making the inspection.

A careful examination was made by the commission and a report forwarded to the Department, December 16. This report is included herewith together with the report made by the mine inspectors.

The inquest on the bodies of the victims of the Marianna explosion was held in the court house at Washington, Washington County, Thursday and Friday, December 17 and 18. At that time twenty-nine witnesses were examined.

Under the law, only an inspector can interrogate the witnesses. Inspector I. G. Roby, of the Fifth Bituminous District, was selected for this purpose, and suggestions were made to him in writing by the Chief of the Department of Mines and by the other inspectors. The coroner was a most intelligent man and conducted the inquest in a masterly manner, and his summing up of the case to the jury entirely from memory was remarkably well done.

The jury was composed of most capable men, who gave close attention to the evidence submitted and rendered a verdict according to the evidence.

By reason of having a coroner who understood the situation thoroughly all proper evidence on the case was admitted. The witnesses, or at least many of them, were men of high character and intelligence, and many of them men of prominence. They gave with great care their evidence and recommendations, which were very comprehensive and satisfactory.

Without impropriety I quote herewith some of the testimony.

Walter R. Calverley, Superintendent of the Windber District of the Berwind-White Coal Mining Company, who spent three days in the mine after the explosion, testified in part as follows:

"The plan of the mine was very good. I consider the system of ventilation an advanced system, with an extravagant volume of air; that with the volume of air passing, it was possible to have an explosion. Constant success begets carelessness, even among those who know the consequences that result from tempting Providence, but they still tempt it. I am positive that even though the explosion started from a slight accumulation of gas, it was the dust that caused the enormous pressure. The volume of air in this mine was unquestionably sufficient to dilute and carry off the gas, but the enormous velocity meant that there was an unusual quantity of dust floating in the air. A blown-out shot would have been sufficient to cause the explosion without any accumulation of gas. That tongue of flame coming in contact with the dust floating in the air would be sufficient."

Mr. H. K. Knopf, General Superintendent of the Pittsburg and Westmoreland Coal Company, with sixteen years' experience, testified in part as follows:

"I was at the Marianna mines three different times before the explosion, in a period of eight months, and my last visit was the last of October, or the first of November, twenty-nine days before the accident. The operation of the mine was very practical, and the method in which it was laid out was, in my opinion, unquestionably the best I was ever in. I went through nearly all of the entries and in none of them was any gas visible, and it was the safest mine, and the method of keeping it safe was the best in the region. I think they had six or seven fire bosses and assistant pit bosses, and even if they did not do the blasting themselves, they supervised it constantly. The dust was loaded out as fast as it was made, and the roads were new and clean. I was in the mine three days after the explosion and made special examination as to the cause of the explosion. In my opinion it was unquestionably a dust explosion caused by a blown-out shot in No. 3 Blanche entry. It would be impossible for a gas explosion to occur in that mine from the way the brattices were kept up and the places constantly inspected. They had water lines all through the mine, and before firing a shot they would water the side of the coal and sprinkle it before shooting. The system of watering in this mine was the only one in the Pittsburg district where they had gone into it liberally and tried to be thoroughly effective. It would be almost impossible with the large quantity of air which necessarily has to be put into a modern mine, for any method of sprinkling to take care of all the fine dust."

Richard Maize, Superintendent of the Pittsburg and Westmoreland Coal Company, at Hazel Kirk, with an experience of twenty years, testified in part as follows:

"I visited the Marianna mine about two weeks before the explosion and spent a day in the mine, and visited the face of every entry. Some of the entries were dry and some were wet. There was no accumulation of dust anywhere. I found no gas in any entry except in one of the Blanche entries, where there was a small cap found. I made no special effort to find gas in other places, as they were all worked with naked lights. I thought the Marianna mine was one of the finest mines I was ever in, and as safe as any mine I had ever been in, and the system they had for taking care of the mine and employes therein was the best I had ever seen. I have spent the greater part of three days in this mine since the explosion. I came to the conclusion that the explosion came out of the Blanche entries, on account of the way the timbers were strewn around. In regard to the system of watering the places, every entry had a water line and fifty feet of hose, and in one of the Blanche entries Mr. Kennedy had the water pressure turned on, the sides and roof were thoroughly wetted, and I was informed that was done before every blast was fired. It is possible to make every mine in this state safe by using the coke-region system and by making every man dig down his coal with a pick. If the air was saturated with spray, and the coal sheared in addition to undercutting, it would reduce the danger of a dust explosion from the fact that it would reduce the danger of a blown-out shot, and in that way would safeguard life."

George Whyel, a practic[redacted]er, mining engineer, superintendent, manager, general manager, [redacted]esent operator; L. E. Fogg a mining engineer of large experience, fourteen years as superintendent and general manager and at present the general manager of Tower Hill Coke Company; and George E. Gay, mining engineer and a graduate of the Lehigh University, with experience since 1884 in coal mines as a mining engineer and superintendent of mines, were selected by the Chief of the Department of Mines to make a careful investigation as to the cause of the explosion in the Marianna mine, and to make in connection therewith any recommendations that would have a tendency to prevent disasters in coal mines from the explosion of gas and dust. Their full report is given elsewhere, but I desire at this point to call attention to a few of their remarks and recommendations:

"We feel that it should be recognized that mines liberating gas and producing dust have to face the danger of ignition from three principal causes—open lights, blown-out shots and electric sparks. To reduce these dangers to a minimum without forcing a condition of sacrificing values of property should be the aim of our future laws. We feel that the danger from open lights can be more easily eliminated than the other two, and we do not believe it is a hardship to enforce the use of improved safety lamps in any or all of the mines that have given off, or are apt to give off, explosive gas. In regard to blasting, it is a recognized necessity that in mining the Pittsburg coal other means than hand-pick mining must be employed, and that the blasting of this, under proper regulations, can be accomplished with a minimum amount of danger. To do this, we feel it is necessary for the employment of competent shot firers who shall have charge of the explosives and be responsible not only for the firing of the shot but for the quantity and quality of the explosives used; that all holes should be tamped with clay; that the shot firers shall use only permissive explosives as furnished by the company; that all shots shall be fired by an electric battery, and that blasting for the complete safety of the miners can be done only between shifts when the men are out of the mines.

We recognize at the present time that one of the dangerous conditions of any mine is the accumulation of dust. To prepare and take care of it is a serious condition, and we cannot but recommend that the same care as used in the Marianna mine for distributing water for saturating the dust, be employed in every mine under like conditions. We also feel that it is not simply a question of the sprinkling of the dust, but that it should be a saturation; that unless the coal dust is saturated the sprinkling does not accomplish the purpose intended. We also feel that in all mines where machines are used for undercutting or mining of coal, the accumulations of fine coal and dust should be loaded and taken out of the mine before shooting. We recognize the present estimated commercial value of the use of electricity in mines, but we can only recommend its use on intake air currents, believing there is sufficient power otherwise obtainable to do the necessary work as economically, and, in eliminating electricity from all gaseous parts of the mine, we remove as great a danger as the open light. That there should be realized by the miner his importance as a factor in not only safeguarding his own life, but those of his fellow-employes in faithfully following the rules and regulations prescribed, and his education should be first

on these lines. That the employer and employe working together for mutual protection under intelligent guidance will reduce the liability to accident by explosion by removing the causes. We realize that following out the lines of our recommendations may mean an increased cost of operating expenses, and hardships might result between competitive fields unless similar laws are passed in all such fields."

J. L. Dixon, a mining engineer and superintendent of mines for about thirty years, said in part:

"I went into the Marianna mine after the explosion and visited about twenty entries, examined them carefully, and noted the condition of the mine. From what I saw of the mine and what I saw of the workings, I am fully convinced it was not a gas explosion, and from what I knew of the condition of the entries and the care taken to keep them free from dust, I came to the conclusion it was not an ordinary dust explosion. I believe the explosion was caused by a large amount of dust being carried in suspension in the currents, and also by gas being given off. I think the primary cause was a blown-out shot. It only takes a small temperature to start a destructive distillation of gas and dust, and I think it was caused by coal dust in suspension mixed with gas. In my opinion, mine explosions are caused by blown-out shots; therefore, the real protection is to have all the men out of the mine when the shots are fired. An additional safety would be the shearing of the coal. It would probably take only about one-quarter as much explosives to produce the same amount of coal as when the coal is not sheared. A shot takes the path of least resistance, and with shearing the least resistance is always along the laminations of the coal."

W. W. Keefer, at present Manager of Mines for the Monongahela River Consolidated Coal and Coke Company, a man of large experience and an expert on all mining matters, testified in part as follows:

"I visited the Marianna mine in October, being one of a party that went in with the foreign experts. I found nothing to criticize, but, on the contrary, the consensus of opinion was that the mine was very well arranged. I regarded the proposed plan of development and the actual development, so far as I observed it, as being excellent. I spent several days in the mine since the explosion, and was one of a party who made an exploration of the mine before any changes were made after the explosion and while all the bodies were still in their original positions, and while the equipment was still standing as left by the force of the explosion, and while there were evidences of counter forces from a series of explosions, as usually occur in cases of this kind, the bulk of the evidence points undeniably to the fact that the explosion originated about the Blanche headings. I think the weight of the evidence points to No. 3 Blanche with its blown-out shot, justifying the theory that that would have originated it. I do not believe the explosion could have been caused by an accumulation of gas; my judgment is that the dust had more to do with it than the gas."

In answer to the question, he said that "electricity is absolutely necessary in a mine such as this. It is folly to attempt to exclude it from the mine. As far as I know, no explosion has ever been traced to electricity."

REPORT OF COMMISSION

Uniontown, Pa., December 18, 1908.

Hon. James E. Roderick, Chief of Department of Mines, Harrisburg, Pa.

Dear Sir: In pursuance with your instructions to us, under date of December 4, 1908, 'To make a thorough inspection of the Marianna mine of the Pittsburg-Buffalo Company, located at Marianna, Washington County, Pa., for the purpose of determining, if possible, the cause of the catastrophe,' we, the undersigned, beg leave to report:

We began our inspection on Thursday, December 10, 1908. We met Mr. John H. Jones, president of the Pittsburg-Buffalo Company, at the mine, and he introduced to us J. E. Kennedy, his mine foreman, who was in full charge of the mine at the time of the accident, with instructions to conduct us through the mine and give us all information possible.

We first visited the main raise entries on the southeast side of the main shaft and traveled each of these entries to the faces, returning to the main dip entries on the northwest side of the main shaft, including the raise face entries and butt entries on the north side of main shaft; then passing from the main shaft along the main entries between the air shaft and main shaft; thence down the supply entries on the northwest side of the air shaft to the entries known as the "Blanche" entries, returning through to the face of the northwest dip entries known as the "Supply" entries into No. 1 right aircourse and into the sump entries; thence through the dip face entries on the right, passing into entries on the southeast end of the airshaft to the faces of 1, 2 and 3 supply entries. This completed our route through the mine, which covered the face of all entries throughout the mine.

Our object was to locate and follow as far as possible the primary force of the explosion but we very soon realized the impossibility of exactly locating in every entry the primary forces in a terrific explosion of this kind. We do feel positive, however, that in one section of the mine there should be no question in locating the direction of this force, which, in the end, brought to our minds the conviction of the location of the first explosion, regardless of the conflicting evidence of the forces in practically every direction.

The conditions we found are as follows:

In the raise entries on the southeast side of the main shaft, the primary forces were not in as good evidence as the reactionary forces; the latter were all in the direction of the main shaft, and it is our opinion that the primary forces were reinforced at the various faces of these entries and came back with increased violence toward the escapement at the main shaft. The evidence at the face of these various entries showed us that the primary forces had charred the face of these entries 20 to 30 feet back, and that the cars and mining machines in these entries had been driven against the face, but the reaction between this point and the main shaft showed greater violence than was shown at the face. We found every indication and evidence that all these entries had been bratticed up close to the face with canvas brattice. On the day of our examination, however, there was only one of these entries, known as No. 5, that showed any indication of giving off gas.

What we did consider remarkable under the conditions was that in the motor barn where no gas was detected, and where brattice had been maintained originally a distance of 280 feet, there was no brattice in evidence on the day of our examination and test for gas.

We also found evidence in a shot hole in the rib of No. 5 entry, where, contrary to written instructions, coal dust had been used for tamping instead of clay, and at a point approximately 50 feet from the face we picked up a paper cartridge filled with slack coal prepared for future use in tamping a shot, and at the mouth of the entry we found a small can of black powder, approximately 5 pounds.

We mention these facts not because they were in any way connected with the primary cause of the explosion, but to call to your attention the utter disregard of the company's rules and regulations, and the recklessness and carelessness of the employes in their daily occupation.

On the raise face entries north of the main shaft, the force was toward the face. The faces of these entries and ribs for some distance back were badly charred, indicating intense heat. On the first butt entry to the right of these entries, we found considerable gas being given off by a blower. The face of this entry and a parallel to it are in a fault composed of clay; this entry was bratticed with canvas very close to the face and a fair quantity of air was circulating. Gas was detected at the face of the first butt entry. The face of this entry and its parallel, from indications on the mine map, are directly under Ten-Mile Creek.

The same conditions apply to the butt entries to the left. No gas was found in either of these entries.

Passing down to the entries on the northwest side of the main shaft, we found little variation in the conditions existing there from those previously examined.

Entries 1, 2 and 3 showed evidence of considerable force, and in entry No. 1 gas was found on a fall near the face.

We found the condition in No. 4 main dip entry different from that of any of the entries found in this side of the mine. While the effects of heat were possibly not any more pronounced than in a few other entries, the line of the force was all in one direction, which was toward the main shaft, and showed evidence of being less violent than any of the other entries.

The sump entries to the right of No. 5 were filled with water and were not examined.

Passing up to the connecting entries between the air shaft and main shaft, we found the evidence of force marked in the direction toward the main shaft, and exhibiting greater power than possibly any other place in the mine. It was the location of this force and its direction that helped in a great measure to determine in our minds the location of the primary explosion. While it had its origin beyond the points that up to this time we had followed, we believe that the evidence is fully as strong to show that a secondary explosion might have occurred in No. 4 main dip entry.

The evidence of force in the empty return dip toward the main shaft is shown by brick walls that were completely torn out and by large portions of the material blown toward the main shaft. The steel beams located in these entries near the air-shaft were also torn off and piled in the direction of the main shaft.