

FERNDALE. Tylorstown Pit. Rhondda Fach, Glamorganshire. 27th. January, 1896.

The colliery was the property of Messrs. D. Davis and Sons Limited, Ferndale and had been bought from Messrs. A. Tylor and Company, Limited in January 1894. They were in the Rhondda Fach about 17 miles north west of Cardiff. The Company owned the Nos. 1, 2, 3, 4, 5, 6, 7, and 8 pits all of which were more or less connected and worked the semi-bituminous South Wales steam coal. The explosion affected three of these pits, Nos.6, 7, and 8 which were taken over by this Company two years before. Nos.6 and 7 formed a pair of pit within 26 yards of each other and No.8 Pit which was also known as Cynllwyndu Pit was 937 yards further down the valley which had been sunk by A. Tylor and Company about three years before. No.6 Pit was 16 feet in diameter and sunk only to the Four Feet Seam at a depth of about 450 yards. No.7 Pit was also 16 feet in diameter and sunk to the Four Feet Seam at 330 yards. The No.8 Pit was eighteen and a half feet in diameter and was sunk to the Five Feet Seam at about 600 yards passing through the Four Feet at 416 yards and the Six Feet at about 400 yards. Coal was raised from all three pits. At No.6 from the Five Feet at No.7 from the Four Feet and Six Feet and at the No.8 from the Six Feet. The only connection between Nos.6 and 7 Pits and No. 8 Pit was in the Six Feet workings.

The No.6 Pit was the upcast for all the three pits and the ventilation was produced by a Schiele fan, 21 feet in diameter, placed 29 yards from the mouth of the No.6 Pit Nos.7 and 8 were both downcast shafts. The fan delivered a total of 202,771 cubic feet of air per minute through the three pits. The Four Feet and the Six Feet seams were those that had been extensively worked and for the most part the working in the former were under those of the latter with the exception of places where the Six Feet had been worked from No.8 Pit and some adjoining workings in the same seam from No.7 Pit. The Six Feet seam in the workings were therefore, in maiden coal and had not been drained of gas by the upper seam being worked. The Five Feet seam was commenced in January 1895 when the No.6 Pit was sunk to it from the Four Feet seam in 1893 and the workings, at the time of the accident, were small. They were connected to the No.5 Ferndale Pit at one point but had a separate ventilation system.

All the seams produced firedamp freely and were lit exclusively with locked safety lamps. These were bonneted Clanny types which were the property of the workmen who took them home and cleaned them. There was no lamp room at the colliery. Each overman of a district acted as a competent person under the 10th. General Rule and locked the lamps at a 'lamp station' before they were taken into a district. In Nos.7 and 8 Pits there were five such lamps stations, all of which were in the intake airways which satisfied the requirements of the 11th. General Rule. The lamp station for the No.6 Pit was at the surface.

Blasting was not permitted for coal getting in any of the seams but it was allowed for ripping the roof of the roadways and in making the headings in the working of the Six feet seam in both Nos.7 and 8 Pits. The use of gunpowder was discontinued by the management in November 1894 and at that time they used Roberite, Bellite or Ammonite. When these newer explosives were introduced, the mode of firing shots was changed from a fuse to that of an electric battery, but for some reason, the fuse had been reintroduced just weeks before the explosion. The fireman acted as 'shotmen' under the Special Rules and they ignited the charge by means of a wire which they heated by passing through the gauze of their safety lamps which were Davy lamps with an additional bonnet above and a movable glass below. Shot firing was restricted to the interval between a day shift and a night shift or in the morning between a night shift and a day shift.

Colliers and rippers bored all the holes for the shots and charged the with explosive which they obtained from magazines which belonged to the owners. The shift colliers usually got heir explosives on leaving work and took them home to be ready for the

following morning. Those working on the night shift obtained in the morning and took it home with them ready for the evening shift. By this method, colliers and others requiring explosives had facilities to take explosives that the management did not permit into the mine. It was not difficult for the men to get gunpowder and various forms of dynamite in a large mining village. At the inquiry it was stated that the firemen had instructions to see the holes charged but further evidence showed that this happened only occasionally.

The seams were worked on the longwall system with the face advancing and the roadways for ventilation and transporting the coal were made through the 'gob' or waste behind the face. Stone was obtained from ripping the roof and for the continual enlargement of the roadways and maintaining the mine good order and height. Small coal debris from falls and road cleanings were 'gobbed' or stowed between as the faces advanced.

The coal was hauled by mechanical power and there were three large engines worked by steam which was brought down the pit from the surface, near the bottom of the No.7 Pit and another near the bottom of a dip drift to the Six Feet seam, within 200 yards of the bottom of the No.7 Pit. In No.6 Pit there was a steam engine that was powered by steam also from the surface and in No.8 Pit there were four engines worked by compressed air sent from the surface. Except for four headings in the rise workings of No.8 Pit, where the gradient was 1 in 4, and where hand crabs were used, all the rest of the haulage was done by horses of which there were 183 in the three pits. Eighty two of them were killed in the explosion.

The workings on the east side of No.7 Pit in the Four Feet Seam, extended eastwards for 1,350 yards and 2,070 yards to the south east and 1,060 yards to the north east. To the west of the pit, they extended south west in a straight line for 1,580 yards and from there a further 400 yards north. At a point 540 yards in from the shaft on the main west level there was a branch extending 957 yards to the north west. These workings were divided into districts, the Pendyris, the Penrheol and the Darwonne on the east and the Dip, the Penrhys, No.6 and No.9 on the west. At a point 20 yards to the west of the No.7 Pit bottom, a drift which dipped at 1 in six reached the Six Feet seam at 157 yards and from this point the workings in the Six Feet went north east for 620 yards to the face of a district which was not being worked and a small district called 'Swamp'. To the west of this drift the main level went on for 1,560 yards but the working at the end were not in operation. At 528 yards along the level there was a branch to the rise into the 'Hard Heading District' and the No.21 district on the west was reached. It was 1,166 yards to the face, and this was the only working district to the rise on the west side of the shaft.

Returning to the dip drift at 100 yards west on the main level was the entrance to 'Blacker's dip' which the lower workings in the Swamp district to the east and the No.1 district on the west were reached. Blackers dip was also the main communication between the workings of No.7 and No.8 pit in the Six Feet seam. in the No.8 Pit the workings extended 560 yards to the east, 550 yards to the south and 418 yards to the north where they joined those from No.7 Pit. There were three main districts in this pit, the main east, the lower east and the Penrhys district. These districts were not ventilating districts as defined by the Act but were under separate firemen.

There were 156 men employed in the No.6 Pit, 894 in the No.7 Pit and 430 in the No.8 Pit, a total for the mine of 1,480. Of this total 1,050 worked on the day shift. There was no regular night shift on the coal but some of the colliers worked at night in special places repairing. The managing staff comprised Mr. David Hannah, the agent and general manager of the Ferndale Collieries and who also acted as the manager of the No.8 Pit. Mr. J.W. Evans was the manager of the Nos.6 and 7 Pits and Mr. John Jones the undermanager of the No.7 Pit. Mr. David Griffiths was the undermanager of the No.8 Pit and Horace Thompson undermanager of the No.6 Pit. In addition there was

day overman and a night overman in the No.7 Pit and a day overman in the No.8 Pit. There were 11 firemen on the day shift and 10 in the night shift in all the pits.

In common with all the larger and deeper collieries in South Wales, the workings in all the seams are naturally dry and dusty. A few years before the disaster a system of watering the roadways by sprays was introduced in the No.7 Pit and the same system had been extended a short time before to the No.8 Pit. The water was obtained from the lodge rooms in the shafts and was taken to the workings in two inch pipes. At the date of the explosion 6,500 yards were laid in the main roads in No.7 Pit and 1,900 yards in the No.8. Sprays were fixed to the pipes which were one inch in diameter at distances varying from 20 or 30 yards to 80 or 90 yards according to the air currents. The pipes and fittings were in charge of a special man in each shift in the No.7 Pit and another on the day shift at No.8 Pit during the night shift in this pit. Besides these men there were several others, firemen, master hauliers and riders on the engine planes who had keys by which they could turn the sprays on or off. The man who attended the pipes in the No.8 Pit had been off work during the week prior to the disaster and the man who had taken his place did not attend the inquiry as he could not be located. At the time there was no statutory obligation on owners to provide water sprays to keep dust down. Where the pipes did not reach, water barrels were provided and the hauliers spread water on the floors. Where blasting was done, the place of the firing and other places within a radius of 20 yards were supposed to be watered by casks and buckets which were filled from the nearest piping. The Inspector commented-

“Such watering as this would not be likely to wet all parts of the roof and sides where dust collects unless it was carefully carried out and several casks of water used for each shot. Indeed it was clear that little watering had been done where the shots were fired. Probably the fact that safety explosive was used, led officials to place more reliance on the explosives that they ought to have done and so they did not think it necessary to much watering.”

The explosion occurred when there were few men in the pits at the interval between two shifts. A repairing shift which included several colliers had descended the pit at 10.30 p.m. on Sunday after the usual inspection of the night firemen who had gone down about 8.30 a.m. These firemen and many who were on the night shift had only just come up when the explosion took place. All the day firemen with the exception of the one in the No.6 Pit descended the pits from 4.20 to 4.30 a.m. and six of these men were killed. It was believed that 58 men were in the No.7 Pit, 12 in No.6 Pit and 20 in No.8 Pit making a total of 90. Of these, 30 escaped uninjured, 3 were injured and 25 were killed. Everyone in the Nos.6 and 8 lost their lives.

Of those who escaped from the No.7 Pit, 29 came from the east side into which the explosion did not pass further than 270 yards where it was arrested. The men in this side of the pit had little difficulty in making their way out of the pit. The only other man who escaped uninjured was Roderick Williams, the day foreman in the Penrhys District of the Four Feet seam, west side. He stated that he was making his morning inspection and was at the face when the explosion occurred. He said-

“I heard reports like great falls but I thought it was an explosion. I took a look at my watch and saw it was twenty three minutes to six. I felt a check in the wind and the air stopped. I tried to make my way out by the return and arrived at the doors in No.12 heading. I found these doors partly blown towards the rise intake and the firedamp was so strong in the intake, that I retreated into the return. Failing to get out by way of the return, I went up the old road to the rise of the return, where the air was fresher, and waited there until 11 a.m. The afterdamp became so strong there that I made another attempt to get out and this time, finding it better in the intake, I succeeded in getting out that way passing over several falls, until I was met by the first exploring party coming in.”

The Inspector commented that-

“This man displayed considerable judgement and coolness, and to these qualities he owes his life. Had he rushed thoughtlessly out by other road, he would have certainly lost his life in the afterdamp.”

On the three rescued alive, but injured, two were enginemen and were found near the bottom of No.7 shaft but both were burned. The other, a collier named Griffith Phillips, aged 24 years, was found at the entrance to Canon's heading in No.9 district Four Feet seam, at a point 1,200 yards from the shaft. Four others were found dead, lying besides him and it was only by the treatment of his rescuers including Dr. Morris, the medical doctor, at the collieries that he was rescued alive.

The explosion was heard all over the village of Tylorstown and a dust laden blast followed by dense smoke was seen to come up the three shafts but there was no flames seen. The covering of the fan drift was blown off but fortunately the fan was not damaged. The cages at the No.7 Pit were slightly damaged but the damaged guide ropes were quickly replaced and Mr. Hannah, who arrived at the pit top about 6 30, descended with others as soon as possible on the cover of the cage. After considerable difficulty they reached the bottom and found broken trams and debris heaped up in the shaft. They had been blown from the west side. Near the shaft they found a number of dazed men but most were not injured. They also found the two men from the east side already referred to and the two injured enginemen lying in the cabin.

After repeated attempts to enter the cross measure drift leading to the Six Feet seam, and the west level in the Four Feet seam, Mr. Hannah was informed that a man was believed to have been left behind in the east side and he and the fireman went in and found a collier working away at the face, when he was told he said that he had felt nothing wrong. On returning to the shaft, they found that a fireman had succeeded in entering the Six Feet workings after an air crossing on the cross measure drift had been temporarily replaced, and by passing over a large fall which had blocked the road before. This fall was estimated to be over 600 tons. They were unable to travel far east or west along the Six Feet level because of the afterdamp, but they reached Blacker's dip which they got down after great difficulty and reached the bottom of the No.8 Pit with only one lamp alight.

While these attempts were going on, active steps were brought into effect by the Ferndale managers, undermanager and firemen to reach the workings by the other shafts. Between 10 and 11 a.m., the first descent was made at No..6 Pit (upcast) and in a very short time they found that all the 12 men in the Five Feet seam had been killed. Nine of the bodies were burned and death had come from carbon monoxide poisoning. They found that several lamps were burning near to the bodies. There was no sign of burning in these workings and the force that damaged the doors came from the staple pit by which the intake air current reached them. From the position of the bodies, it was obvious that the men had moved about after the explosion and it was thought that it was unfortunate that there was no official with them at the time to tell them to go through the doors to the Ferndale No.5 pit where they would have been safe, Two of them were found 70 yards from their working places and near the doors leading to safety. On the day of the explosion, the Inspector arrived at the colliery found that the colliery had been explored and most of the bodies had been recovered. The following day he made an inspection of the mine with his assistants.

Those killed in the No.6 Pit-

John Watkins aged 33 years, collier, single.

James Evans aged 38 years, ostler, left a wife and 7 children.

James Edwards aged 35 years, collier, left a wife and 3 children.

Henry Wiltshire aged 17 years, collier, single.

Evan Morgan aged 34 years, collier, widower with 4 children.

Abraham Charles aged 29 years, collier, left a wife and four children.
Daniel Reardon aged 24 years, labourer, left a wife.
Lewis Williams aged 19 years, collier, single.
Charles Norman aged 22 years, labourer, single.
James Jackson aged 25 years, collier, single.
Alfred Beecham aged 15 years, collier.
Henry Davies aged 25 years, labourer, single.

Others who died in the disaster-

David Harries or Harris, aged 49 years, collier, wife and 4 children.
Henry Harries or Harris, aged 19 years, collier, single.
John Lewis aged 39 years, fireman, wife and 6 children.
James Sutton aged 38 years, ostler, wife and child.
Sidney Davies aged 37 years, haulier, wife and 3 children, single.
George Jones aged 19 years, labourer, single.
George Gardner aged 25 years, ostler, single.
George Stapleton aged 54 years, ostler, wife and 6 children.
Richard Davies aged 34 years, collier, wife and 4 children.
Samuel Williams aged 32 years, collier, left a wife.
George Lewis aged 50 years, labourer, wife and 2 children.
John Collins aged 27 years, master haulier, single.
Richard D. Evans aged 28 years, fireman, left a wife.
Jacob Elias Jones aged 18 years, collier, single.
Gwilym Jones aged 29 years, collier, wife and 3 children.
William Rees Jenkins aged 39 years, collier, wife and 7 children.
Walter Barrett aged 17 years, collier, single.
David Rosser aged 41 years, fitter, single.
David Davies aged 26 years, master haulier, wife and 3 children.
David Williams aged 22 years, haulier, single.
Edwin Williams aged 20 years, labourer, single.
Thomas Hall aged 17 years, labourer, single.
Thomas Davies aged 18 years, collier, single.
Griffith Jenkins aged 35 years, haulier.
Isaac Pride aged 19 years, labourer.
John Thomas aged 37 years, collier.
Joseph Williams aged 20 years, rider, single.
Robert Sanders or Saunders aged 30 years, ostler, widowed.
Samuel Morgan aged 21 years, haulier, lived with widowed mother.
Amos Pritchard or Richards aged 46 years, haulier, wife and child.
Solomon Davies aged 25 years, collier single.
Albert Olding aged 20 years, collier.
Benjamin Phillips aged 52 years, fireman, wife and 6 children.
John Rowlands aged 21 years, collier, single.
Richard Evans aged 48 years, fireman, wife and 5 children.
Jesse Evans aged 52 years, fireman, wife and 2 children.
David Davies, wife and 7 children.
George Groves, wife and 2 children.
Alfred Jackson aged 15 years, single.
David Jones aged 27 years, single.
David Jones aged 22 years, single.
John Pearce aged 64 years, wife and 5 children.
David Lewis aged 22 years, single.
Thomas Scourfield aged 32 years, wife and 3 children.

Richard Thomas aged 35 years, wife and 2 children.

Those injured

Arthur Brodie aged 28 years, engine driver,
Eddy Williams aged 18 years, engine driver and
Griffth Phillips.

The inquest was held by the coroner for the district Mr. R.J. Rhys at Tylorstown on the 18th. February and lasted for six days. All interested parties were represented and the report was presented to the Secretary of State for the Home Department. Evidence was heard about the state of the mine prior to the disaster from workmen and expert witnesses and the Inspector gave a detailed description of the mine after the explosion.

He found two shots, one in the ripping of David Evan's stall which had been prepared by Evans, a collier, on the Thursday before the explosion. The hole was two feet four inches long and charged with one cartridge of what was described as 'the last new powder' which was probably Bellite. This shot remained unfired until Sunday and on The Saturday the fireman told Evans that 'there was gas there'. William Arthur, a night fireman, had refused to fire the shot because he found gas. After the disaster the shot was found fired by the shot had not done all its work and there was only a small portion of the roof brought down.

The other shot that was found, was in the rippings in Daniel William's stall and was prepared by him on Friday afternoon. He stated that it was bored about twenty seven inches and charged with one cartridge of Ammonite and stemmed with the borings from the hole. The night fireman and his assistant, William Douglas saw the shot prepared but did not fire it because of a blower in Skyrme's stall. The shot was not fired on Saturday morning and the day shift fireman. Richard Evans said he 'did not know there was shot there'. Richard Evans body was the last to be recovered for the pit and was found within eight feet of the shot in William's stall.

The inspector came to the conclusion that the primary cause of the explosion was the firing of this shot and went on to say-

"An explosion once started in a colliery of this description would certainly extend generally throughout the workings where there was a coal dust n suspension or deposited on the surfaces of the roadways especially where there was active ventilation passing through large roadways of large dimensions as in this pit."

With regard to watering and the use of explosives he went on to say-

"It seems necessary to remind managers of collieries that the introduction of explosives of a safer description does not make it less necessary to properly carry out all the regulations as to the examination of the places where shots are to be fired and all accessible places contiguous thereto, as well as any place in the ventilating districts in which firedamp may have been found 'at other of the four inspections under Rule Four last recorded'. A grave responsibility rests with the 'competent person' appointed by the manager to the owner to make these inspections, and none but thoroughly reliable and careful men should be appointed. These men are permitted by law to fire a shot when and where in their opinion, it is safe for firing.

In the light of the present knowledge as to the inflammability of small percentages of gas and their increased danger when coal dust is present, it seems to me that no shot should never be attempted to be fired where the slightest indication of gas, by a 'cap' on the safety lamp, can be detected. Similarly I think no shot should be fired in any ventilating district in which there happens to be an accumulation of firedamp."

The Coroner summed up and the jury retired to consider their verdict. They returned and delivered the following verdict-

"We are of the opinion that the cause of the explosion was the firing of a shot in gas in Daniel William's road in No.8 Pit, and that the air passing through the faces was charged with gas and probably came into contact with a film of gas in Daniel William's road and the explosion was accelerated by coal dust. We are of the opinion that no one now living is responsible for the explosion.

We recommend that a competent man be appointed to fire all the shots, one man on each shift. We are of the opinion that a practical and competent undermanager by appointed to have sole charge of the night shift in each pit. We are surprised to understand for the evidence of H.M. Inspector have no made a thorough and systematic inspection of No.8 Pit during the last fifteen months and we also recommend that practical working men be appointed as assistant inspectors of mines."

At the end of his report Mr. Robson commented-

"With reference to the recommendation of the jury that shot men should be appointed. I have respectfully to say that in my opinion a fireman is a suitable man to perform the duties of a shotman but before any shot is attempted to be fired in a ventilation district the whole of the district should first be carefully examined and then, if safe any shots to be fired should be fired by the fireman acting as shotman, commencing with the shot nearest the return end of his district.

I am also of the opinion that all shots fired in dry dusty mines or those that produce firedamp, should be fired with an electric battery.

With reference to the expression of surprise on the part of the jury that no complete and systematic inspection of the No.8 Pit by the Inspectors of Mines had been made for the last eighteen months, I have to explain that, though I stated at the inquiry that there inspections of portions of the No.8 Pit had been made during the last years, I have since found, from reports in my possession, that one of these was made in January 1895 by the late Mr. J.M. Sims was not a complete inspection. At the same time, I most respectfully submit that even if no complete inspection of this colliery had been made, it would not, in my view of inspection, be a matter for surprise, I think the making of complete inspections ought to be left as at present, to the discretion of the Inspector in charge. A colliery might be inspected from end to end one week and found satisfactory, it would probably be left uninspected for a longer period as under the present system of more frequent inspections and, the changes that are going on in collieries, such as complete inspections would not in my opinion, tend to the discovery of illegal practices or contraventions of the Act nearly so well as the present system."

WESTLEIGH. Leigh, Lancashire. 20th. February, 1896.

At a few minutes before 6 a.m. on the 20th. February at the Westleigh Colliery there were eight men in the cage preparing to descend the shaft. The engineman started the engine in the wrong direction and the cage was raised until the safety hook disengaged it and the safety catches of the of the headgear failed to hold the cage which fell 370 yards to the bottom of the shaft.

The men who died were:-

John Seddon aged 51 years, collier.

Henry Dootson aged 41 years, bricklayer.

Edward Clough aged 41 years, collier.

Edward Farrington aged 35 years, collier.
Walter Cunliffe aged 25 years, drawer.
Joseph Parkinson aged 22 years, drawer.
James Hope aged 23 years, hooker-on.
Peter Croft aged 14 years, jig tenter.

The engineman had worked at the pit for nine months and at the time of the accident, he was sober. All the usual lamps were lit, those in the engine house and those at the pit bank. The engines were a pair of 26 inch diameter, horizontal cylinders with a 5 feet stroke, slide valves with easers and a 12 foot diameter drum. The cage, which was double decked holding two tubs on each deck, was fitted with a Byrham's detaching hook which was simply a detaching hook and was not self suspensory. On being disengaged the hook passed with a rope over a pulley. The system worked by catches being fitted to the headgear so as to allow the cage to pass upwards but not backwards. There were four of these catches, two on each side of the cage and they worked on a round axle. By experiment of the day of the accident, Mr. Gerrard proved that,

“these catches were so fixed as to be more than a foot from the bottom of the cage, when the hook was at the point of disengagement. The cage at the side had sheets of iron, leaving a space below the middle hoop of 12 inches, and the space below the top hoop, four and a half inches. Into these spaces, it was expected the safety latches would project. The cage would have dropped about 2 feet when the 12 inch space came opposite the latches, and would have dropped about 7 feet when the second space of four and a half inches was opposite the latches.”

The shaft was an upcast shaft and had a furnace to aid the ventilation. Soot was freely deposited on the framework of the headgear and would have been deposited on the axle of the catches. The banksman said he poured paraffin oil on the bearings on the day before the accident but the soot was not removed and no cleaning of the axle was done. It was thought that the catches did not operate quickly enough to catch the cage and the catches should have been placed under the bottom of the cage.

The banksman was at his post by the lever of the keps which held the cage but he did not have the presence of mind to push the lever when the cage would have fallen about eight feet on to these. The engineman had been on duty from 5 p.m. the preceding day, no coal was drawn at night and at 7 a.m., the fireman was lowered down the shaft and at 8 p.m. eight workmen, no one came up the shaft until 5 a.m.. Beyond oiling the engines about 4 a.m. and occasionally looking at the two boiler fires, he had no work to do between 8 p.m. to 5 a.m. He would have gone off duty at 6 a.m.

As to the cause of the accident, Mr. Gerrard commented-

“The engineman made a pure mistake in starting the wrong way. He had lowered two cage loads of men immediately before and he must have stated rashly as he would have seen the cage going up instead of down. The men in the cage carried lights which could be well seen and the finger on the indicator would have showed him that he travelling in the wrong direction. The cries of the men and those of the banksman would have given him ample time to rectify the error.”

After the accident the Byrham's hook was replaced with an Ormrod's hook and there was a thought that the introduction of the safety devices could lead to carelessness by the enginemen. Mr. Gerrard thought that they should be introduced throughout the country and could and had saved a many lives. He commented-

“In my opinion detaching hooks should be required at all pits they should be supplemented by other safety catches, properly placed and not depending upon gravity alone, or by arrangements to shut off steam and apply brakes. I would not depend upon detaching hooks alone or upon visors or similar apparatus. Should

the cage be carried up into the headgear at full speed, I am satisfied detaching hooks require supplementary apparatus and visors require detaching hooks.”

As a result of the new Workman's Compensation Act a case was brought at Leigh County Court by the widow of John Seddon who claimed £250 compensation or three years loss of wages. After hearing about the defects in the machinery damages of £324 were awarded but the Company lodged an appeal which was heard before Judge Wynne Ffoulkes. The grounds for the appeal were that the jury brought in a verdict which was against the weight of evidence and that the compensation payment was excessive. The damages were upheld and the application dismissed with costs.

BRANCEPETH. ('A' Pit.) Willington, Durham. 13th. April, 1896.

The village lies between Bishop Auckland and Durham and the pit has been working for about fifty six years before the disaster. The colliery was owned by Messrs. Straker and Love and was one of a group of seven pits belonging to the firm at Willington, Sunnybrow, Oakenshaw and Brandon. The pit had been sunk about 1850 to a depth 240 feet and the Brockwell, the Jet and the 'B' or Seggar seams were worked at the colliery and a few weeks before the disaster, work in the Hutton seam had been discontinued. The explosion occurred at about 10 p.m. in the 'A' Pit which was- *'So destructive of life and property that it will henceforth be a landmark in the history of Willington.'*

The pit employed over 300 men and boys of whom about 30 worked on the night shift. The foreshift deputies went down about 3 a.m. and the ninety one foreshift hewers, went down at 4 a.m.. The putters, drivers, waggonmen and workers went down at 6 a.m. at 9.50 a.m. the backshift hewers went down to relieve the foreshift hewers who came to the surface at 11 am. At 4 p.m. the nightshift men, two hewers who were employed in the Seggar Seam, putters, drivers, water leaders, stonemen and shifters descended. At 9.30 p.m. the backshift hewers, 200 in number, relieved their mates who ascended at 10.30 p.m. The nightshift men repaired the mine and made it fit for the next shift and they came up at 12 p.m. The explosion occurred at 10 p.m. when there were the lest number of people in the mine.

The colliery was managed by Mr. R.L. Weeks who was agent for the Company. He had been in the post for thirteen years and had been instrumental in bringing in improvements to the working of the mine was held in high regard by everyone. He was described as 'every inch a gentleman' The acting manager at the colliery was Mr. Grieves who also had charge of the 'C' pit and the 'B' pit at Oakenshaw. Joseph Dowson was the foreshift overman and Thomas Laws the overman on the backshift. Mr. Laws' son was one of the last to be recovered form the mine and all the time he worked with the rescue workers.

At the time of the explosion, John Mould was the brakesman. He lowered the men into the mine at 9.30 p.m. and ten minutes after, while waiting for the signal to draw some men out of the pit, he saw that all was not right. There was no loud report but Mould was an intelligent man and heard a low peculiar noise. The time was 9.40 p.m.. At first he thought it was something to do with the boilers and went to investigate. The boiler attendant was not there so he blew the whistle to let him know that he was required and went up the pit heap. When he walked on the flat sheets he found that his foot steps were muffled by a layer of dust two to three inches thick and when he looked to the pit mouth he saw a cloud of dust rising. It then dawned on him that there had been an explosion underground.

When the boilerman came Mould sent him to the Mr. Dowson, the overman, and Dowson and Mould looked down the shaft. The lights that were usually seen at the bottom were out. Mould tried to signal down the shaft with the rapper. There was no reply and Mould ran the cage up and down the shaft to make sure that all was in

working order. All was in order and the overman got into the cage and was lowered to the bottom. Shortly after Thomas Laws came and he went down the pit. George Wilson, the rapperman at the bottom of the shaft, was brought alive to the surface. His head was bleeding and he was a very dazed. Mr. Grieves, Mr. R.L. Weeks and John Rutherford, the engineer came to the scene. A rescue party under the charge of Mr. Weeks went down the pit and went down the pit.

At the pit head, hundreds of people gathered and a solemn silence was over the crowd who waited patiently for the news that the rescue party would give them when they returned to the surface. The work of rescue was extremely difficult and hazardous. Nearly all the timber in the pit had been blown out and there were many large falls which blocked the way of the men and the ventilation in the mine. Mr. Weeks and others went down the Oakenshaw pit and opened the connecting doors and at once found that the atmosphere was full of afterdamp and they were forced to retreat. Mr. John Wilson, M.P. was in the rescue party and he discovered several of the victims. The treasurer of the Durham Miners' Association, Mr. J. Johnson, was in a party with Mr. Gilchrist of Brandon who had a narrow escape when he crawled over a fall and fell over the other side. He became unconscious after breathing the afterdamp and was attended to by Dr. R.E. Brown and taken home very ill. All the bodies were eventually recovered.

Those who lost their lives were-

Joseph Forster aged 40 years, a waggon way man who was single,
Ralph Lawson aged 60, deputy, married with a grown up family,
John Rogerson aged 66 years, master shifter, married with a grown up family,
Thomas Moses Nicholson aged 20 years, stoneman, married,
John Dowson aged 20 years, stoneman,
William Cooke aged 52 years, stoneman, married with a grown up family,
Henry Hodgson aged 32 years, stoneman, single,
Thomas Carlon aged 14 years, driver,
Bert Newall aged 15 years, driver,
Joseph Brigham aged 22 years, shifter, single,
Michael Turner aged 50 years, shifter, married with ten children,
John Jefferson aged 58 years, shifter, married with a grown up family,
Richard Ranson aged 15 years, pumper,
John Wearmouth aged 54 years, shifter, married with a grown up family,
George W. Lauder who was also known as Rutherford aged 39 years, stoneman,
married with five children,
William Laws aged 21 years, stoneman,
Tristram Spence aged 31 years, stoneman,
Charles Linton aged 34 years, stoneman, married with six children and
William Rawlings aged 50 years, stoneman, married with a grown up family.

Six others escaped with their lives. Of the thirty horses and ponies that were in the mine, 22 were lost and the task of bringing the dead animals to the surface was arduous and unpleasant. They had been dead for several days and putrefaction had set in. They were buried in a trench. While the work was going on, a Police sergeant noticed a lad with a sad look on his face at the pithead. The boy looked at the dead horse and said, 'That was my Galloway. The best I ever drove. The best in the pit.'

The Inspector Mr. Bain, commented that-

"The explosion was undoubtedly caused by firing a shot in the main engine plane and the management have now prohibited shot firing entirely on the main roads and are introducing the use of higher explosives for use in the caunches and drawing roads."

Roberite was the explosive that was selected. The Inspector went on to say-

“A considerable amount of gunpowder is still, however, being used in the coal and roadways and some of the seams connected with these collieries, but I hope to see the quantity again reduced before long.

Whatever his politics may be the average working miner is very conservative in matters which affect his work, and a change from gunpowder, to which he has been accustomed for years to an explosive, which had somewhat different characteristics and to which he is a stranger, is sure to be met with a certain amount of disfavour.

A little difficulty is experienced at first before the relative proportions of the different explosives to be used to do the same amount of work is thoroughly understood, the tendency being to use more of the higher explosive than is necessary, but when this had been mastered the higher explosives do their work well, and it is only reasonable that both owners and men should yield something in exchange for the greater safety there undoubtedly in the higher compounds that with gunpowder in mines which are dusty or which give off inflammable gas.”

A local paper commented-

“The disaster cast a gloom over the county but at the same time it gave another proof, if one were needed, of the fact that the hours of trial and difficulty as by noble heroism can be displayed by Durham Englishmen as by any soldier on the field of battle.”

MICKLEFIELD. Leeds, Yorkshire. 30th. April, 1896.

The colliery was the property of Messrs. Joseph Cliff and Sons and was opened out by this firm about 22 years before the disaster. There were two seams of coal being worked at the time of the disaster, the Upper, the Beeston Bed where the explosion occurred and to which it was confined, and the Lower, Black Bed seam. The coal in the Beeston Bed was mainly steam coal, hard strong, not friable and easily broken. The Section of the Beeston Bed to the south of the East and West Levels, in the Dip, was damp and that to the north of these levels on the rise although drier, was not fiery.

There were two shafts at the colliery, the upcast was sunk through both the Beeston and Black Beds and was used to wind men only. The downcast was sunk to the bottom of the Beeston Bed at 175 yards and was used for drawing coal and the winding of men. The access from the Beeston Bed to the Black Bed was by way of a drift out of the East Level about 320 yards from the downcast shaft.

The manager of both the seams was Mr. Charles Houfton who held a First Class Certificate and had been manager of the colliery since it opened. Mr. William Radford was the undermanager who also held a first class certificate and had worked as an undermanager for 17 years. Each seam had separate deputies, and each deputy had a portion of the seam assigned to him. In the ordinary course of events there was one shift for getting coal per day which went down at 6 a.m. and employed between 250 and 260 men and one shift for repairs which went down at 10 p.m. which employed 35 to 40 men. The colliery was worked on the longwall system.

The ventilation of the colliery was by a Waddle Fan which was at the top of the upcast shaft. The fan was 30 feet in diameter and worked at 40 revolutions per minute. It had been installed about 22 years before the accident and since then had been kept in good order and had been running continually. The Beeston Bed was divided into four ventilation districts which each taking its intake from the downcast shaft. These four intakes were on the West Level No.1 Rise Bord, The East Level and No.1 Dip. In the West Level and the No.1 Dip there were two air splits each and in the East Level and the No.1 Rise Bord there was one air split. The currents were carried round all the working faces and the air in the Black Bed was supplied down the Drift from the East

Level. Readings taken on the 30th. March by William Hargreaves showed the 79,000 cubic feet per minute were passing into the pit and 16,020 cubic feet to the West Level and its splits, 14,000 to the No.1 Rise Bord and its splits, 32,000 to the East Level and its splits including 8,100 cubic feet to the Black Bed and the No.1 Dip and its splits, 16,500 cubic feet.

There had been very little gas found in the mine before the explosion and there was no history of blowers. Hissing had never been heard in the mine. There were eleven cases reported in the previous five years and these were quickly dealt with by the ventilation. The last two of these were on the 17th. and the 23rd. December 1895 in James Plumb's gate in the Fast Level Division in the south east of the Beeston Bed and was coming from the same place on both occasions. There was a crack in the roof and it was cleared away within 12 hours after each discovery. No gas had ever been found in the New North Road of the West Level Division or in the place where the explosion originated. The place was closely packed and there were no cavities that would harbour gas.

Before the explosion the manager was never believed by the three deputies of the night shift that coal dust was likely to explode but it was a coal dust explosion that claimed the 63 lives. Dust was found to be on the props about one-sixteenth of an inch thick and it was admitted that there could have been accumulations behind the timbering on the sides and roofs of the roads. The hardness of the coal was not likely to produce much dust. The coal was loaded into open tubs at one end and taken to the bottom of the downcast shaft in trains of 22 tubs which ran five times each way during the coal getting shift. Lumps of coal fell out during the journey to the bottom of the shaft and there was dust from the shaking tubs during transit which would have been blown down the travelling road by the ventilation currents.

The coal was screened on the surface but the coal was holed in the dirt at the bottom of the seam and was filled into the tubs with forks with prongs about two inches apart which meant that no dirt was filled. The dust from the passing of the tubs and that which fell from them was usually cleared away every evening. The dust that was removed was mainly of shale dust but no coal dust had been removed from the Beeston Seam for six months previous to the explosion. The roadways but not the sides or roofs were watered but this was not done on a regular basis and the last time that this was done was two weeks before the explosion.

Safety lamps were used by the deputies during the examination of the seams before the commencement of a shift and before blasting operations. For coal getting operations naked lights were used and the colliery engineer, Mr. Childe, that these lights were unsafe.

At 7 a.m. on the morning of the explosion, three deputies, Lillyman, Hopkinson and Backhouse inspected every part of the Beeston Bed and the report was that it was clear of gas and the ventilation was good and the roof and sides were safe and good. Lillyman placed his mark in white chalk at the side of John Goodall's Gate and no fall or break from which gas might come was observed at that time. No coal was got on the 30th. April and the ordinary shift did not go down at 6 a.m. by a shift of 98 men went down the pit at 7 a.m. to repair roads, fill tubs and do other jobs. They took their naked lights with them.

The explosion took place about 7.15 a.m., within twenty minutes of the 98 men going down. Of these, 35 including one who came out just before the explosion survived. The remaining 63 were killed including a man named Whitaker who was recovered alive from the mine but later died in Leeds Infirmary. All the officials on the day shift were killed and this included the undermanager and every deputy. The bodies of these men were found in the cabin near the bottom of the shaft where it looked as though they were filling in the report books. Two bodies were found on the East Level between the

shaft bottom and the entrance to the Black Bed Drift. The falls of roof were very heavy and all the evidence pointed to the blast going from East to West.

Mr. Childe who was with the first rescue party to go in to the mine said about the discovery of the body of a pony driver-

“It is more than a probability that he had gone inbye with his pony and left it in the New North Road at the Gate whilst he went past No.1 Gate and beyond into the fresh air current to perform a natural operation and the by means of his naked light, fired a small quantity of gas.”

Mr. Childe then went on to say that this small explosion disturbed the coal dust that had gathered on props, bars and roofs and sides which fired at the flame of the explosion.

Mr. Wardell went down the pit and found falls and afterdamp but several bodies were found at the bottom of the New North Road. The working faces were in good working order and no trace of the explosion existed in any of them and it was believed that many of the men had never reached their working places. In the Old North Road the body of Westerman was found clutching a Clanny lamp that was in good order. The colliery was carefully inspected by Mr. Wardell and Mr. Childe, Mr. Parrott and Mr. Spencer. The last two were representatives of the Miners' Union and represented the workmen at the colliery.

There were 23 horses in the pit at the time of the disaster. Fourteen of these were in the stables and of these two were found to be alive with those on each side of them dead as was the horsekeeper. Two other ponies were later got out alive one near the place where Whitaker was found down the No.2 South Bord and the other nearly two weeks later down the No.1 Dip.

Those who died were:-

Noah Ball aged 37 years.

William Barker aged 40 years.

James Benson aged 56 years.

George Benson aged 24 years.

Fred Benson aged 14 years.

Elias Clarke aged 20 years.

William Dean aged 37 years.

Thomas Everett aged 27 years.

Sam Godber aged 16 years.

George Hayes aged 17 years.

William Herring aged 31 years.

Sam James age unknown.

Jos. Johnson aged 50 years.

Tom Longden aged 43 years.

Edward Maggs aged 26 years.

Henry Martin aged 56 years.

Harold Martin aged 56 years.

John Meakin aged 34 years.

Job Millership aged 52 years.

George Moakes aged 55 years.

Charles Noble aged 33 years.

Thomas Oakeley aged 50 years.

William Shelfdon aged 34 years.

Richard Shepherd aged 28 years.

Cvharles Shepherd aged 68 years.

James Shillito aged 50 years.

David Shillito aged 55 years.

John Shillito age unknown.
John Sutton aged N/A years.
Charles Swift aged 35 years.
Dan. Taylor aged 25 years.
William Varey age unknown.
John Wallis aged 48 years.
Robert Westerman aged 36 years.
Joseph Whitaker aged 55 years.
Amos Whitaker aged 32 years.
William Naylor Whitaker age unknown.
George Whitaker aged 22 years.
William Wilks aged 47 years.
Joseph Winfield age unknown.
Walter Winfield aged N/A years.
Herbert Winfield age unknown.
Edward Goodall age unknown.
Joseph Jackson aged 30 years.
Walter Jackson aged 28 years.
Rayner Scrimshaw aged 22 years.
Arthur Simpson aged 24 years.
John Simpson aged 26 years.
George Simpson aged 21 years.
Henry Talbot aged 41 years.
Sam Goodall age unknown.
Arthur Howson aged 10 years.
William Stead age unknown.
Jos. Wilson aged 60 years.
Alfred Wilson aged 19 years.
Harry Bellerby aged 19 years.
Fred Bellerby age unknown.
Frank Edwards aged 35 years.
Alfred Norton aged 28 years.
M. Rockyard age unknown.
James Wilson aged 30 years.
George Dunnington aged 20 years.
William Radford aged 56.

Those rescued were:-

William Holding
Tom Crossthwaite
William Dobson
Joseph Day
Richard Watson
Daniel Warwick Snr.
Lot Warwick
William Attack
James Edgington
R. Simpson
William Appleyard
Isiah Evans
John Render
Sidney Revis
Henry Hague

George Turner
Fred Shillito
Sam Marriot
Thomas Freeman
Reuben Winfield
Henry Rawnsley
Feilding Rawnsley
Fielding Pickard
J. Hardwick
George Hick
R.H. Newton
Caleb Stack
John Simmons
Joseph Wilson
Fred Nutton
Fred Atkinson

An investigation was carried out by Mr. Wardell and Mr. Thomas and presented to The Right Honourable Sir Matthew Ridley, Bart., The Secretary of State for the Home Department. They were of the opinion that the explosion did not origin at at the bottom of the shaft when a flame was produced since paraffin that was stored near the official's cabin was not affected by the flames. All interested parties were represented and the inquiry came to the conclusions that the probable cause of the explosion was firedamp coming into contact with a naked light and exploding and thus igniting the coal dust, that coal dust carried the explosion forward from its initial point, that naked lights ought not to be used in the Micklefield colliery, that further precautions than those adopted prior to the explosion to avoid dangers arising from coal dust, should be taken in the Micklefield Colliery and that no prosecution should be instituted against anyone in respect of the explosion.

The owners of the Colliery bought Routledge and Johnson safety lamps which was similar to the Muesler lamp for use in the colliery.

No.1 MAIN BRYNCOCH. Neath, Glamorganshire. 4th. August 1896.

The colliery was about three miles from Neath and was the property of the Main Colliery Company, Limited. This Company succeeded to the Dynevor Colliery Company who had worked the Dunevor Duffryn Collieries in the same neighbourhood for many years before 1889. Mr. H. T. Wales, mining engineer, was the managing director and agent for the company and Mr. Richard Thomas was the certificated manager with Mr. William Williams and the certificated undermanager.

The colliery consisted of two shafts, No.1, the downcast, 18 feet in diameter which was used for winding and pumping and the No.2 , 16 feet in diameter which was the upcast and was used for temporary pumping and the winding of water by barrel. The sinking of the No.1 shaft was started by the Main Colliery Company in May. 1891 and the Graigola Seam was reached in January, 1883 at a depth of 435 yards. The No. 2 shaft was sunk about the same time and was 412 yards deep to the same seam. The No.2 shaft was 670 yards to the south of the No.1 shaft.

The ventilation was produced by a Capell fan placed eight yards from the mouth of the No.2 shaft. The fan was 15 feet in diameter, 6 feet 6 inches wide and was driven by an engine which made 25 r.p.m. while the fan ran at 80 r.p.m. It produced 53,000 cubic feet of air per minute at a water gauge of 0.5 inches.

The sit of the No.1 Pit was close to the old Bryncoch Colliery which had been recently working a seam known locally as the Wernfraith which was bituminous coal at

a depth of 179 yards. The new pit passed through this seam and then the Three Feet Seam at 141 yards, 28 yards of shale and rashes, the Victoria or Tir Edmund Seam, black shale, cliff and rock before reaching the Graigola Seam which was made up of 1 foot of coal, 1 foot of clod a, 2 feet 6 inches of coal and another 10 inches of coal. Neither Tir Edmund nor the Three Feet seams had been worked here.

At Courtherbert Colliery, which belonged to the same owners, the Tir Edmund Seam had been worked to a limited extent and the Graigola extensively worked to the dip and with in a short time of the sinking of the new pits, a connection was made in this seam between these pits and the Courtherbert Pit which was 3,322 yards to the south of Bryncoch. Both seams were considered by the management to be 'fiery' and were worked with safety lamps. Gas had occasionally been encountered in the working. To the west, on the rise side of upthrow fault, the same seams were regarded as none-fiery and were worked with open lights.

Particular attention had been taken in laying out the workings. The regularity and straightness of the roads and pillar and stall workings was a feature that was all too frequently absent in these kinds of workings in South Wales. For the most part, the pillars had been made about 80 yards long by 30 yards wide while the stalls were generally double-roaded stalls, about 14 yards apart.

Up to three months before the explosion, no pillar working had taken place. About that time, the management decided to work away some pillars in a part of the mine 300 yards north east of the shaft to the rise of a fault and at the date of the disaster, one pillar had been finished and three others were in the course of being removed. The roof was a strong hard rock and had not fallen to any extent before that date, even in the largest area which was that which was formed by working the pillar between two large stalls. No gas had been observed in the pillar working and the air current which passed through the exhausted area was expected to dilute any gas which might have been given off when the roof fell.

There were two ventilation currents, one passing into the West heading and the other into the East heading. That to the West was split on No.2 North heading, one portion returning through the workings on the West side of the shaft to the South heading and from there, up that heading to the upcast shaft. The other portion of this current was joined by the current which entered the East heading from the shaft and the combined current ventilated all the workings on the North and East sides of the shaft where most of the work was being carried out.

Firedamp had been reported on very few occasions, the last being 25th. June when a fireman found a little in No. 4 S.E. On January, 16th., a slight explosion occurred when a shot of gunpowder was fired in a stall which resulted in injury to two the colliers who were working there. The fireman who examined the place before the shot was fired said it was clear but it was possible that he had not detected a small accumulation which was fired by the flame of the shot.

The seam was slightly inclined, not more than two inches per yard and the roof was remarkably strong. There had been no falls on roadways or in old stalls with the exception of where pillars had been removed and there was adequate ventilation of the whole workings which were rather damp with the floor being quite wet in places. There was no accumulated dry coal dust in the roadways, roof, sides or floor and very few timbers stood in the headings. The only places where there was any dust was in the rubbish which formed the gobs.

About 230 men and boys were employed underground, mostly on the day shift. The day before the explosion had been a holiday and on the fateful day there were less than the usual number in the mine. They went to work between 6 and 7 a.m., after the morning inspection. The inspection was made partly by the night fireman and partly by the day fireman. Nothing had been discovered and each fireman made his report to that effect in the book.

Mr. Williams, the undermanager, had been away for a week's holiday and had returned the previous day to be on duty on the day of the disaster. He descended the pit shortly before 6 a.m. and saw Elion Rowen, the night fireman, who reported to him that all was clear on the South and East sides. He also saw James Jones, one of the day firemen who told him that all was clear on the North and West sides. The night fireman left the pit and David Meyrick, fireman, came on duty. William James, who had been the undermanager for many years of an adjoining colliery, which had closed and was employed as a kind of undermanager with the special duty of examining the coal in the stalls.

Up to 10 a.m. work proceeded normally and nothing happened for any of the officials to suspect that there was any danger. The first unusual event was noticed by two repairers, David Harris and William D. Jones who were working in No. 1 N.E., a little above the fault that crossed the road. At about 8.30 a.m. when they heard the top 'working', a noise as if the roof was cracking and likely to fall, at the place where the pillar had been removed. Harris went to the place but found nothing wrong. As he knew that the roof was to be expected he went back to work. A little later he heard what he described as a small fall and about 10 a.m. a larger fall. Harris was just about to examine the place when he saw some colliers coming out of the working places which were a little further in where they were working out pillars. These men said the places were filling with gas and at least one of the lights had been put out by the gas. Harris acted promptly, hurried the men out and sent a haulier to warn the officials and workmen in other parts of the pit.

In a short time 176 men and boys were out of the pit which left 20 still down but at that time it was not known exactly how many were actually in the workings. It was believed that they were all out except for those in No.2 S.E. and those who were in charge and assisting men to get out.

William James gave his own account of events-

"I was in the pit at 6 in the morning. I was examining the coal. I went up No.1 N.E. about 7.30 a.m. I went to where the fall was expected and waited there about 10 minutes talking to the roadman, Thomas Phillips. I examined it back and fore. A few stones had fallen. I did not notice any work in the top (roof). I then went to the roadman in another stall. About 10.30, when I got to No.5 N.E., I met Richard Jones, who told me he had come to get the men out. I met David Harris at No.2 N.E. and asked him how the air was going, and he said 'going very well'. I met David Meyrick near the East heading. We went up the East heading 200 to 300 yards. We did not reach the fault. We saw a 'cap' on Meyrick's lamp and returned to the lamp station. Then someone said Lewis Jones and two sons were in No.2 S.E. I said to Meyrick, 'Let us go as fast as we can'. but Meyrick said, 'Let us have someone younger than you.' I am not sure whether Evan Jones or William Jones went with him. One of them had my lamp. I told Meyrick to send a message how it was there. In a short time I went in and saw no one but the two doorboys, Sam Harris and Gardellias Jenkins. I went down the South heading, passing the two doorboys who asked if they should not go out. I told them to wait until I came back. I was near the mouth of No.2 S.W. when I heard the explosion and was blown back towards the pit for a few yards. I lost myself a bit. I lay down a few minutes and then went towards the pit thinking no one else was alive but me."

During the time between the alarm being given and about 11 a.m., a labourer, William Jones, working in the No.2 S.E., and who was still down the pit when the explosion occurred, stated that he met Lewis Jones jnr. at No.2 S.E., coming out for a light, and they went towards the face together. On reaching a point 230 yards from the South heading, his lamp went out in the gas. Lewis Jones jnr. had left his father and brother near the face and he told William Jones that all their lamps were out. They

called to the men inside but got no answer. They went together to get fresh lights and seeing colliers going out of the South heading, borrowed two lamps and returned with a collier, Evan Jones. They returned but their lamps again went out at the same place in the gas. They called again and received no answer so they went back and were met by David Meyrick, William D. Jones and James Jones, each of whom had a lamp. William Jones took up the story-

"I told them to take care and not to take the lamp too high, and call on Lewis Jones (snr). Evan Jones and Lewis Jones, jnr., turned back with the three others. I went slowly to the pit in the dark and the explosion occurred when I was at the lamp station. I went to the lamp station and there, James Bowen, Thomas Phillips and Lewis Williams. Isiah Jones came after and we went up after the explosion."

Mr. Williams, the undermanager was in the No.1 N.W. when a boy came to him a little before 11 a.m. and told him there was gas in the East. Williams sent the men out from that district and went towards the shaft where he met David Harris at No.1 N.E. Near his door. Harris told him there was gas in the No.1 N.E. coming from where the fall was - between No.1 and No.3 in a stall. Williams and Harris had partially opened the door on No.1 N.E. after door gas in the heading above the fault. The gas was working out against the air. While watching the effect of opening the doors, they heard a noise which Harris thought was a fall but Williams recognised as an explosion. They saw no flame but felt a puff of wind. Williams said-

"I went as far towards it as I could, until I met the gas on the heading, inside the fault near the mouth of the stall. The air was fresh. I had a Clanny lamp with a shield on. I heard the explosion and Harris and myself went back into the pit. The lamp station was full of smoke. We met William James calling out, 'is there anyone alive there?' he was by the stables. We went to No.2 S.E., Harris and I. Some more men came soon after. In 10 to 15 minutes we were able to go into No.2 S.E."

About 27 yards further on, Williams found William D. Jones, the repairer who had been working with Harris and who had remained underground to help the men out, with a fractured skull. Between him and on a further 100 yards up the heading, they met Evan Jones walking put, James Jones sitting on the side of the road and David Meyrick lying on the road. All three were badly burnt. A further 150 yards in they found the body of Lewis Jones jnr.

Those who died were-

William D. Jones aged 26 years, repairer who was found dead with fractured skull,
Evan Jones aged 28 years, collier who died 24th. August from severe burns,
James Jones aged 51 years, fireman who died 5th. August from severe burns,
David Meyrick aged 56 years, fireman, who died 7th. August from severe burns,
Lewis Jones jnr. aged 25 years, collier who was found dead, badly burnt,
Lewis Jones snr. aged 54 years, collier found dead from suffocation and
Leysion Jones aged 21 years, collier found dead from suffocation.

Mr. Robson, H.M. Inspector of Mines arrived at the colliery at 4 p.m. and immediately descended the pit. The men's lamps were recovered and all the gauzes were found to be in good order but he thought that the explosion had been caused by one of these lamps being taken too far into an explosive mixture.

The inquest was held before Mr. Cuthbertson, Coroner and a jury at Neath Abbey on the 13th., 14th., and 27th. August. All interested parties were represented and the Hone Office was represented by Mr. Chester Jones, barrister, Mr. W.W. David, solicitor appeared for the owners and Mr. Isaac Evans represented the Miners.

William Jones was the only living person who was known to have been in the No.2 S.E. on the morning of the explosion. At the inquiry he stated-

"I know shot firing had been going on the No.2 S.E. and a shot was fired in the face that morning about 10 a.m. - three quarters of an hour before the explosion. James Jones, fireman, fired it. I saw him coming from the face. I heard the shot. He told me about the rubbish Lewis Jones wanted off. The shot had nothing to do with the explosion. I was employed discharging rubbish in an old stall. It had nothing to do with the face. I first mentioned about the shot and seeing James Jones, fireman, come out on the Thursday morning after the explosion. I saw the lamp getting dull and going out directly we got into the gas. Lewis Jones ran in the first time we went in. The second time we went in, I told them to be careful. Their lamps went out first and then mine went out. The gas had come out some distance between my first and second attempt Meyrick and the others hurried in, and I went out quietly. I met Meyrick and the others 10 yards from the South heading."

After hearing all the evidence and the Coroner's summing up, the jury found as follows-

"We, as a jury, find that Lewis Jones, senior and Leyshon Jones died through suffocation, but whether before or after the explosion there is no definite evidence, and that the deaths of David Meyrick, James Jones, William Daniel Jones, Lewis Jones junior and Evan Jones were caused thorough injuries received by the explosion which took place of August 4th., 1896, at Bryncoch Pit that the explosion was caused in the following manner: That a fall took place in the heading, No.1 North-East which caused an extraordinary accumulation of gas, and that the fireman and others endeavouring to warn the workmen still left in the inner working, accidentally causing the gas to be ignited by going through the workings with a partially protected Davy lamp, and that the jury have heard with satisfaction that the owners have already dispensed with the Davy lamp part protected and have adopted a safer lamp for future use, namely, the Cambrian Bonneted Fireman's lamp. The jury also wish to recommend to the owners a reconsideration of their method of working the pillars near faults, and that in future every precaution should be taken to detect any further appearance of gas. They also recommend that an effective method of surface communication should be made between Nos. 1 and 2 pits and also with Court Herbert Colliery. The jury are of the opinion that the greatest praise is due to the officials and the workmen who took part in the rescue efforts for their energetic and heroic conduct and they extend their deepest sympathy to the families and relatives of the poor men who died through the explosion."

Mr. Chester Jones concluded his part of the report by saying that-

"The evidence, on my opinion, disclosed two breaches of the rules., Firstly a breach of Special Rule No. 116, in that no book was kept, nor entries made therein, of the number of strokes per minute made by the ventilating apparatus and the pressure shown on the water gauge. As, However, the fan-man made reports at intervals and the ventilation was good and efficient, the omission to keep a book is only a technical breach of the rules, which might be considered of hardly sufficient importance to warrant a prosecution being instigated.

The second, and far the most serious offence, is the allowance of the use of lamps which if the conclusion I have arrived is correct, did not comply with the requirements of the 9th General Rule. Although, in my opinion, an offence had on this respect been committed, yet, as the efficiency of the partly protected Davy as a safety lamp is a matter for experts' opinion, I think there would be great difficulty in securing a conviction."

RIVER LEVEL. Abernant, Glamorganshire. 9th. December, 1896.

The colliery was one of a group of mine owned by the Aberdare Works and Collieries Company and was at Abernant near Aberdare. At about 3.45 p.m. on the 9th. December, an inrush of water occurred at the colliery and six men and boys lost their lives by drowning. The remaining one hundred and twenty men either made their way out or were rescued uninjured within two hours of the first alarm.

Richard Bedlington, one of the oldest mining engineers in Wales, was consulting engineer to the owners and Edward Morgan, a mechanical engineer, was the general manager with an experience of the collieries that went back to 1869. At the date of the disaster the certificated manager of the colliery was Rees Howells who held a First Class Certificate of competency and was also the manager of the No.9 Pit and Park Pit. He had been in this post for only ten weeks and therefore did not have an extensive knowledge of the collieries under his charge. Thomas Landeg was the certificated under manager and he had been at the colliery for many years.

Several seams of coal had been worked at the colliery and in 1868 there was sinking from the Nine Feet Seam, to the Gellydeg which was the lowest seam that was worked in the coalfield. There were three seams worked at the time of the accident, the Nine Feet, No.2 Yard and the Gellydeg and it was in the Gellydeg that the inrush took place. the coal had originally been worked by the pillar and stall method but it was changed to the longwall system and the workings extended on the rise from the boundary in a southerly direction for 1,540 yards to the boundary of a neighbouring Ysguborwen colliery. At the date of the accident the only workings in the River Level Colliery that were approaching Ysguborwen were some that had a full 56 yard barrier between them according to the plans and another part 400 yards on the East Side which had approached to within 8 or 10 yards from the boundary of the working plan. Theses places were driven in 1872, according to the plans and for many years, Messrs. Samuel Thomas and Company owners of the Ysguborwen Colliery had worked the seam. About 1892 they worked the coal on the dip portion and the colliery was finally abandoned in December 1895.

The Ysguborwen Colliery was a very wet one and while it was working, water flowed out of a level called the 'Drain Level' to the surface. Any water that was met with while working to the dip of the Drain Level was pumped to that level and there could be no doubt that when the colliery finished working the water accumulated in these workings. It was clear that, if there was any obstruction in the Drain Level, the water would fill the dip workings of the Ysguborwen unless it could reach a neighbouring colliery to the dip. It was evident that no such danger would occur if a sufficient barrier was left between the two collieries but this was no the case.

A rider on the empty plane was the first to notice the inrush when the trams on which he was riding were stopped by water running down the plane. He went to the bottom of the River Level pit and he and the hitcher immediately went to the surface. The manager and Mr. H.A. Phillips, a surveyor who had been working in the Gellydeg seam and had had to go to the surface to for something they had forgotten, descended the pit and the cage went into several feet of water at the bottom of the shaft. He returned to the surface immediately and got the manager, Mr. Howells. Both men went down the pit and entered the water which they found, was flowing down the engine plane. they were joined by David Evans, the fireman, who had been near the bottom of the shaft when the inrush was discovered.

It was found that they could not pass a journey of trams in the engine plane and realised that the men could only be rescued from the return air way. After taking steps to try to stop the water, they succeeded in reaching the engine plane by breaking down and air bridge and this made a way out for a large number of men who at reached that point by that time.

David Evans reached the No.5 West Level and warned a large number of men who were there and Mr. Howells went there as well and brought out the remainder from that

level. Before Evans left he attempted to reach the No.6 West Level but found that he could not do so because of the water. He had a son working there and did not know at the time whether he had escaped or not. If these men had not acted quickly more lives would have been lost. Twelve men were brought out of the No.5 West Level and they had to wade through the water which almost filled the road a very soon afterwards was filled to the roof. Several other men and boys made their escape from No.6 West Level which was the lowest point in the workings and they had to pass through a large body of water. They were not aware that they had left anyone behind at the time but in the course of the evening it became known that six people were missing all of whom, worked in the No.6 West Level.

During the night the source of the water was discovered. It was found to be flowing from the Ysguborwen workings down No.2 heading and steps were taken to enter the Drain Level when it was seen that the roof of this level was blocking it. When this was partially removed, the water took its normal course and stopped flowing into the River Level workings. It was then evident that the barrier between the two collieries which was supposed to be 11 feet wide was only a narrow strip of coal 2 to 4 feet wide on each side of the breach.

Mr. J.T. Robson, the Inspector was informed by telegram of the accident and reached the colliery by train in the company of Mr. F.A. Gray, another of H.M. Inspectors, at 12.45 the following morning. They examined the plans and heard from the officials that six lives had been lost. They went down the pit and found very little water was running down the dip and the water had reached a point a little above the No.5 West Level. It seemed that the six had not got out of the No.6 West Level but there was a possibility that some small portion of the workings could have been kept free from water by the compressed air at the end of a working. It was decided that an attempt should be made to try to get through the water and pumping operations should be begun at once and continued round the clock.

A diver was brought from Cardiff but after he had had the conditions explained to him he would not make an attempt to enter the workings. David Morgan, the Miners' Agent and Sir William Thomas Lewis sent to the Bute Docks for divers to go to the colliery and although these men made several attempts, the conditions were too difficult for them. The Inspector commented-

"It may not be out of place to state that there was a great danger incurred by these divers because had the air pipe (over 100 yards of which was used in the last attempts) been cut by a fall of roof or side, or dragged it over uneven surfaces, the diver at the end would have been instantly suffocated."

On the 23rd. September, the fourteenth day after the inundation the water in the No.6 West Level was pumped out and the bodies of the six were found together in a narrow airway which proved to be the highest point in the workings. It was evident that the water had not reached. It was evident that they had been drowned within a few hours of the water first coming in as a man's watch had stopped at 10 o'clock.

Those who lost their lives were:-

John Jenkins aged 52 years,
Thomas Jones aged 29 years,
J. Phillips aged 29 years,
Thomas Jenkins aged 14 years,
George Evans aged 14 years and
John Williams aged 13 years.

The adjourned inquest was held on the 20th. and 21st. January and it was brought out in evidence that a workman, John Hopkins who had been working on the dip side of the heading in Ysguborwen colliery which skirted the River Level barrier in 1892 had

'struck loose' into the workings of the River Level Colliery. the 'skip' where he was working was found to be 8 to 10 yards wide and 30 yards long. In describing the holing Hopkins described it 'as big enough to put my head through' both Samuel H. Hopkins and Mr. Evan Jones, manager and undermanager of the Ysguborwen Colliery, denied any knowledge of this hole but Hopkins, the collier, said he reported it to the Thomas Davies, the fireman but this man denied he was the fireman at the time although he admitted that he saw the hole. He tried to show that Taliesin Jones was the fireman but Jones gave evidence to the contrary.

The plans of the Gellydeg workings in the Ysguborwen colliery were deposited at the Home Office early in 1896 and on this, the workings at the spot where the hole was made were shown touching the boundary line. It was clear from an examination of the workings after the disaster that some coal had been taken away from the Ysguborwen side and therefore the plan was inaccurate as it did not show *'the boundaries of the workings of the mine or seam up to the time of the abandonment'* as was required by Section 38 of the Coal Mines Regulation Act, 1887 which was the Act that governed the colliery and the plans were deposited prior to the Act of 1896. The Inspector was of the opinion that no breach of the Act had occurred by any person connected with the River Level Colliery.

He went onto say-

"Whether criminal liability attaches to those responsible for the working of the Ysguborwen Colliery, in destroying the barrier and brought about this disaster, will doubtless be reported upon by Mr. Woodfall, barrister, who attended the inquiry on my behalf.

I think it well to mention that, although there is no legal obligation to provide a double road in the No.6 West Level, so long as the adequate ventilation of the place could otherwise be maintained, had there been such a double road through the fault, say, 30 yards above No.6 Level or what would have been better still, a road communicating directly between Nos. 5 and 6 Levels on the inside of the fault, the six men would almost certainly have got out."

After hearing the evidence at the inquest Mr. Woodfall stated in a letter to the Inspector-

"It appears to me that the the managers of the Ysguborwen Colliery committed a trespass, in the course of which they did act whereby loss of life was occasioned, and the fatal consequences of their act was one which was and ought to have been contemplated by them and assuming even that the trespass could not be established, that a legal duty lay with them to give notice to the Abernant people of the barrier having been cut away. I do not think that the managers of a pit can be heard to say that they had no knowledge of such an occurrence. No such notice was, in fact, ever given to the Abernant people.

I am of the opinion that the managers, Samuel Richard Hopkins and Evan Jones and the fireman, Thomas Davies have been guilty of culpable omission of discharge of duty tending to the preservation of life, and, consequently, of the manslaughter of the six men drowned.

I am informed that it would be difficult to obtain a conviction, because the recklessness shown is so common in mining. Whether a prosecution, even if unsuccessful would have a salutary effect appears to be a question outside the ambit of the report I am instructed to make."

BROADOAK. Loughor, Glamorganshire. 5th. January, 1897.

The colliery was the property of Samuel Thomas and the explosion took the lives of five men. The colliery was small and employed 70 to 80 men. Mr. Thomas was the manager who held a first class certificate and the undermanager was Mr. David Davies who held a second class certificate. The downcast shaft was 190 yards deep and the

upcast shaft 200 yards deep. The ventilation was by a Waddel fan, 20 feet in diameter which was placed near the top of the upcast shaft. The seam that was being worked, was the Five Feet seam of bituminous coal and was worked by the pillar and stall method. firedamp was produced and the mine was lit by locked safety lamps. The workings were dry and dusty.

On the evening of the 4th., a night shift had gone to work and the three or four men of this shift had ascended between 4 and 5 a.m. the following morning. They left seven men in the pit, six of whom were repairers and the other, the fireman in charge. At 5 a.m just as the day fireman ws about to descend, the explosion occurred. Five of those in the pit were killed and two others escaped unhurt. Two of these men were repairing on the Gelly slope.

The body of the fireman was found and the bonneted gauze of his Clanny lamp was found about 20 yards higher up the road. On the following Friday the remaining part of the lamp was found near the same spot.

The dead were named as-

David Lewis aged 52 years, fireman,
Thomas Bowen aged 26 years, collier,
Thomas White aged 45 years, collier,
Morgan Sanders aged 32 years, collier and
John Toulmin aged 38 years, collier.

After the disaster the inspection found that there were heavy falls of roof from the downcast to the foot of the incline and on the level from the top of the incline westwards. In other parts the falls were slight. All the main doors were blown away. Thick deposits of coked coal dust were found on the props and sides and face of the coal and everywhere there was a thick covering of coal dust.

The safety lamps of the four workmen were found locked and from the careful examination of the workings the Inspector was convinced that the explosion originated in the No.2 slope and that it was caused by the fireman opening his lamp. The explosion was intensified by the large amounts of coal dust that were present.

The jury returned the following verdict on the deaths of the men-

“We believe that the cause of the explosion was the opening off David Lewis’s lamp but not amounting to culpable negligence on his part.”

DOVER. Dover, Kent. 6th. March, 1897.

The Kent coalfield is bounded by Canterbury and Folkstone in the west and Ramsgate in the north east and extended under the Channel. The existence of the coal measures in Kent was postulated by de la Beche in 1846 and in more detail by Goodwin and Austen in 1856. It was supposed that Kent was on a a line joining the South Wales and Bristol coalfields in the west and the coalfields of north west France in the east. Between 1875 and 1874, a borehole was sunk at Battle but stopped at a depth of 1,905 feet Oxford Clay, when it was realised that it was sited too far south to strike the coal at economic depths. It was not until 1890 that the coal measures were proved to exist when they were struck by a borehole in the foreshore of the Shakespeare Cliff, one and a half miles south west of Dover at a depth of 1,151 feet. The borehole, 15 inches in diameter, was commenced by using a percussion system in 1886 and coal was struck at 1,140 feet the diameter of the hole then being 9 inches. From that point it was carried forward by a diamond tipped drill to a depth of 2,330 feet and finished with a diameter of 4 inches in February 1893.

Operations with a view to get the coal began by the Kent Coalfields Syndicate Limited in July 1896. The Brady Pit or No.1 shaft, 17 feet in diameter was sunk to 366

feet when it was stopped on the 16th. October 1896 by an influx of water and there was no adequate means of raising it at the surface. Shortly afterwards the Simpson Pit or No.2 was commenced 20 feet in diameter. This shaft had reached 303 feet when the water burst in. The hoppet was at the surface and the water rose rapidly allowing only six of the fourteen men at the bottom of the shaft to escape. The rest lost their lives.

At about 10 55 p.m. on the day of the accident 14 men were at work at the bottom of the No.2 Simpson Pit which was a sinking pit when the water broke in, lifting the bottom. The men had to climb on to iron rings within the timber which lined the shaft for 40 feet. At the time the hoppet, a large iron bucket that was commonly used in sinking operations, was at the top being emptied but the cries of the men were heard and the hoppet was lowered. On being raised three men were brought out safely. One was hanging on the rope just above the safety hook, one on the chains below and one inside the hoppet which had send in it to within one foot of the top.

The hoppet was again lowered with a torch lamp attached and when it was raised three men were brought put. Again the hoppet was lowered this time with one of the men who had got out, John Little, master sinker. They descended to the surface of the water and carefully made an examination in the hope that others might be rescued but nine could be seen. The water had rise 80 feet up the shaft and of the 14 at work at the time only six escaped. The rest were drowned.

John Little, one of the survivors, gave an account of what had happened. He said, "I was in the bottom on the south side, and my back to the centre of the pit. I and Scott were striking at a wedge or punch. I heard someone shout 'Lower the hoppet', then turned round and saw water and sand rising from the bottom. I made to the spare hoppet, there were a number of men around it, and standing on it I do not remember how, but somehow I found myself climbing up the rings, climbed up to the top one, the water rising after me. The bridge was over the pit top. William Bishop was below me and there was one in the hoppet. After the hoppet had been lowered and brought up three more men, I went down in it with George Holder the chageman we went to the water, each had a flaming torch lamp. The water was full of sand, boiling up, several boards were floating we looked carefully all over but saw no one, waited a minute or two and then were drawn up. About five minutes before the water broke in Bob Read and George Terry were striking at a punch in the north east quarter of the bottom, there was parting in the flooring, a little water came, it was shovelled up with the dirt, no further notice was taken."

On the following day the only available means of getting the water out was a water barrel of 400 gallon capacity and this was put into operation. pumps had already been ordered and this process was speeded up. The only boilers on the ground other than two portable engines were two boiler used by the Channel Tunnel Company.

On 16th. March, a body floated up and was recovered. It proved to be that of John Davis Barrs. He probably had hold of the rope but lost his grip. On 17th. March the pumps were finally got to work in the No.1 Pit and the drawing of water continued in the No.2 pit by barrel. As the water lowered time was taken to grapnel for the bodies and divers descended several times but found that all was covered by sand. Mr. G.P. Simpson the Managing Director, Mr. N.R. Griffith, the Consulting Engineer, Mr. Reid the Colliery Manager and Mr. Cousins for the Contract Company were unsparing in their efforts. On the 26th. March it was recognised that although they were within a few feet of the bodies, they would not be recovered until there was an increase in the steam pressure. The erection of the new boilers was pressed on and by 6th. April they were completed. On the 14th. April the remaining seven bodies were recovered from four feet of sand. It was found that there were large pieces of hard green rock which had been broken and a water feed was coming up under pressure in the north-east corner of the pit which was nearest the borehole. The water was charged with firedamp and the conclusion was reached that it was coming from a great depth, probably 1,200 feet.

Those who lost their lives were-
Samuel Wilmot aged 38 years, chargeman,
Robert Reed aged 54 years, sinker,
George Wigman aged 36 years, sinker,
Richard Brookwell aged 22 years sinker,
George Terry aged 22 years, labourer,
John Davies Barrs aged 24 years, hoppet steadier and
Henry Kitchen alias Newton aged 22 years, labourer.

Those who were rescued were-
John Little aged 37 years, labourer,
Samuel James aged 32 years, labourer,
James Scott aged 31 years, sinker,
William Walker aged 22 years, labourer and
George Brooks aged 21 years, labourer.
All the survivors were cut and bruised in their desperate struggle for life.

The inquest into the disaster was conducted by Mr. R.M. Mercer of Canterbury, Coroner for East Kent when the dramatic stories of the survivors were given in court.

William James Bishop said- "I went down the Simpson pit on the 6th. March at 9 a.m. with thirteen others, including my brother Charles, he was a native of Canterbury but I lived in Ramsgate for 18 years, he has been down the mines in the North of England. I had never before worked in the mines. The head man of the fourteen was Samuel Wilmot. The master sinker was George Holder, he came down after us and remained until a quarter past ten. I saw him trying the ground with a jumper drill. We had come to the hardest strata we had had to go through. We worked it with hammers and punches, as it was too hard for the picks. It took three men with sledge hammers to drive the punches into the ground. there were bore-holes in advance of where we were digging. This watch, which I had on at the time, has stopped at seven minutes past eleven. I set it by St. Mary's church clock the same night. Another man in the pit had a watch on but his and mine do not correspond. I and James were picking up a lump of stuff to chuck into the hoppet, when someone called out that the ground was rising, we dropped it. I think it was Read that called out, he ws working about two yards from me. The ground rose bodily just like opening a door, there was a tremendous inrush of water. I jumped for the rings on the side at once. There was no rope down the pit at the time we had sent the little hoppet up full of rubbish. I fell into the water twice before I got to the top of the rings when I had climbed as far as the brickwork and could go no further, the water came right up round me I turned me head round and fancied I saw a rope I saw the rope properly. I jumped and swam for the rope, and at length got hold of it, and was drawn to the top of the pit. I worked in the No.1 Brady Pit but was not there when the work was stopped on account of the water. The water came in there gradually we went down there so much deeper that the Simpson Pit."

George Brooks was in the bottom of the sinking pit working with Robert Read and they were striking a punch wedging the floor. George heard George Terry cry out 'Look up she's coming in', and saw the ground rising, and Samuel Wilmot say 'it's the water'. He saw the water coming in. It was gradual at first until it got a vent opened and the it rushed in. He climbed on the rings of the brickwork and then up the bell line, when the water drove men above the rings and saw the rope in the middle of the shaft and swung across to it and was drawn up.

James Scott, who had worked in the mines of the North of England most of his life, said the shaft was perfectly dry when they went down that night of the accident and we

saw no sign of water for two hours. One bore-hole tested by the master sinker which came up dry, about three quarters of an hour before the accident.

George Holder said-

"I am the foreman or master sinker. I went down the pit at 9.15 p.m. on the night of the accident and inspected the bottom of the pit all over. I had 14 men under my charge in the pit. I made a careful inspection and there were no signs of water. I relieved William Wigman, fellow master sinker. He told me that all was right, that one hole was a bit damp and he had dried it out. There were three boreholes in different parts of the bottom. I examined the two nearest to where they say the water first came in with a scraper which was in the hole at the time. The hole was about four feet nine inches deep. It was bored to the hard rock. I tested this about 9.20 p.m. I went up about 10.20 p.m. intending to take a jumper drill down to drill a shot hole, the ground was so hard. I was just about to go down about five minutes to eleven when the men shouted and cried out. I could hear the rush of water and see some lights. I helped to send the hoppet down, the rope slackened and I heard a cry 'Go on'. I shouted to the engineman to up to the top when it came up there were three men brought out. The hoppet was sent down again with a flaming lamp attached and this was put out when the hoppet was lowered into the water. On being drawn up three more men were brought out they were exhausted. Then John Little volunteered to go down with me. We were lowered to the water. It was thick with sand we remained long enough to rescue any one but there were none to rescue. I could not see then end of the air pipe which was 70 to 80 feet from the bottom. The water must have risen that height in about ten minutes. George Fisher was in charge of the pit top as banksman he said nothing to me about any hoppet coming up containing a little water. There were partings in the strata which inclined in a north-easterly direction. If there was any 'bleeding' it would be from the partings between the layers of the strata. I saw none. We had bored 17 feet 6 inches in advance of the bottom before getting to the hard rock, never less than 15 feet. It never entered my mind that the water would burst through hard rock. When sunk the Brady Pit we had a trickle of water below the hard rock. We sunk 60 feet below it, the water increasing until we were drawing only water and then we stopped. For the last 12 years I have been engaged in sinking in Yorkshire, Derbyshire, Nottinghamshire and South Wales. I left the colliery the same day at 2 p.m. when William Wigman took charge up to 9 p.m. I had charge from 6 a.m. to 2 p.m. The last shots that were fired prior to the accident were fired at about 12 noon. Three shots, 3 feet 9 or 4 feet deep, they were sumping shots."

During sinking operations, it was the usual practice to keep boreholes in advance of the bottom of the shaft, to gain information of the ground that was below. Alexander Reid, certificated manager told the inquiry- "I have had charge since the commencement of these sinkings about July 1896. The No.1 shaft or Brady Pit reached a depth of 366 feet 6 inches. The No.2 shaft or Simpson Pit is 138 feet 8 inches eastwards of No.1 centre to centre. This shaft was 303 feet deep when the accident occurred. Further to the east, 143 feet 4 inches, is the experimental borehole, it goes down about 2,300 feet. The shafts and borehole are in a line. Water stood in the borehole about 40 feet from the surface and about the same in No.1 pit. at the present time the water in the borehole is about the same level as in the shafts. Yesterday it was about 180 feet from the surface. On the 6th. of March I was down the No.2 pit twice, the second time a little after one o'clock. I examined the pit bottom very minutely. There were no signs of water whatever, I had been told by the chargeman that a layer of iron pyrites had been found three inches thick. I knew this was the base of the gault. We had it in No.1 pit. Below this pyrites was sandy clay and then a bed of hard rock. We had proved it by three boreholes, equidistant, in the form of a triangle. At one o'clock we were six feet from the rock. They had sunk 2 feet in ten hours following. I was

especially on the look out for water and the strata over the hard rock being of a slightly sandy nature, had any water percolated from the No.1 pit it should have shown in the boreholes and when we entered it. Our intention was if the water had shown itself in these boreholes, to plug them and suspend the sinking for a time. We had discussed it. We started boring 20 feet from the hard rock. My instructions were perfectly clear that on the first sign of water the men were to be withdrawn. There was no sign of water, that I was notified of until a few minutes prior to the accident. The hard green-sand rock in the No.1 Pit was three feet thick. I heard of the accident when in bed at home at 11.15 p.m. by telephone. I got to the colliery at 11.50 p.m. and went down the shaft with the chargeman at 12.15 the water was 174 feet from the surface showing a depth of 29 feet. It is quite certain that the water came in at the bottom of the No. 2 pit. In the No.1 pit it percolated in but in the No.2 pit it burst in suddenly. I attribute it either to a direct upwards pressure on an exposed area of a portion of the rock underlying the bottom of the pit, or to a fault in the rock. To break that strong rock there must have been a tremendous pressure on it, and to get the pressure on the rock you must have a large exposed area, acted on by water. When we sunk through the hard rock in the No.1 pit there was no water I telegraphed to London that we had gone through rock and there was no water. The men were standing on the sand and it was perfectly dry, after going a foot water percolated through we carried the shaft 60 feet below the hard rock, the quantity of water gradually increasing until it became so much that we could only wind water and we stopped. For some time we drew water by barrel, allowing a certain quantity for lodgement. Then we allowed the water to rise 40 feet from the surface. An hour and a half after the accident the water in the No.1 shaft had lowered from 40 feet to 167 feet. The difference had gone to the No.2 pit. It there had been an upwards pressure independent of No.1 pit to give the No.2 pit the first heave, then the No.1 pit water flowed. We never assumed the possibility of a cavity under the rock. There was no secret about it. The matter was discussed with the chargemen and everyone. In fact when we put down the three boreholes, the chargemen were so confident, they thought one was sufficient. we had no anticipation of danger. If water had been found in the boreholes they would have been plugged up it was the wish to have the No.2 pit dry. The temperature of the water averaged 72 degrees Fahrenheit. This was due to the fact that the water came from either a great depth or from chemical action. I think it was the former. When Wilmot, the temporary chargeman, saw the little water bleeding from the strata he ought to have shouted up the pit to Holder the chargeman. That warning, if taken notice of, might have saved the men."

The jury brought in the following verdict-

"Accidental death by drowning whilst working in the Simpson Pit on the 6th. March the inrush of water having, in the first instance, come from the borehole, and that thereupon the water from the Brady Pit sought its level by entering the Simpson Pit.

They added their opinion that it would have been better to clear the Brady pit of water before starting the Simpson Pit also that the conduct of John Little, one of the rescued, in descending the pit in an endeavour to rescue others, was deserving of great praise."

Production from the Dover shaft of the colliery was commenced in 1912 and the colliery ceased production in 1915 due to flooding.

DEVON. Clackmannan. 26th. March, 1897.

The colliery was the property of Alloa Coal Company and was one of four collieries owned by the Company. Six lives were lost when there was a rupture of a door or valve in a dam and the men were drowned. Mr. A. Roxburgh, a partner in the Company, was the General Manager for all the collieries, a position he had held for the previous twenty three years. he held a certificate of competency as a mine manager but had never

acted in this capacity. Mr. James Fyfe was the certificated manager of the Devon Colliery and had held the post since March, 1896. Before this Mr. H. Nisbet was the manager and he was then the manager of the Leven Colliery in Fife.. Mr. Roxborough's assistant was Mr. John Orr who acted a surveyor to all the collieries owned by the Company.

The winding shaft was sunk to the Lower Five Feet Sea, at 104 fathoms, passing through the Upper Five Feet Seam which lay 55 fathoms higher. the Upper Five Feet Seam was not worked directly from the shaft but was won from the level of the Lower Seam at the shaft by a level stone mine cross-cutting the metals of the dip. Both seams were worked on the stoop and room system. Pillars of coal were formed in the Upper Five Feet and they extended for some distance on other side of the workings. Water was encountered in these workings and as the means of dealing with it were not effective, it was decided to abandon the mine for a time. The feeder of water was not great and amounted to about 33 gallons per minute.

Before the Upper Five Feet workings were abandoned, a bore was put down to the Lower Five Feet, not from the lowest point in the seam since this had already filled with water, but from the face of a level stone mine driven forward above the level of the water as far as the workings had extended in the coal seam. The intention was to drain the water from the Upper to the Lower seam where the pumps were to be provided. The bore was three and a quarter inches in diameter and 230 feet deep but was not tubed. When the bore was put down the workings in the lower seam had not reached the point where it penetrated the seam but when the dook or main dip road in the Lower Five Feet reached the vicinity of the bore, its approximate location was determined by surveys and preparations were made for tapping it.

A level in the coal was driven to the right from the dook in the direction of the bore. This level was about 6 feet wide and 4 feet 6 inches high and when it had been driven 12 yards, a dam was built. It was constructed of bricks and cement and was let into the sides, roof and the floor. It was arched, the convex side towards the bore. The dam was 3 feet 3 inches thick and it had three openings., one a 4 inch iron pipe near the top right hand corner. This was continued as a 5 inch pipe to a Moore's hydraulic pump, 92 yards from the dam by the side of the dook and about 53 feet above its level. It was intended to act as a conduit for the water behind the dam to the pump. This pump was capable of delivering 2 to 300 gallons per minute. A valve was fixed to the 4 inch pipe, close to the dam on the outside and a similar valve, with a short length of pipe, was lying at the pump ready to be fixed to the end of the 5 inch pipe.

Another iron pipe of 14 inches diameter was placed near the bottom left hand corner. this pipe was to allow water to escape after the bore had been reached and while the door was being placed in a position and screwed up. The third pipe came through an opening in the centre of the dam, 2 feet 6 inches square tapering to 2 feet 3 inches square next to the dook. this opening was strengthened with wood. When in position, there was an iron plate next to the water, then 3 inches of wood made up of three planks placed horizontally and three placed vertically and held in place by nails through the iron plate. There was an eye-bolt was fixed near the centre of the door to which a chain was attached and two handles on the outside of the door to place it in position.

When Mr. Nisbet left the colliery, the Upper Five Feet near the borehole had been abandoned, the borehole was completed and the workings in the Lower Five Feet had advanced towards it. The level from the dook had been driven for 12 yards, the dam was built, the small pipe fixed in it and the door was provided for closing the manhole. Mr. Nisbet stated that he would have preferred to drive a level stone mine from the pump to the bore or to move the pump down the dook to the level of the bottom of the bore. The advantage of either of these plans was that the water flowing from the bore would run direct to the pump without the need for a dam.

When he left the colliery it was his intention stopping the vertical bore inside the dam by a horizontal bore. The horizontal bore was plugged and hole bored through and a pipe inserted. A cock on this pipe would have controlled the flow of water so that the pump could deal with it. If this operation had been successful the dam would not have been used. Had the plan failed and the horizontal bore failed to be plugged, then the dam was to be used with the exception of a small water pipe which would deliver the water to the pump. Mr. Nisbet stated that he did not intend to put the full pressure of the water on the dam. He did not think the door was strong enough to resist the water.

When Mr. Fyfe took over the management, Mr. Nisbet remained at the colliery for a fortnight to acquaint him with the job. There was no satisfactory exchange of ideas as to how to the water from the upper to the lower seams and Mr. Fyfe seemed to have considered the dam and its appliances in a different light to Mr. Nisbet.

Mr. Fyfe continued the level in the Lower Five Feet looking for the borehole but without success. There was some doubt that the borehole had reached the Lower Five feet and a stone mine was driven into a seam called the Mosie which lay 23 feet above the Lower Five Feet and the search for the borehole continued. Horizontal bores were put out in the vicinity of the vertical borehole and then the coal was removed. The waste was brought in hutches through the large opening in the dam.

While the search was going on, shots were fired inside the dam, some as great as three and a half pounds of gunpowder. When these shots were fired, as was the custom to place the dam in such a position in the large opening of the dam, that it could be easily be drawn forward from the outside, in the event of the shot liberating water. On one or two occasions the shot wedged the door firmly in the hole and force had to be used to displace it.

In searching for the bore inside the dam, 9,000 cubic feet of mineral was extracted. Part of this space was occupied by buildings put in to support the roof but the free space was calculated at 6,000 cubic feet. Part of this lay below the level of the small pipe in the dam but the greater part was above this level.

The miners, John Nichol and John Hunter were employed in looking for the borehole on the day of the accident. Hunter was the only survivor of the disaster. They started their shift at 10 p.m. on the previous day and about 4.15 a.m., the bore struck by a pick at the highest point in the excavation. Water started to flow, at first just a little and then quite freely. Hunter and Nichol retired, drawing the door into position. Peter Allen, the oversman, was sent for and four other men, Charles Taylor, roadsman, David Allen, roadsman, George Blair, fireman and William Grant, haulageman came to help. The door was foxed in place and screwed up tight. The work was completed about 4.45 a.m., and the large pipe was closed by screwing up a blind flange, which was already in position but not screwed up, outside the dam. This work was completed at 5.15 a.m.

During these operations the small pipe remained open and after the door was in position and the large pipe closed, it delivered water up to the pump where it was seen flowing by Thomas Dawson, foreman. A few minutes before the accident Peter Allen closed this pipe by shutting the valve on it at the dam. At about the same time, he instructed John Hunter to look at the end of the pipe near the pump to see if any water was being delivered. Hunter went to the pipe and found no water coming from it. He was returning to the dam and was near the entrance to the level when the door collapsed. He was knocked down by the rush of water and had great difficulty in escaping.

The flow of water continued for 74 hours and the whole body of water was transferred from the Upper Five Feet to the Lower Five Feet. No one was able to approach the dam for some weeks and the pump was drowned on the day of the accident. Attempts were made by divers to recover the bodies but this task proved too difficult and dangerous. The bodies were recovered on 30th. April and 1st. May. Five

were found in the level between the dam and the dook and one in the door, 25 yards below the level.

Those who lost their lives were-
John Nicol aged 45 years, miner,
Peter Allan aged 42 years, overman,
David Allan aged 29 years, drawer,
George Blair aged 46 years, fireman.,
Charles Taylor aged 57 years, roadsman and
William Grant aged 22 years, haulageman.

Although the Moore's pump was drowned on the day of the accident, it continued to work under water for three or four weeks but eventually stopped as the pipes were crushed. After it broke down, water chests were used and the mine was cleared by the 30th. April.

Water chests used for taking water out of the dook had been left standing in the dook opposite the level leading to the dam had it was thought possible that some of the men might have escaped if there had not been for this obstruction. Mr. Atkinson, the Inspector made a full inspection of the mine after it had been drained and found that the brickwork of the dam was practically intact but the wooden framework into which the door fitted, was damaged. The top portions was torn off and found clear of the dam, the side portions were partly torn away. The bolts were bent forward. The door had been forced through the opening and was found in the level near the dook. The outside planks of the layer of three and tone of the handles had been torn off. It was bent out of shape from the pressure to which it had been subjected. The top had been forced out which allowed it to move outwards without from top to bottom.

A public inquiry into the disaster under the fatal Accident (Scotland) Act, was held before Tyndall Bruce Johnstone, Esq., Sheriff Substitute of Clackmannanshire in the Court House at Alloa on the 17th. May. When all interested parties were represented.

Mr. Atkinson told the inquiry that when the pipe was closed the air pressure behind the dam would build up as the water came in. The Inspector thought the responsibility for the accident rested with Mr. Fyfe for not satisfying himself that the strength of the door was sufficient for the use to which it was to be put.

After hearing all the evidence the jury returned the following verdict-

"That John Nicol, Peter Allan, David Allan, George Blair, Charles Taylor and William Grant met their death on the 26th. day of March, 1897, in the Lower Five Feet seam of the Furnacebank Pit, Devon belonging to Alloa Coal Company and that the accident was caused by the bursting out of the manhole door of the dam there, owing to undue pressure of water from the Upper Five Feet seam and that this pressure was caused by the closing of the valve on the four-inch discharge pipe leading from the dam to the pump.

Mr. Atkinson commented-

"The degree of blame attaching to Mr. Roxborough in connection with the accident this somewhat difficult to determine. I have always found Mr. Roxborough most painstaking in his general direction of the Collieries and anxious to prevent accident, and for a gentleman in his position giving much attention to minute details, but it is probable that this misled Mr. Fyfe, who, looked upon him as a mining expert, did not exercise his own judgement to the extent that he would otherwise have done. On full consideration I do not think Mr. Roxborough's judgement can be considered sufficient in a matter of this kind, and he should have made this plain to this managers, and if he had any reason to doubt their competency to deal with the matter he should have called in an expert."

EAST HETTON. East Hetton, Durham. 6th. May, 1897.

The colliery was the property of Walter Scott Limited and water entered the workings from the Cassop was of the Harvey Seam when the working of the Cassop colliery were holed into. Ten men lost their lives. The accident occurred at 3.30 a.m when only a few men were in the pit. Had it occurred on the day shift the loss of life would have been far greater.

The first intimation that anything was wrong was one of the chargemen noticing that some water coming out of the face of some longwall workings in the Harvey Seam about a mile north of the winding shaft. steps were taken to warn the men who were in the workings at the time and it seemed probable that most of them would have got out if they had stated as soon as the warning came. As it was they stopped to put on their clothes but two men did manage to save them selves by keeping hold of the rope on the main haulage road and manager to get through the water even though it was up to their necks. The others appeared to have turned back on seeing the water and tried to come up another road but the water rose so rapidly that they were unable to get through.

On hearing of the accident Mr. Tate, the agent and Mr. Chipchase, the manager along with the overmen, deputies and several workmen quickly descended the pit. They found that the water was already three feet deep of the flat sheets and it was impossible to get into the workings. It was found that the water had gone down in the Old Cassop shaft which was a few hundred yards from the longwall workings in the East Hetton Colliery. It was known that the Five Quarter and the Main Coal seam had been worked at this colliery some years previously and it was decided to try to fill in the shaft and stop the inflow of water. To do this a large engine house that was nearby was blown down and the debris put in the shaft together with large quantities of lime, clay and anything else that was available. At the same time, water tanks and the pumping operations at East Hetton were kept running at full capacity and after a few hours the water level started to go down and that in the Cassop shaft stayed the same, indicating that the plugging operations had been successful.

Owing to the irregular gradient of the roads it was slow work getting the water down and operations were further slowed when gas was encountered and had to be dealt with at various points. The water had filled many of the roads to the roof and the ventilation had been interrupted. Every effort was made at great personal risk by the explorers which was made up of the staff of the colliery, mining engineers and managers from surrounding collieries and representatives of the workmen. It was hoped that there would be men that had survived but the slow rate at which the water was falling and the gas that was found did not leave the explorers with much hope of fining any one alive but on the morning of the 10th, Mr. Chipchase heard something moving in the water and rushing in, found a man making his way out. It was the deputy, Wilson, who had been imprisoned since 3 a.m. on the 6th., a period of about 100 hours.

He had found him self hemmed in and had climbed on the wood work supporting one of the horizontal sheaves connected with the haulage arrangements. The water reached about 3 feet deep underneath him and stayed there. This sheave was fixed on a piece of high ground, and although the water was as high as the roof on both sides of him, there was enough air coming through for him to breath. He was very weak from fatigue and lack of food but after medical care he returned to work three months after the disaster as if nothing had happened. It seemed possible that he had either been unconscious or asleep for most of the time and he had lost track of time completely thinking that he had been in for only 24 hours. Wilson was indeed a lucky man as he had been the last person brought out alive after the Trimdon Grange explosion in 1882.

The first of the bodies were brought on the 12th. and 5 more on the 13th. but it was until the 26th. that the last was recovered from the mine. The Inspector, Mr. Bain, commenting on the rescue operations, said-

“I cannot speak too highly of the energy and resourcefulness displayed by all classes of persons during a very anxious and dangerous time when every one did his utmost, it would be invidious to mention anyone in particular. Mr. Tate, Mr. Chipchase and all the colliery staff and their workmen, as well as the neighbouring viewers were constantly on the spot. Mr. Wilson, M.P., Mr. Johnson and other officials of the miners’ union took an active part in the exploration and Mr. Plummer, Mr. Walker and myself were constantly at the mine.”

Those who lost their lives were-

John Garside aged 51 years, stoneman,
Thomas Hutchinson aged 49 years, stoneman,
William Hall aged 50 years, shifter,
Matthew Robinson aged 26 years, shifter,
Anthony Gibbon aged 41 years, shifter,
Thomas Roney aged 58 years, shifter,
Edward Smith aged 26 years, shifter,
John Raine aged 63 years, waterman
Edward Pearson aged 50 years, waterman and
James Oliver aged 42 years, waterman.

The resumed inquest was held under the direction of Mr. Crofton Maynard, H.M. Coroner for the Easington Ward, in the National School Room at Kelloe on the 1st. September 1897 and lasted for two full days. All interested parties were represented and it was apparent to everyone that the water had come from the Cassop Colliery, but for some time the absolute reason could only be conjecture.

There had been a great delay in reaching the point where the holing took place owing to the heavy falls which had taken place and there were many faults that crossed the road near the face. More than a thousand tubs of debris were removed and at last on August 18th., the holing was reached and there was then no doubt where the water had come from. It was seen that a clean holing had been made in to some old workings coming from the direction of the old Cassop shaft which was about 300 yards away.

Before starting to work this coal, the colliery company had made great efforts to get information about the old workings. Plans of the Five Quarter and Main Coal were found but there was no plan for the Harvey Seam and from various statements from people who had worked there, it appeared that only a short distance of the seam had been driven into. Mr. Bell who was for many years the Inspector for the District had been connected with the Cassop Colliery 30 years before had a word with Mr. Tate before workings were commenced in the seam and drew a circle of radius 300 yards from the Cassop pit on a plan and said that if they were outside the circle then they would be safe and with taking the precaution of boring they might go a great deal nearer. A bore hole was put in on the east side nearest Cassop to prove the position of a fault which according to the plans of the Main Coal and the Five Quarter was shown at this point, this bore hole was not used to look for old workings and was not driven in accordance with the regulations as no danger was anticipated from water in old workings.

After a careful hearing and consultation for about an hour the jury returned the following verdict-

“We find that Thomas Hutchinson and nine others accidentally lost their lives in the Harvey Seam at East Hetton Colliery by an accidental inrush of water from the old workings of the Harvey Seam at the Cassop colliery into the Harvey Seam at the East Hetton Colliery on the morning of the 6th. day of May 1897. further, we

believe that Messrs. Chipchase and Tate did their best to find the plans of the workings of the old colliery and we believe that they used every precaution for the safe working of the East Hetton Colliery, and we think no blame was attached to one or either of them."

SNAEFELL LEAD MINE. Laxey, Isle of Man. 10th. May, 1897.

The mine was on the eastern flank of Snaefell about three quarters of a mile from the summit. A rough cart road connected it to the village of Laxey about four miles away. The top of the shaft was 908 feet above sea level. The property belonged to the Crown but the mine was leased to the Snaefell Mining Company, Limited which had worked it for many years. Mr.. John Kewley was the resident agent of the mine and Mr. Frank Rediccliffe visited it every month in his capacity of consulting engineer.

The vein that was worked at the mine had a strike which was approximately north-south and a average dip to the east of about fifteen degrees from the vertical. It width varied form 6 inches to 40 feet and consists of galena, zinc blende, copper pyrites, some iron pyrites, pyrrhotine, pearl spar and calc spar. The surrounding rocks are generally composed of clay-slate which was known locally as 'Barrule Slate' and are considered to be of the Cambrian or Silurian period.

The mine was worked by one shaft, 171 fathoms deep measured along the dip, which followed the dip of the main vein In most places the sides required to be supported by timber which was arranged to form a series of rectangular frames. Each frame consisted of two long pieces of 8 inch by 8 inch timber which were called wall plates and supporting two end-pieces. The space enclosed by this rectangular frame was divided into three compartments. the first No.1 was for winding, the second contained a ladderway and the third took the pumping machinery and the compressed air pipes for the rock drills. There could have been planks or lagging around the outside of the frames.

The winding compartment was lined with planks nailed to the successive frames at distances varying from 3 feet 6 inches to 6 feet apart or to the cross pieces, so the winding shaft could be compared to along box made of planks nailed to strong ribs. Part of it had a thicker lining than the rest to provide for the wear and tear caused by the bucket or kibble as it went down what was a particularly steeply inclined wooden trough..

The middle compartment in which was the ladderway was divided by horizontal platforms, called sollars, 10 to 50 feet apart and these were connected by sloping ladders. There was man hole in one of the platforms to give access to the next ladder. There was a close partition of planks between the winding compartment and the ladderway, the ladderway was separated from the pumping compartment merely by cross pieces which served to prevent a person standing on the ladder platform from falling into open space at the side. The pumping space contained the main rod for the pumps, the rising main and two pipes for conveying compressed air.

At distances of 20 to 30 yards, horizontal tunnels, or levels, had been driven out and these were the main roads of the mine. Here and there these were connected to intermediate shafts called '*winzes*' which served as ventilation and for access to the ladderways. Sometimes the roof and sides of these levels had to be supported by timber whilst in other cases the rock was firm enough to stand for many years by itself.

The valuable portions of the vein were being removed by a method which was known as '*overhand stoping*'. The work of excavation, whether for driving level of for '*stoping*' away the vein, was done partly by hand and partly with the help of machine drills driven by compressed air. The sole explosive used i the mine was gelatine dynamite.

The ore and any waste material not used for filling exhausted workings were taken in little wagons, pushed by hand, along tram roads in the levels and were tipped when they got to the shaft. Here the mineral was shovelled into a wooden bucket, the kibble, in which it was slowly dragged up the shaft. The kibble held 8 cubic feet of ordinary ore which weighed about 7 to 8cwt. and 5 to 6cwt. of rock waste. The kibble took one and a half minutes to travel from the bottom of the mine to the top, and allowing for stoppages in loading and unloading, it made about 12 journeys an hour. Four and a half tons of mineral or three and half tons of waste were raised in this period. Even at the time this method of winding was recognised to extremely old fashioned even though it was the same method that was used at the adjacent and well-known Laxey mines.

The upper parts of the mine were kept free of water by a drainage tunnel, and 'adit' and the working that were far below it' level, were drained by means of a force pump and lifting pumps placed in the shaft and worked by a main rod, driven by a waterwheel at the surface.

The ventilation to the min was in the main, natural, in other words the miner had to depend on natural air currents which entered the mine by the changes in atmospheric pressure at the surface an in the workings of the mine. A few years before the disaster, work to improve the ventilation was carried out. The end of the adit was connected to a sloping chimney, 136 feet high erected along the hills hillside. This created a difference of 96 feet between the top of the main shaft and the pint where the air came out of the chimney. The air current was controlled by a door in each level, close to the shaft. The air generally went down the main shaft to the bottom of the mine and up through various winzes to the adit level and from there to the chimney. the natural current was supplemented by the air escaping from the rock drills after it had down its work.

The men had to ascend and descend the mine by ladders. It took about a quarter of an hour for a young active man to go from top to bottom and at least half an hour to ascend. The older men climbed much slower than this and the average ascent lasted about an hour. It was estimated that in an 8 hour shift, 12.5% of the men's time was spent on the ladders. In 1893 the mine had employed 79 men underground and 59 on the surface, a total of 138 but in 1886 the mine employed 30 men below ground and 16 above ground, a total of 46.

Commenting on the state of the mine before the accident the Inspector, Mr. C. Le Neve Foster, said-

"From the inspectorial point of view, the mine can scarcely be said to have a good 'record', if I may use a common expression of the day I have had to make complaints about the ventilation upon various occasions, and, indeed, in two instances I have been officially instructed to take legal proceedings. However, in justice to the Mining Company, I will not insist upon these past offences, as the wooden chimney to which I have alluded materially improved the position of the affairs. At all events during the few days immediately preceding the accident, the ventilation of the mine was in a condition complying with the present vague working of the Statute."

On Wednesday 5th. May, the mine was inspected by Captain Reddicliffe, the consulting engineer for the Company. (The work captain denoted the foreman, agent or manager of the mine.) and he found everything in good condition and everything was satisfactory. The Assistant Inspector visited the mine on the 7th. May, which was three days before the accident and made a thorough inspection. He reported in writing to the Inspector that the ventilation was very good and that, with a few trifling exceptions, due attention had been paid to the regulations concerning timbering, explosives, ladderways, fencing of machinery and the fencing of dangerous openings and gave the mine a clean bill of health.

Captain Kewley, who accompanied Mr. Williams did not go underground on Saturday but from the evidence that was presented at the inquiry, everything was normal.

A little after 6 a.m. on Monday, 10th. May, the morning shift consisting of 35 men, entered the shaft and began their descent by the ladders. Shortly afterwards, several men came to the surface in an exhausted condition, saying that the mine was full of foul gas which so deprived them of their strength that they could scarcely climb the ladders. These facts were reported at once to Captain Kewley who immediately sent a message to Laxey asking for assistance before descending the shaft to try to find out what was going on and to rescue the men who, he believed, had been overcome by noxious gases. He met a few men almost dead-beat, trying to make their way up and between 45 and the 60 fathom levels, he came across others, alive but unconscious.

Efforts were made to improve the ventilation and on his orders, holes were punched in the compressed air pipes and this improved the air to some extent. It was obvious that the rescue of any one from such a shaft would be a difficult and dangerous task. The unfortunate men had to be dragged from platform to platform with the help of ropes and through the manholes which measured only 22 inches by 19 inches. The rescuers themselves were in a foul atmosphere and were beginning to feel its paralysing effect.

As has been mentioned the ore and rock were drawn to the surface in a kibble but in cases where there had been severe accidents a special box, six feet long and just deep enough and broad enough to take a man was used to get them to the surface. This was used by volunteers who had come to the mine from the Laxey mine, three survivors were rescued in this way and dragged from the shaft by the winding engine.

The rescue work went on until five in the afternoon when James Kneale, the last survivor was brought to the surface. by this time the rescuers were thoroughly exhausted. Dr. Miller of Laxey went to the mine when he heard of the disaster and gave medical aid to the sufferers, several of whom were still unconscious when they were brought to the surface.

The assistant Inspector, Mr. Williams was still on the island and was told of the disaster by Mr. Samuel Harris, High Bailiff of Douglas. He hastened to the mine and arrived about six in the evening. In the hope of finding someone alive in the mine, he organised a rescue party with Captain Kewley and went down the shaft to the 74 fathom level, passing three bodies in the way/Mr. William and a miner named Frederick Christian, then made their way almost to the 100 fathom level. In doing so they had to pass over some bodies that blocked their way.

They decided not to go any further and this was a very fortunate decision because of the way back their strength began to fail and they had great difficulty in climbing the ladders. They reached the 60 fathom level where captain Kewley met them with the rest of the rescuing party who were also weakened and many found it too difficult to climb. It was then that Mr. Williams tried something that had not been tried in mining accidents as far as the Inspector was aware.

When Mr. Williams was in Douglas and tried to get some cylinders of compressed oxygen. None could be obtained but he thought he could make the gas on site and bought a pound and a half of potassium chlorate. He carried the chemical down the mine and made use of it while the rest of the rescue party were waiting to start their ascent from the 60 fathom level. he set light to a pile of newspapers on the floor of the level and kept throwing on the potassium chlorate, little by little. When the party leaned over and inhaled the fumes, they experienced some relief and regained some of their strength and the rescue party reached the surface in safety. By this time they had been forced to the painful conclusion that no one below ground remained alive.

A meeting was held between Captain Kewley, Captain Reddcliffe, Mr. Williams and Dr. Miller when it was decided to bring up the dead as quickly as possible and the work would become increasingly difficult with the passage of time. Mr. Williams again descended the mine with a party of men and was below ground until 11 p.m. during which time they had recovered three bodies.

Early the following morning, the work of recovery continued under the charge of Mr. Williams as Captain Kewley was suffering from the effects of the poisonous atmosphere and stayed at the surface attending to the bodies as they arrived at the surface. Further advice and aid came from the manager of the Foxdale Mine, Captain W.H. Kitto and Mr. H. Wynne-Finch who was a friend of Mr. Le Neve Foster.

Early in the afternoon, Mr. Williams was totally exhausted by his efforts, lost consciousness for a few minutes and had to be sent to the surface in the 'box'. By this time ten bodies had been recovered which made thirteen with the three that had been recovered. At this point work was suspended for the day. About 6 p.m., a party of volunteers from the Foxdale Mine that had been summoned by telegraph by Captain Kitto, reach Snaefell and would have descended immediately but were told that their services would not be required until the following day.

Another Assistant Inspector had received a telegram informing him about the disaster when he was in Chester and he reached Laxey on Tuesday evening. On Wednesday morning a party of volunteers, led by Mr. Williams and Mr. Jones descended the mine and recovered five more bodies which were found on platforms near the 115 fathom level. By this time they had got as far as the 130 fathom level. One of the miners who was kneeling on the platform put his candle through the manhole to look for the last body and found that it immediately was extinguished. Mr. Williams sent a note to the surface asking for some bottles, filled with water and well corked to be sent down to collect some of the gas for analysis.

When the bottles arrived, he stood on the second rung of the ladder below the platform and, keeping his head well up, he held them under the platform and allowed the water to run out. he then re-corked the bottle containing the sample of the gas. He got a second sample in the same way but as he was getting the third, he suddenly and without warning, became unconscious. Mr Jones and some of the miners who were holding the rope managed to drag him back 80 feet, still unconscious. They accomplished the task with great difficulty, with only just enough strength to lift the heavy unconscious body.

There could be little doubt that he had inhaled a whiff of the gas that came through the manhole. The effect was instantaneous but his blood must have been affected as he had been down the mine for a number of hours. He knew he was running a risk and fortunately had the foresight to put a rope round himself before descending otherwise he certainly would have lost his life. On reaching the 115 fathom level, Mr. Jones held his colleagues' mouth to a hole punched in the compressed air pipe and worked his arms backward and forward in the manner which had been recommended for the drowned. Before long they were rewarded by seeing signs of life. Mr. Williams was then sent up in the 'box' and when he arrived at the surface he was revived by Dr. Miller who injected ether subcutaneously. Mr. Jones managed to get to the surface with great difficulty but there was no doubt that his great presence of mind saved Mr. Williams' life.

Undeterred by Mr. Williams' narrow escape, Captain Kitto descended the mine in the afternoon with Mr. Wynne-Finch and a party of the Foxdale volunteers to recover the last body. He left his assistant, Captain Lean to direct the operations at the surface. The party got as far as the platform which Mr. Williams had reached when he took his sample and reported that he had seen a body on the landing about 10 feet below. while one of the men was punching the air pipe, Mr. Wynne-Finch became unconscious and was sent to the surface in the 'box'. Captain Kitto and his men then ascended the ladders, all suffering from the poisonous atmosphere they had been breathing.

Mr. Le Neve Foster was not able to reach Douglas until the afternoon of 12th. May and went immediately to the mine where he found Dr. Miller who took him to see the eighteen corpses which were laid out in the carpenter's shop. The Doctor pointed out the signs that they had died from carbon monoxide poisoning. He then went to see his friend Mr. Wynne-Finch who was still in his mining clothes and feeling quite ill. Later he

was brought down to the Inn at Laxey where he was put to bed. The next day he was well enough to return to Foxdale.

As the men who had been working underground were tired and exhausted and there was nothing to be gained by an immediate descent. The following day the Inspector went down to test the air and he came to the conclusion that the poisonous gas was carbon monoxide caused by a fire or foul gas. he had brought with him a supply of mice which he had purchased in Liverpool and intended to use them to test for the gas. A mouse was put into an improvised receptacle made from the revolving part of its cage and this was attached to the 'clevis' or spring hook of the winding rope and a lantern and lighted candle were placed inside the kibble. With this apparatus they established that the air was not bad up to the 115 fathom level, after that it became poisonous and deadly at the 130 fathoms. the mine showed the same symptoms as the human beings. If they were not dead when they arrived at the surface, they had lost all power in their legs and a pinkness of the snout.

Mr. Le Neve Foster decided to make a descent to see the precise conditions. Accompanied by Messrs. Williams and Jones, Captain Kewley and several miners, they went down the ladderway to the 115 fathoms level and then proceeded by testing the air lower down with the help of the mice and a candle before going down to the next platform. The cage was held on a string and the candle attached to the top by a lump of clay. It was left for a minute or two and then retrieved. Using this method, they were able to get to the bottom of the fourth ladder when the mouse started to show signs of severe distress. The air was worse than it had been the previous day and a light would continue to burn on the platform but was extinguished below. One of the miners asked to go down with an air pipe in his mouth but permission was refused and the Inspector took the sensible decision that no one could go lower and the party returned to the surface. The journey took them an hour and they arrived at the surface showing signs of the bad atmosphere.

In order to improve the ventilation of the mine, a fire was lit at the bottom of the wooden chimney and this created a good draught. The following day tests were made at the surface which showed that the level of the bad air in the mine had decreased. The Inspector concluded that some of the ventilation doors, which he had been told were shut, must have been open. Captain Kewley offered to send men down but the Inspector thought it would be better to go himself. Williams, Jones and Captain Kewley accompanied Mr. Le Neve Foster to the 100 fathom level and two doors were found to be open. These were shut and the party returned to the surface to wait for the expected improvement in the ventilation the day after.

On the Saturday, tests proved that the conditions in the mine were not much changed. It seemed probable that a door at the 130 fathom level was open which was allowing air going down the main shaft to escape through this level to the shafts which formed the upcast shaft without going to the lower levels at all. It was obvious that the door should be close, if possible and there was great desire that the last body should be recovered.

A party composed of the Inspector, Mr. Williams, Captains Kewley and Reddcliffe and a party of miners went down, without incident, to the 115 fathom level. The air below was tested with the aid of a rat in a cage. The miners stayed behind and Williams, the two Captains, the Inspector and Henry Clague reached the 5th. platform in safety. The testing apparatus was lowered with a candle and the body of a miner could be seen in the position that was reported by the Foxdale men. Just at the level of the body, the candle went out. The rat in the cage was left for five minutes and was brought up alive but visibly affected.

Captain Kewley and Hague volunteered to go down and get the body which was only 10 feet below the party but the Inspector thought the risk was too great. The idea was arrived at that the body could be recovered by a grappling iron and the short ladder

leading from the platform to the 130 level was pushed aside. Moving the ladder seemed to disturbed the gas for immediately afterwards Captain Kewley said he was feeling ill. The Inspector shouted. "*All up at once,*" and the party climbed to the 115 fathom level where the 'box' was. Kewley was put in it and wound to the surface. The rest of the party which had been on the lower platform felt that they could not climb the ladders and rested at the 115 'lodge' or 'plat', the enlargement of the mouth of the level where it joined the shaft.

The miners who had stayed at the 115 fathom level started to go up the ladders and reached the top in a state of exhaustion. The 'box' that contained Captain Kewley was being raised to the surface, stuck in the shaft. a link of the chain by which it was attached to the winding rope got caught between two planks in a defective part of the wooden trough in which it was sliding. The 'box' would go neither up nor down and Kewley was kept in this desperate position for about an hour. His son went down with some other men to free the 'box' and another party came to the 115 fathom level to rescue those who were unable to climb and one after another they were brought to the surface. After these disturbing incidents, it was evident that it would be unwise to go down the mine again until the ventilation was considerably improved.

On Monday 17th., the Inspector met with one of the directors At Douglas and again at the mine. It was made clear that the Company was expecting too much from the Government officials and that while they were ready to give assistance, it was not part of their duty to recover the bodies and to put the mine in order again. Mr. Le Neve Foster said-

"I told him that the mine seemed to require the services of some competent mining engineer, possessed with more technical knowledge than Captain Kewley, though I knew the latter could not be surpassed in personal courage."

The directors employed the services of Mr. N.R. Griffith, of Wrexham, who advised that a ventilation fan should be installed. All underground work was stopped until the fan could be procured and set to work. Owing to the difficulties of preparing the site for the driving engine, many weeks elapsed before The fan was working. When the Inspector returned to the island on the 24th. May, nothing had been done. At that time he tested the air but did not think that it was safe to descend, especially as there was an obstruction between the 130 and 141 fathom level which prevented the kibble being lowered any further than this the latter level. At this time, Mr. Le Neve Foster attended the inquest into the men's deaths.

The men who lost their lives were-

James Henry .
William Kewin.
Joseph Moughtin.
Louis Moughtin.
Loius Kinrade.
Robert Cannell.
Edwrad Kinrade.
Sandy Callan.
William Senogles.
William Callow.
Robert Lewney.
Frank Christian.
Edward Kewley.
William Christian.
John Kewley.
William Christian.
John Fayle.

John Oliver.
Walter Christian.
John James Oliver.
John Robert Kewin.
Robert Kelly.

Those who were injured-
Philip Mylechraine.
Evan Christian.
James L. Kneale.
John Corlett.

It was not until 7th. June that the body of the last man, Robert Kelly, was recovered when the atmosphere in the mine had cleared enough by natural ventilation for a party to go down.

The inquest was opened by the High Bailiff on Wednesday, 12th. May for the evidence of identification and adjourned. When the proceedings were re-opened, Dr. John Haldane, F.R.S., Lecturer in Physiology at the University of Oxford presented a report of an analysis of the gas samples which had been obtained by Mr. Williams. Dr Haldane concluded that-

“The composition of the sample corresponds to a mixture produced by the combustion of wood or some other similar material, Inhalation of this compound would produce helplessness (in an man) within about 7 to 8 minutes at most, and would soon cause death. a candle would not burn in such air, but would do so on the addition of a third of its volume of fresh sir. the mixture would then be still be intensely poisonous to life, and would still be if diluted with four times its volume of fresh air. When diluted to nine times its volume of fresh air it would still be capable of rendering a man incapable of walking.”

On a visit to the mine, on or about the 16th. June, Mr. Le Neve Foster went into the mine with Dr. Haldane, Dr. Miller and captain Reddcliffe to the 130 fathom level. at a point about 630 yards north of the shaft they found that the level was completely blocked by rubbish which had fallen from the workings above as the supporting timbers had been destroyed by fire. The pieces of charred timber that was left were no doubt the origin of the disaster.

The inspection of the mine revealed the seat of the fire was sat the 130 fathom level where men were engaged in putting in new timber. The timber was very dry and would have easily taken fire and was probably ignited by the manner in which the miners handled the candles that gave them light.

It was their practice that when the candle was almost burned out, for the to remove them from the clay socket an stick the still burning end against the side of the working place, take out a fresh candle and light it at the flame of the old one. The flame of the stub was then blown out. careless miners often forgot to extinguish the end an there was evidence given to the court that this was a common practice in the mines on the island.

The jury brought in the following verdict-

“That the deceased met with their deaths by breathing air impregnated by carbon monoxide, which was generated by the burning of timber in the 130 fathom level, but we have no evidence as to how the timber was ignited. We would strongly recommend the means suggested by Dr. Foster for the prevention of such a lamentable event, namely those of uninflammable roof-timbers and supports the mechanical means for raising and lowering men, but especially the inspection of the mine prior to the commencing work on Monday morning. We are glad to learn that the fan now being put up is to be a permanent erection, and hope that it will

be a further improvement to the ventilation of the mine. We also recommend the periodical inspection of the upcast shaft, not only by the officials of the mine but also by H.M. Inspectors. We wish to express our profoundest sympathy with the families of the bereaved, and our high appreciation of the ready and generous response to the appeals which have been made on behalf of the Relief Fund. We would also take this opportunity of placing on record our great admiration of the courage and perseverance displayed in the rescue of the men and the bodies by Inspectors By the Captains and also the men who formed the relief parties. And lastly, we would thank you Mr. Coroner, for the patience and urbanity which you have displayed in conducting this very painful and difficult inquiry."

The names of Mr Williams and Captain Kewley were remembered on the Isle of Man when their conduct was brought to the notice of His Excellency the Lieutenant Governor of the Island to the notice of the Chapter of the Order of St. John of Jerusalem and that the silver medal for saving life on land was awarded to each of them. The medals were presented by His Excellency on behalf of His Royal Highness the Prince of Wales, grand Master of the Order.

GARTH MERTHYR. Maesteg, Glamorganshire. 11th. June 1897.

An overwinding accident occurred at the colliery about 5 p.m. when nine persons lost their lives. The Garth shaft was 260 yards deep and was the downcast and winding shaft at the colliery which was the property of the Garth Merthyr Colliery Company. James Barrow, mining engineer, had been the general manager of the colliery for many years. The shaft was fitted with steel guide rails, two for each cage and was carried 32 feet above the level of the surface landing where they were bolted to cross beams which were fixed immediately below the pulleys. The pulleys were 12 feet in diameter and mounted on a frame at a height of 44 feet from the surface landing.

The winding engine was a double acting horizontal type with cylinders of 25 inches in diameter connected directly to the crankshaft of the engine. Ropes one and one eighth inches in diameter, of the best crucible steel was used and they were attached to the cage chains by 'caps' or sockets riveted and hooked in the usual manner. The engine was provided with the necessary gear for starting, stopping and reversing, a foot brake common to the class of engine and a disc indicator. Everything about the engine was in perfect working order.

The signalling arrangements were of the usual kind and the proper signal appear to have been given by the hitcher and the banksman at the time of the accident. The winding engine was not provided with an automatic apparatus to prevent overwinding but the 26th. General Rule was complied with for the Special Rule 104 provided that-

"When raising persons in the shaft of a mine, the engineman shall check the engine in due time, so that the speed of the lift shall not exceed 3 miles an hour at a point 10 feet below the surface and the lift shall not exceed that speed at the surface."

The distance fixed by this rule was fixed by arbitration in 1895.

On the afternoon of the fatal occurrence, Thomas Thomas, the engineman, changed with William Lewis, the day shift engineman at 5 p.m. Lewis had worked from 7 a.m. and left everything in working order when he left the enginehouse. Lewis observed nothing the matter with Thomas and nothing except a 'good night' was exchanged between the two men.

Thomas wound two or three cages, some with coal and some with men, and the men were waiting ready to ascend at the end of their shift. Among the men who had just ascended safely was Thomas Hopkins, the mechanical engineer at the colliery, and on leaving the cage he walked across the pit bank for about 20 yards and sat down on some timber. He was looking back at the pit head when the accident happened.

The first thing he noticed by those at the surface as that the cage, known to be winding men from the signals, was not stopped at the proper place but went against the cross beams where it stayed for a moment. The rope was then pulled out of the socket and the cage containing the men crashed down the shaft to the bottom. The banksman, who was holding the 'fangs', seeing the cage strike the gate violently, left his post for fear that something would fall on him and the fangs not being arranged so that they could fall on their own were not in position to hold the cage. It seemed to the Inspector that the fangs would have held the cage in any case. The cage would weigh about 1 ton 11 cwt and had fallen 2 feet to that point.

Hopkins went immediately to the enginehouse and found Thomas there alone standing two or three yards from the handles. When asked what had happened, Thomas replied, '*I do not know.*'

THE VICTIMS.

[these are required]

The inquest was held before Mr. H. Cuthbertson, Coroner and a jury on the 14th June.

Thomas, the engineman, told the court-

"I have been an engineman at the colliery for 32 years. I went on duty on Friday evening at 5 and changed with William Lewis. I first raised a tram of coal, then cages with men safely. It was, I think, the fourth cage that the accident happened to. The first thing I remember now is seeing Thomas Hopkins in the enginehouse after the accident. I did not see the cage go up into the sheaves. I found nothing wrong with the machinery."

Thomas did not make any attempt to blame anything or anybody for the accident but himself. He was a man of good character and the Inspector thought that the disaster was caused by a momentary loss of concentration by the man. Mr. Robson went on to say that there were no automatic contrivances to prevent overwinding fitted to the machinery although detaching hooks were available and continued-

"Unfortunately these hooks are not entirely reliable in their action in the manner expected and claimed for them. Moreover, their adoption entails some additional anxiety from a dread of the becoming detached in the shaft or by breaking. One such case has happened, where a hook broke when the cage was running in the shaft. They certainly require to be kept in perfect order if they are to act when the occasion arises. Even when in perfect order, or supposed to be so, it has happened that the impact due to an overwind was so great that the beam for the catching hook (when the rope is detached) had been broken, thus rendering the apparatus worse than useless, for in the event of an overwind without such apparatus the cage may not be separated from the rope at all. Some engineers which use detaching hooks recommended in use, and as an additional precaution, a strong set of 'keps' between the ordinary stopping place and the pulleys, so that in the event of an overwind and the failure of the hook to hold the cage from any cause, it shall be held by these keps. But even in a case of this description loss of life resulted, for the keps failed as well as the hook and the cage and men went to the bottom. It should be borne in mind that accidents of this nature are very rare, I believe this is due to the improved machinery in use, and to the exceedingly careful, steady class of engineman employed. For this reason I do not advise adoption of detaching hooks as a compulsory measure."

The jury brought in a verdict of 'Accidental Death' and recommended that self-acting 'keps' or 'fangs' should be used.

AYR, DRUMLEY No.1 PIT. Ayr, Ayreshire. 9th. September 1897.

The colliery was the property of George Taylor and Company. There was a sudden outburst of firedamp which ignited at the naked light of the fireman in the airway. He was not aware what had taken place. The No.1 pit had recently been sunk to the Diamond seam which was 3 feet 4 inches thick and lay 139 fathoms from the surface. It was being opened out on the longwall system. The air current was stated to be 5,000 cubic feet per minute and naked lights were used throughout the workings.

It appeared that shortly before the explosion the workmen retired to the heading road as the roof began to 'work' and there was a hissing noise of firedamp being discharged. the fireman had been in the section from which the men had withdrawn and was unaware of what had happened. he was returning along the airway when he reached a point where his naked light ignited the firedamp and caused the explosion. It swept through all the working places and extended down the heading. Two workmen, and the manager, who were in the level were uninjured.

The men who died were miners-
James McCreadie aged 38 years,
Hugh McCreadie aged 28 years,
John White aged 55 years,
Walter Dunlop aged 28 years,
Thomas Martin aged 40 years,
Thomas Martin aged 13 years,
John Brannigan aged 14 years, and
six other men were injured.

From the account given by the survivors among whom was the fireman, there seemed to be little doubt that, owing to the working of the roof, there had been outburst of firedamp and the gas was carried in an explosive state to the fireman's lamp. The explosion was not a violent not, and very little damage was done to the workings. The manager state that an hour after there was no afterdamp of firedamp in the seam. The workings were dry, and after the explosion there was a coating of coked dust on some props. Apparently the explosion had been intensified by coal dust.

Mr. Ronaldson, the Inspector, commented-

"It is unusual in Ayrshire to have sudden outbursts of firedamp, and in the adjoining pit where the Diamond seam had been worked extensively, such an occurrence is unknown. Since the explosion the pit has been worked with safety lamps."