

WHITWICK. Coalville, Leicestershire. 19th. April, 1898.

The colliery was the property of the Whitwick Colliery Company who had worked the mine for along time. The colliery consisted of a number of shafts which worked two seams of coal, the Lower Main at 309 yards and the Upper Main at 249 yards. The fire which caused the deaths of 35 men and boys occurred in the Upper Main Seam.

The Upper Main coal was drawn at the No.5 shaft which was 8 feet in diameter, 249 yards deep and was the downcast for the ventilation of this seam only. The shafts were sunk about 50 years before the disaster and a large area of coal had been worked. The day shift employed 140 underground and the night shift consisted of 30 to 40 men, some of whom were repairing the roadways and others were at work in the coal stalls. The seam was about 5 feet thick with a good roof. The coal was worked on the longwall system, with roadways that were packed through the goaf. The inclination of the strata was variable but in general, the roads were only slightly inclined.

The ventilation of the pit was produced by a Guibal fan, 30 feet in diameter and 10 feet wide which ran at 48 r.p.m. The air current in the Upper Main Seam was about 10,000 cubic feet per minute, and the air current passing along the intake of the district in which the fire occurred was measure as 9,600 cubic feet per minute a few days before the fire broke out. The mine was worked with open lights as firedamp was unknown.

For many years, the Colliery Company had retained the services of Mr. George Lewis, a consulting mining engineer, who visited the colliery about three or four times a month and who was the appointed agent. The certificated manager was Mr. Thomas Young Hay who lived close to the colliery and who supervised the workings of the two coal seams. There was an undermanager and a staff of deputies for each seam.

At about 2.30 a.m. on the morning of 19th. April, the official in charge of the night shift, working in the South District, was travelling down No.88 bank into the main road when he found smoke passing along the intake and main roadway. Fearing that something was wrong, he sent a boy to tell all the workmen to make their way out along the return airway and he went to find the cause of the smoke. He went down the main intake which was also the haulage road and found that the smoke's intensity was increasing as he approached the bottom of the No.47 bank. He got far enough to see that the timbers of the main road about half way between No. 47 and the box-hole road were on fire near the roof. He had to go back and, by passing through the separation doors on No.47, he made his way into the return airway and reached the box-hole road with great difficulty.

When he got through the intake and the main road he was in fresh air and on the outbye side of the fire. He saw two workmen some distance away, nearer the shaft and ordered them to go for the undermanager while he went towards the workings along the main intake. He had not gone far when he saw that the roadway was on fire and that some of the men had come out of the workings by passing under the fire. These men were exhausted and were lying on the floor of the roadway. It was then clear to him that the timbers along the roadway were well ablaze and with a strong current of air passing along the road, there was no chance of reaching the workmen until the fire had been extinguished.

Help soon arrived and means were taken to put out the fire but little progress was made. Soon the timbers gave way and there was a very heavy fall of roof which completely blocked the roadway to and from the workings.

A telegraph message had been sent to Mr. A.H. Stokes, H.M. Inspector of Mines who had contacted his Assistant Inspectors. One of these, Mr. Hepplewhite arrived at the colliery at 3.15 p.m. and immediately went down the mine to see the seat of the fire. He found the officials attempting to enter the return airway by means of a brattice and a fresh air current from the main road. The smoke was as very dense, and the attempt looked hopeless. Men were attempting to remove the fallen debris which blocked the main road and water from buckets was being thrown on the burning timber.

By 6 p.m. a double-acting portable hand pump with a short length of hose was put into service and in a short time all fire that was visible at the intake hand had been extinguished. The fire had extend bar above the falling debris and into the cavity of a previous fall. Falls of very hot stones were frequent from this cavity. The water was well applied but what was gained by the extinguishing the fire was lost due to the heat and steam which caused further falls of roof. Frequent inspections of the return air showed that there was no reduction, either in the intensity or in the noxious state of the smoke coming from the fire.

Mr. Stokes arrived at the colliery about 7.45 p.m. and his other Assistant, Mr. Hewitt about 9 p.m. Mr. George Lewis, the Consulting Engineer had arrived some hours before. These men had a consultation and after a short examination of the plans, all descended the mine. When they arrived at the fire they found that the men were doing their best to get through or over the fall. Some of the timber was breaking into flames over the fall and there was no doubt that the timber ahead was burning and the fire was extending rapidly due to the good air current that was passing over the fall. That part of the roadway was dry and well timbered for a considerable distance. The small hand-pump was at work and was well supplied with water but, although the water extinguished the flames it was doing great damage to the roof.

Mr. Stokes came to the conclusion that any attempt to push through the fire, either over or by the side of the fall was useless. The men working there had put in great efforts but had advanced about 4 feet in eighteen hours. To enter the return airway at the box-hole would have been fatal as the atmosphere there was full of carbon monoxide. It became evident that the men beyond were caught in a death trap. Mr. Stokes commented-

"I had been at the front and had clearly seen the hopelessness of getting to the entombed men through the fall and fire, but what had given me intense anxiety was the safety of the party of workmen acting under our instructions. I had not forgotten the Baddesley disaster in the neighbouring county, when 23 lives were lost on trying to rescue 9 persons entombed under similar conditions, and, to add to this anxiety, I heard ominous sounds over my head when at the fall, which I feared, indicated small explosions of gas generated by the fire. This conjecture was strengthened a short time afterwards by one of my assistants, and an official of the mine, who, without knowing what I had heard, and the conclusions I had drawn reported to me the opinion as to the sounds and the checking of the air current, and that the men working at the fall, were alarmed at the repeated heavy falls which were taking place. Some of the officers in charge intimated that explosions were taking place, and therefore instructions were given to commence the erection of a strong stone dam, so that we might be ready to cut off the air if necessary.

It now became a question of sealing up this part of the mine and Dan with it all hope of rescuing the entombed men, or an attempt to reverse the ventilation, and to enter the mine by way of the return airway. The responsibility of such a serious step, and the difficulties we had to encounter, were so great that it was thought advisable to withdraw the men working at the fire, and call together all the colliery managers within a few miles radius, and have a consultation as to the steps proposed to be taken. Men were dispatched in the early hours of the morning to various managers, and to ask them to meet at the colliery offices at 8 a.m. At the time named every manager requisitioned (16 in all) willingly appeared, some of them at much personal inconvenience.

The working plans were produced and sketches made of the exact position of affairs and every detail necessary for a decision placed before the meeting. After a long and exhaustive explanation and discussion, I put the following question to each manager separately, viz. Is it *probable* that any person is alive beyond the seat of the fire? The answer was a unanimous No! I then put a further question, viz. Is it *possible* for any person to be alive beyond the seat of the fire? and each individual manager again gave the same answer, No!"

After this dramatic meeting, instructions at once went out to complete the dam in the main intake which was called stopping No.1, to prepare to cut off the ventilation to the fire. this was finished without incident and by 2 p.m. on the 20th., a stone dam, 6 feet thick, was constructed across the roadway and had been lined up with a brick stopping and flue-dust to within 115 yards of the edge of the fire. Two rows of iron pipes, 12 inches in diameter had been built into the stopping so that air was still passing to the fire which enabled men building the stopping to work in fresh air and also prevented the products of the fire backing up on the flames and perhaps exploding before the stopping was complete. While the work was going on, the question of reversing the air was considered. This proved to be difficult.

It would have been quick and easy to reverse the air at a point 370 yards from the shaft but this would have lost the use of 1,200 yards of the main haulage and the prospective rescuers would have had to use a long airway which could be used only for men to travel. It would have cut off access to the main road dam, and made the work of exploration and recovery very difficult and dangerous. Further more the mine could not have been re-opened until the air current had again been reversed.

It was clear that there would have to be reversed at the box-hole slit or the opening between the main intake and the main return road which men and materials could travel. A detailed plan had to be devised to carry this out but during Wednesday night a plan was drawn up which catered for every anticipated emergency and it was decided to carry it out by gently diverting the air into a figure 8 path. Another dam was built in the intake airway, leaving a space of 5 yards between it and the dam nearest the fire. Two pipes were built into the dam similar to those in the first but nether connected nor in line. In the event of an explosion behind the first dam, it was hoped that the space would absorb the blast.

An explosion was anticipated not from firedamp but from the products of combustion from the fire. The pipes from the last stopping where continued down the main intake, through the box-hole slit and into the return airway where a door had been made through which passed the pipes. The door was a regulator about 18 inches square with a chain attached, supported by props and passing to the intake corner of the box-hole slit. The aim was to make an immediate diversion of the main current through the slit. An observation box with a glass door was fixed in one row of pipes, so that the air current coming from the fire could be tested. Only one row of pipes was used the other being sealed near the front of the stopping.

At about 2 p.m. on Thursday, all was ready and the door was gently closed and the ventilation reversed. the effect was soon seen in the observation box and in about 15 minutes, the foul gasses from the fire started pass through showing that the current had been reversed. The reversal was done so gently that there was no explosion. All persons left the mine about 5.30 p.m. except those who were required to watch the return air from the fire and report on its state from time to time. The temperature rose slowly through the night until it reached 81 degrees Fahrenheit.

By 11 a.m. on Friday Mr. Hepplewhite, Mr. Lewis jnr., Mr. Hay, the manager and A party of volunteers started up the return airway. They found it clear of noxious gases and a current of about 600 cubic feet per second was flowing but the temperature in the return air pipes was high as was the temperature in the old return airway that they had to travel. They had not gone far when they found Clamp's body. They pushed on and arrived in No.47 road. this was the point where the first smoke would have entered the return and it was important for them to know if the doors separating this return from the main intake were open or closed. Some of the party venture down the roadway and found both doors closed, but beyond the second door, a heavy fall had blocked the road. It was clear that the noxious gasses from the fire had been passing into the workings.

Some of the exploring party became affected by the fumes in the road and others, finding No.47 a good travelling road, decided to press on. They went to the top of the road where they found eight bodies in an old road, lying a few feet from the entrance to the return airway. the man appeared to have got into to this place to get out of the direct

current of foul gas. The exploring party then retired and picked up the men who had been stationed along the roadway for verbal communication. They returned along the airway to the entrance to the box-hole and the main intake. Many of them were in a state of exhaustion and required the attention of Drs. Burkitt and Griffen, who had accompanied the party and whose presence gave confidence to the explorers.

Nine dead miners were brought to the surface, a short time after they had been discovered and the last body arrived at the pit bank about 6 p.m.

A list of those who lost their lives that was included in the official report.

Bodies recovered 22nd. April-

Charles Beresford Clamp aged 27 years, onsetter,

Joseph Shaw aged 21 years, holer,

William Davis aged 30 years, dataller,

John Elliott aged 40 years, dataller,

Albert Edward Limb aged 20 years, holer,

Thomas Gresley aged 29 years, stallman,

Joseph King aged 30 years, stallman,

John William Platts aged 23 years, holer and

William Belcher aged 36 years, stallman.

The return air passing through the dams and air pipes was carefully watched and the temperature began to increase. All the bodies had been recovered from the top of No. 47 and it was evident that they had been dead for some time. There was no chance of any of the entombed workmen being alive. Mr. Stokes stated in his report-

“After careful consideration of the matter, it was decided to seal up the old return roadway and completely dam off all access to the workings by the intake and return and hermetically seal the fore.

Under these circumstances it was deemed advisable to re-open two old roads which had been abandoned for many years and leave a considerable distance between the fire and the nearest road for the future entrance of the workings. It is hoped that no unforeseen difficulty may arise to prevent the workings being reached and recovery of the bodies now lying in the mine.”

Bodies not yet recovered-

Pat O'Mara aged 45 years, stallman,

Thomas Timpson aged 30 years, stallman,

William Bostock aged 47 years, dataller,

Edward Edwards aged 27 years, dataller,

John William Tugby aged 16 years, driver,

Albert Gee aged 15 years, deputy's boy,

John Skellington aged 31 years, dataller,

Henry Springthorpe aged 45 years, dataller,

John Moore aged 46 years, dataller,

James Evans aged 57 years, dataller,

Benjamin Wileman aged 46 years, dataller,

Samuel Stacey aged 22 years, holer,

James Wright aged 30 years, stallman,

Joseph Brooks aged 30 years, stallman,

James Wyatt aged 35 years, stallman,

Jacob Wyatt aged 41 years, stallman,

Thomas Berniston aged 45 years, stallman,

Joseph Wilson aged 43 years,

William C. Moore aged 30 years, stallman,

John Richards aged 29 years, stallman,

William Percival aged 28 years, stallman,
William Gresley aged 60 years, stallman,
Lewis Smith aged 24 years, holer and
William Bradshaw aged 63 years, stallman.

A the inquest and inquiry into the disaster. It emerged that the mine had previous trouble with gob fires. On the 14th. December, 1893 there was an entry in the Report book that stink was observed the return airway at the top of Old 94 and men filled the hot stuff out and a brick stopping was put in. On 23rd. January, 1894 a fire was thought to be in the Old 81 and a brick stopping was put in and there were subsequent reports up to the disaster.

The jury returned the following written verdict-

“We agree that the men were suffocated by carbon monoxide gas, from a fire which originated in the main road on No.5 Pit at the Whitwick Colliery, on April 19th, 1898, in consequence of the faulty nature of the strata. The fire travelled to the timber in the roof from the gob.

We agree that we have not had sufficient evidence before up to prove culpable negligence on the part of any one person. we agree to recommend greater precautions to be exercised by the more regular attendance of the head officials upon any site wherever gob fires exist, and that steel girders be used instead of timber wherever practicable. Also that all dangerous places in any main road be encased by brick inverted arches. Also that all return airways be traversed more frequently by men and boys.”

BRANDON. Brandon, Durham. 15th August, 1899.

The colliery was the property of Messrs. Strakers and Love and was worked with locked safety lamps and had not given off much explosive gas. The ventilation was good and the last recorded measurement, taken on 8th. August showed a total of 64,931 cubic feet of air per minute in the Brockwell Seam in which the explosion took place. The blast caused the deaths of six men and injured four others

William Carr was the deputy overman in charge of the district. He had gone down the pit at 2.45 a.m. to make his statutory examination before the men went in and his report indicted that he had not found any gas. Whether he neglected to examine the inbye side of the shot hole before firing, or when the gas was forced out of the goaf by a fall or some other cause, after the examination, will never be known but there was gas present. There wasn't much dust in the district and the place where the shot was fired was damp and the stones left in front of the hole were wet to the touch.

Those who lost their lives were-

Enoch Griffiths aged 32 years, hewer,
Frank Murphy aged 20 years, putter,
Ralph Broadbent aged 53 years, hewer. Died 16th. August,
William Carr aged 39 years, deputy. Died 14th. August,
George Robson aged 18 years, putter. Died 17th. August and
Frank Robson aged 22 years, putter. Died 18th August.

Those injured-

George Winter aged 44 years, hewer,
William Robson aged 45 years, hewer,
Robert Hunter aged 17 years, putter and
James Liddle aged 21 years, putter.

The inquest was opened by J.T. Proud, of Bishop Auckland when J. Strachan, Q.C., represented the owners, Mr. I. Isaacs, of Sunderland, the Miners' Union and Mr. E. Bell the Deputies' Union. Mr. John Wilson, MP., and Mr. Foreman and Mr. Cann were present on behalf of the men. There were several mining engineers present as well as the Government Inspectors.

On inspecting the area after the disaster, a shot hole was found in Broadbent's working place which still had the stemming in, but when a pricker was inserted, no charge was found and the stone was hewed down by pick. The hole was found discoloured with powder and tasted of saltpetre. The hole was found to have been stemmed with small coal but clay was provided and taken into the working places so that this could be put down to carelessness by the man but it had no effect on the accident.

All the lamps were found locked with the exception of a broken glass in one of them which was probably caused by the explosion. William Carr, the deputy, was the only man in the district who was authorised to fire shots. He was found a considerable distance from the shot with the top of his lamp screwed on, but the lamp was not locked. This led to the suspicion that he had light the fuse and had time to retire to where he was found and had screwed the top on his lamp before the explosion took place.

When the old headway was examined on the inside of the shot, some gas was found. This came either from the goaf or from the leader of a fault and it was thought that the shot ignited gas that was lying in the old headway.

It was evident that the blast had originated in some broken pillar workings about a mile and half from the shaft in a district known as the Jubilee way. A considerable area was affected by flame and several props showed signs of charring but there was nothing to definitely indicate from which direction the blast had come.

After the full hearing the jury brought in the following verdict-

"That Griffiths and Murphy came to their deaths by the force of the explosion and the others died from pneumonia contracted from the burns caused by the explosion having been caused by natural gas ignited from a flame passing from the shot hole into the old headways course, and that the explosion was purely accidental."

Roburite was substituted for compressed powder as the explosive that was used in the mine.

LLEST. Pontyrhyl, Glamorganshire, 18th. August, 1899.

The colliery was near Pontyrhyl in the Garw Valley about seven miles from Bridgend and was the property of the Llest Coal Company, Limited. Messrs. Forster Brown & Rees of London and Cardiff were the consulting mining engineers.

Mr. Thomas Loughor was the certificated manager and Mr. William Rees the undermanager. Mr. Loughor succeeded Mr. Thomas Owen six to eight weeks before the disaster but he had been the undermanager of the colliery for several years. Over the previous three years, Mr. Thomas Griffiths of Cymmer, a colliery manager with about thirty years experience in both steam and house coal collieries had examined the colliery from time to time on behalf of Messrs. Forster Brown & Rees.

For many years the colliery worked the house coal seam which was known as the No.3 Rhondda and for the two years before the explosion, the No.2 Rhondda had been worked. It was in this seam that the explosion occurred. The colliery had two shafts. The No.2 Seam was reached at the winding shaft at a depth of 117 yards and No.3 at a further 110 yards, making a total depth of 227 yards. The seams rose to the north and the workings in the No.3 seam were connected by a slant or dip drift from the outcrop of this seam. The other shaft was sunk about two years before the disaster when the No.2 seam was opened up to provide a separate outlet from these workings and also to provide a more convenient upcast from them when the No.3 seam was abandoned. However, at the date of the explosion, it was used as the downcast for both seams. The air current went

down and entered the No.2 seam and after ventilating the workings, descended by means of the winding shaft to No.3 seam. The same current ventilated the No.3 seam workings and passed from there by way of the slant to the surface.

The ventilation was produced by a Schiele fan, five feet three inches in diameter which was sited at the mouth of the upcast slant. The fan ran at 400 to 800 r.p.m. and produced a current of about 10,000 cubic feet per minute in No.2 seam and about 12,000 in No.3 seam at a water gauge of 1.5 to 1.7 inches. The ventilation in both seams was by the same system and the shaft arrangements were peculiar. Although a portion of the winding shaft between Nos. 2 and 3 seams was the downcast for the No.3 seam, it was not isolated from the upper portion of the No.2 seam nor was the shaft closed at the surface. It was stated that radiated heat from the steam pipes in this shaft warmed the air which filled it down to the No.2 seam and maintained such an equilibrium in the shaft that was neither upcast nor downcast. Mr. Robson, the Inspector, noted that-

“It should be observed that any cooling of the winding shaft would have the tendency to seriously interfere with the ventilation of No.2 seam but there was no evidence, nor have I reason to believe that this ever took place during working hours.”

The workmen in the No.3 seam followed the custom of the district and worked with naked lights and in general the workings in the house coal seams were damp if not wet throughout especially near the surface. Although the depth to No.2 at Llest was greater than in other places where it had been worked and the seam at Llest was no exception to the rule. At the time of the explosion, 160 gallons of water per minute which was equal to 1,028 tons in 24 hours had to be pumped to the dip.

As the workings developed, the upper portion drained into the lower portion. At the date of the explosion headings 1, 2, 3, 4, and 5 were damp and even wet in parts. The workings to the rise, No.1 East and North headings were dry as were most of the faces and stall roads, were in the opinion of the Inspector, ‘dry and dusty’, an opinion that was not held by the officials at the colliery.

Until just before the explosion, the coal had been worked by pillar and stall. The pillars being 9 to 12 yards and the double row of stalls about 14 to 16 yards wide. the stalls were drive off single headings which were at intervals of about 55 yards. A few weeks before the disaster, the management had begun to change the method of working to modified form of longwall working. Up to this time it did not appear that the change had brought about any general subsidence of the roof which usually followed longwall working. the workings had been carried forward far enough to form larger ‘wastes’ behind the faces than there had been under the previous method of extraction. The amount of rubbish formed in the working was not enough to completely full the wastes and so there was more space which required ventilation and more chance that gas could accumulate. On the other hand, the ventilation was becoming simpler as long as the doors and brattice sheets were kept in good condition as the air course became straighter.

Blasting was carried out mainly in stone in the headings and ordinary compressed gunpowder was used, which was not a ‘permitted’ explosive. Blasting was in the hands of the workmen who fired their own shots by means of a fuse. The Inspector commented-

“In my opinion, this use of gunpowder was a violation of the Explosives in Coal Mines Order under the conditions which applied at the date of the explosion and probably for some time previously.”

The No.2 Rhondda had a strong roof of cliff, 6 to 8 feet thick and about 5 inches of shale. the coal was between 3 feet 4 inches to 3 feet 6 inches thick and there was a shale floor. because of the comparative thinness of the seam and the pushing forward of the single headings by a double shift, the workings had been developed rapidly. This together with the fact that the seam was solid between the point where it was opened and the outcrop, resulted in more inflammable gas being encountered than was usual in et seam which, for the most part, had been opened at or near the surface and developed downwards.

During 1897 there were three cases of men being burned by the ignition of firedamp in the No.2 seam, in 1898 one case of burning was reported in the No.3 seam and in 1889 there were four cases in the No.2 seam. The examination of these incidents showed the same cause in all cases, a small quantity of firedamp had been ignited at a naked light. They were all caused by a small derangement of the ventilation which caused a failure in the air current to reach the extreme point of the face. The general ventilation was found to be adequate and no accumulated firedamp was ever found on inspection.

Mr. Gray usually made the inspections and on 11th. January he reported to Mr. Robson that the No.2 seam did not produce much gas and told the manager, Mr. Owen, that he could not depend on keeping the places free from gas and he must use safety lamps. On 10th. April, Mr. Gray again inspected the colliery and reported that the ventilation was adequate and he could not find any gas but he added "a good deal of gas is given off from a 'rider' just under the seam." After the burning incidents, Mr. Robson wrote to the owners on the 24th. July and brought to their attention what appeared to be a violation of the 8th. General Rule. At the inquest it emerged that the letter had not been received nor had its contents been forwarded to the owners as the manager had taken on responsibility himself for the matter.

Mr. Loughor was the manager at that time and he appeared to have provided a few safety lamps and given instructions that these were to be used in any place where gas was found. This was done in one or two instances for a shift or two. Mr. Robson commented that the 8th. General Rule was not wholly satisfactory as it allowed 'mixed lights' in districts.

Naked lights were in use in most of the house coal collieries in Garw and the neighbouring valleys of Glamorganshire. There had been small incidents but no explosion resulting in a large loss of life had taken place in the seam for many years. The Inspector commented-

"There can be no doubt that the general wetness of these seams is deemed a safeguard against any large explosion in them, and that this wetness is considered a good reason for continuing the use of naked lights, when otherwise the same amount of gas met with would suggest the use of safety lamps exclusively."

Forty nine persons in the charge of David Morgan, fireman, went to work in the No.2 seam at 7 a.m. on the night shift of the 17th. August. About twenty four others under the supervision of another fireman, went into the No.3 seam. These men were made up of colliers, repairers, labourers, hauliers, riders and hitchers. The fireman's examination of the No.2 seam before the shift half revealed nothing untoward and everything went on as usual until 2 a.m. when the alarm was raised at the surface that something was wrong. The banksman noticed a puff of air come up the winding shaft and the hitcher came up the shaft saying that he had felt a rush of wind.

David Morgan, the fireman along with William Thomas and Fred Ashton were going down the dip with a 'journey' when they felt a puff of wind from behind. They were between Nos.2 and 3 East and realising that something unusual had occurred, Morgan went up the dip to the No.2 heading and found that the first main door there had burst outwards in the middle and the second door had been blown outwards off its hinges. Passing inwards, Morgan encountered the afterdamp and after passing two labourers who were in the dark, he met James Edwards, a haulier coming out. Edwards volunteered to go with him and they passed through strong afterdamp to reach two other labourers who were in the dark. Morgan told them to go out and then went towards the face. He reached purer air opposite the airway from No.1 to 2. He found two men and a boy in a cross-heading near the face, at work and apparently unaware that anything had occurred.

In a short time all the men and boys were got out with the exception of William Thomas, one of the riders. Thomas had volunteered at once to go and warn others of their danger and as he did so he was overcome by the afterdamp. He was found dead and although everything was done to revive him by two doctors who had gone down the pit, Doctors

Parry Jones and J Arthur Rees, he died. The others suffered the effects of the gas but later recovered.

The manager, undermanager and fireman of the colliery assisted by several of their workmen and the managers of neighbouring collieries, temporally restored the ventilation and reached the working so of the No.1 east and the North heading. Here they found all the dead.

Those who died were-

William H. Jones aged 44 years, repairer.

Samuel Rees aged 26 years, repairer.

Frank John aged 38 years, labourer.

James Jones aged 23 years, labourer.

Herbert Bisset aged 19 years, haulier.

Owen Owen aged 37 years, collier.

David Hopkins aged 23 years, collier.

Hugh Davies aged 13 years, collier.

Evan Davies aged 33 years, collier.

Tom Jeremy aged 24 years, collier.

Thomas Jones aged 18 years, collier.

David Thomas aged 41 years, collier.

Abednigo Williams aged 33 years, collier.

John Mort aged 28 years, collier.

William Daniel aged 29 years, collier.

Fred Evans aged years, 24 haulier.

William Lewis aged 44 years, repairer

Thomas Williams aged 25 years, labourer.

William Thomas aged 22 years, rider taken from the pit alive but died later.

Those severely injured were:-

J. Davies,

James Edwards,

David Morgan, fireman,

Edward Rich, John and

David Thomas.

Mr. Robson received a telegram informing him of the disaster and took at rain, arriving at the colliery at noon. by this time all the bodies had been recovered. He made a full inspection of the area and found that there was little damage to the fabric of the mine. He came to the conclusion that the gas had ignited in the first working stall off No.2 East due to the temporary absence of two colliers, David Thomas and Abednigo Williams, who worked there and the gas was ignited by David Thomas when he returned to the face. Mr. Robson went on to say that-

“I think there must have been some derangement of the ventilation to cause the accumulation of gas but as nearly every sheet in the district and the main doors had been destroyed by he explosion, it is impossible to form any conclusive opinion.”

Ashton, the rider, was the last to pass out of the No.1 East and he gave testimony that the doors were closed after him. There was no evidence to doubt this.

The adjourned inquest was held on August 28th, 1899 when all interested parties were represented and lasted for three days when the jury returned the following verdict-

“The jury are of the opinion that the 19 persons who met their death at the Llest pit on Friday, August 18th., 1899, were suffocated as a result of an explosion of gas.

They are further of the opinion that gas had accumulated in the stall of Abednigo Williams owing to some derangement of the ventilating current during the men's temporary absence, and that it was ignited by the introduction of a naked light. The

jury regret that safety lamps were not in use at this colliery previous to the explosion, and consider that the management unfortunately committed an error of judgement in not introducing them.”

Mr Robson commented that he was glad to report that safety lamps were introduced on 28th. August when the colliery resumed operations.

OLD BOSTON. Haydock, Lancashire. 29th. June 1900.

The explosion occurred when shaft sinking operations were going on at the colliery which was owned by Richard Evans & Co. and the disaster was the worst in the village since the Wood Pit explosion of 1878. The cause was the same in each case, a sudden and unexpected outburst of gas.

A gang of ten men were engaged in sinking operations at the colliery when the accident happened. They were taking the main shaft down from the Nine Feet Seam to the Rushy Park Seam and they had gone down about 10 to 12 yards. By 1 a.m. on that day they had bored nine shotholes in the floor which was of metal to a depth of about three feet. The holes were charged in the usual way and fired by Mark Luke.

All went well until about 5 a.m. up to which time the men had sent up forty full hoppets of metal. At the centre of the shaft there was an electric lamp suspended on a cable and candles were burning round the edge of the pit. Suddenly, and without any warning, there was an outburst of gas from the floor. The gas ignited and burnt the ten men that were working there.

The men were quickly put into the hoppet and sent to the surface. They were seen to be seriously burnt and sent to the Cottage Hospital. Six of the men died from their injuries and there were fears for the lives of four others. These fears proved to be correct and the four later died bringing the death toll to eight out of the ten that had been working down the shaft.

Those who lost their lives were-

James Gillard sinker. aged 45 years, of Leigh Street, Earlestown,
Patrick Babe sinker over 40 years of age, of 41, Barber Street, St .Helens,
James King sinker, aged 20 years, of 342, Church Road, Haydock,
Patrick Flaherty sinker, aged 35 years, of 19, Reservoir Street, of Ashton-in-Makerfield
James Haines sinker, aged 33 years, of 83, Eccles Street, Earlestown,
Patrick King sinker, aged 36 years, of 342, Church Road, Haydock,
Mark Luke aged 51 years, a chargehand of 139, Legh Street, Earlestown and
John Fitzpatrick sinker, of 28, Leigh Street, Ashton-in-Makerfield.

Mr. Samuel Brighthouse, the County Coroner, opened the inquest into the deaths at the Waggon and Horses Hotel with a jury of eighteen men. Coroner Brighthouse who unfortunately made regular visits to Haydock, was walking with the help of a two sticks. He was a keen cyclist and had been involved in an accident which had injured his knee. The jury expressed their sympathy. His medical man had advised him to rest for ten but the Coroner did not take their advice and the County authorities did not view favourably his hobbling round the county on sticks. He was delayed half an hour through missing the train. He is a popular figure in this part of the county and elsewhere but his visits are more frequent would have been desired.

The Coroner took the formal evidence of identification of the victims. The first witness John Luke who lived at 28, Crow Lane, Earlestown. He said that Thomas Gilliard aged 45 years, a sinker, was his brother-in-law and lived with him. He last saw him alive at 9 o'clock and saw him dead at the Cottage Hospital. Margaret Bebe, widow of Patrick said the deceased was a sinker living at 41, Barber Street, St Helens. She did not know his exact age but he was past 40 years.

Elisa Merricks, of 342, Church Road, Haydock, said the James and Patrick King were two brothers who lodged with her. They were sinkers James was 20 years old and Patrick was 26 years. They had a mother and three brothers in County Mayo.

Catherine Flaherty said her husband, Patrick, was a sinker and they lived at 19, Reservoir Street, Ashton-in-Makerfield. Rachel Jones, wife of James, of 83, Athol Street, Earlestown said James Hinde lived with her. He was a sinker aged 33 years. The witness said that she wanted to write to the deceased friends in Ireland.

Gladys Owen, a nurse at the Cottage Hospital said Thomas Gilliard was admitted between 6 and 7 in the morning badly burnt. She was present when he died. Patrick King was admitted at the same time and died at 12.50 a.m.

Martha Marsh Jack, sister at the Hospital said Babe, King and Flaherty were admitted between 6 and 7 suffering from burns. Babe died at 1 a.m. on Sunday morning and King at 8.20 on Sunday morning. Flaherty died on Monday morning.

The injured men who are still in hospital were Mark Luke, chageman, aged 51 years of Legh Street, Earlestown, Thomas Woods, aged 51 years, of Fairclough Street, Earlestown, Luke Dillon aged 39 years, of 23, Queen Street, Golborne, John Fitzpatrick of 1, Heath Lane, Ashton-in-Makerfield. The four men were better but they were not yet out of danger.

Dr. Hayward and his assistants and the entire hospital staff have been unremitting in their attentions to the unfortunate men. A telegram had been received from the Home Secretary, Sir Matthew Wight Ridley by Mr. Hall the Government Inspector of Mines, to express his sympathy.

Later John Fitzpatrick, aged 28 years of Heath Road, Ashton-in-Makerfield, died in the Cottage Hospital from his injuries. Hugh Fitzpatrick, a bricklayer's labourer, of Garswood Street, Ashton-in-Makerfield said that the deceased was his brother who lived at 1, Heath Road, Ashton-in-Makerfield. He had been a well sinker and was 38 years old.

Nurse Martha Marsh Jack gave evidence of another death that morning. Mark Luke, the chageman, had died at 9 that morning in the Hospital. He was 51 years old and lived at 139, Legh Street, Earlestown. This brought the final death toll of the explosion to eight death.

The inquest on Mark Luke on Friday and Mr. John Robinson the manager was present on behalf of the colliery. Luke was aged 28 years, a sinker of Crown Street, Earlestown identified his brother.

The proceedings then went on to examine the cause of the disaster. Luke Dillon, of 23, Queen Street, Golborne and Thomas Walsh of 45, Fairclough Street, Earlestown, were the two men that survived and after hospital treatment they had been allowed to go home. Luke Dillon owed his remarkable escape to the fact that when the explosion occurred, King was knocked against him and he was knocked down and partially covered by debris.

The first witness was Thomas Walsh, 51, of Fairclough Street, Earlestown who was working down the pit when the accident occurred. He was working for a contractor named Morris but had signed according to the rules of the colliery.

Luke Dillon, one of the survivors, gave an account of the conditions down the shaft when the accident occurred. He was holding the hoppet because he was the strongest. He saw the flames and had time to turn to the face the side of the pit and put his cap over his face. He was tumbled over by the others moving about, by King he thought. He fell face down and lay there for a while. He did not shout. When everything went still and he thought that every one was dead. Some were lying on the hoppet and others trying to get into it. Hinde called Dillon by his nickname 'Lord' and he led him to the hoppet and put him in. Flaherty and Bebe were further away but he led them to the hoppet. The witness was the last to get into the hoppet and they all went up the pit.

James Cook, the Certified Manager of the colliery, said that the pit was 245 yards deep and 18 feet wide. The ventilation for the work was by pipes that were taken down one side and up the other. There was no artificial current created.

Charles Johnson was the banksman at the time and he remembered the shots being fired. The hoppet had been down four times, twice with men and twice with tools. Johnson believed that Mark Luke went down first as he should do.

Hugh Neary, of 64, Gerard Street, Ashton-in-Makerfield, was helping the men on the night of the explosion and the men were all in the mouthing and out of danger when the shots were fired.

In answer to a question by the Coroner, Mr. Cook said a lamp was picked up. He had been down three times after the accident and remembers the lamp lying at the bottom of the shaft. It was an ordinary colliers lamp.

Luke Jones, the chargeman said he was superior to Mark Luke and could give orders. He went off duty at 4.45 the evening before the disaster and the men were working by electric light and candles. There was one safety lamp that was taken down to test for gas. After shots were fired he took two men with him into the place and made his inspection for gas. He left the lamp down on Thursday.

Mr. Henry Hall, in the Mines Inspector's Report said the jury took ten minutes in deliberation to come to the verdict that the explosion was caused by an outburst of gas and recommended that in future all these operations should be carried out by electric light.

Payments under the Compensation Act were made under the Act in the Local Courts. Two claims were entered by Mrs. King, mother of John and Patrick at St. Helens Court. Mr. Riley appear for the plaintiff. and the action withdrawn with a settlement agreeable both to Mrs. King and Richard Evans & Co.

In another action at St. Helens Court, Richard Evans and Co. defended a case brought by James Fitzpatrick, blacksmith of 8, Garswood Terrace, Ashton-in-Makerfield. The case was heard by Judge Butler and the claim was for #300 in respect for the death of his son in the explosion. It was stated by Mr Riley who appear for the claimant claimed that the Company had not supplied a sufficient electric lighting system and did not provide or insist on the use of safety lamps. It was said that it was indiscreet to use candles at these depths when the seam was so near. The jury assessed damages at #50, with costs which had to be paid by the Company.

Sarah Ann Gillard, of Leigh Street, Earlestown sought compensation from Evans and Co. on the death of Thomas her married son who was killed in the explosion. The Judge said the only point that he had to consider was if the applicant was a partial dependent of the deceased. He had looked very carefully at the evidence and if he could have given an award he would have done so. The applicant was an aged woman whose eyesight was partially gone. He would have like to have given her £20 to £30 as Mr. Riley had suggested but there was no evidence to show that she was evenly partially dependant on him he therefore made no order.

PORTLAND No.5 Pit. Ayrshire. 17th August 1900.

The colliery was the property of The Portland Colliery Company, Limited. The managing director was Mr. Allan Gilmour with Mr. Daniel Gilmour as the manager of the colliery. The No.5 or Nursery Pit was the downcast shaft and No.4 or Wellington Pit, which was 1,000 yards away was the upcast shaft. The main coal seam in which the explosion occurred was 7 feet thick and was worked by the 'stoop and room' method. The ventilating current came down the No.5 Pit and down the Crosscut Dook and was conducted by screens and bratticing to within 20 yards of the stopping.

Owing to a fire cause by spontaneous combustion, some years before, the Hurlford section was shut off by building stoppings in each of the two mines. One of these stoppings was in the Dook Mine and about a month before the explosion the old workings were tapped and firedamp given off. After this a working place was driven where John Higgins jnr. and Boyd Crummock were working with safety lamps and the working place ventilated by brattice.

It was decided to open up a section in the Dook Mine and on the 17th. August, David Clark and John Todd were sent by the undermanager to blast out the stopping by Nobel's blasting gelatine. The stopping consisted of a brick wall, 30 inches thick and built with cement. At about 12.30 p.m., after having drilled and charged two shot holes and lit the fuses, the men retired. First one and then the other shot fired and the second was immediately followed by an explosion of firedamp which injured Alexander Dunlop who was working with James Brown. There were 12 men in this section and they retired up the Crosscut Dook. Four men went out to the pit bottom and others remained in the intake airway. While they were waiting there for the undermanager, the fireman and two miners took safety lamps and went back to get their clothes but they encountered firedamp and had to retire.

When Johnstone, the undermanager arrived, he went with the fireman and the two miners to explore the Crosscut Dook but he had put out one of the lamps and they retired. They had got nearly to the top of the dook when a second explosion occurred. About three quarters of an hour afterwards the men were found unconscious by the manager and others about 260 yards from the No.5 shaft. The undermanager was found lying in recess with a safety lamp and his naked lamp besides him. The other safety lamp was found some distance from the pit bottom. Turnbull's safety lamps was found where he appeared to have been at the time of the first explosion.

Those who lost their lives were-
Andrew Johnstone, aged 35 years, undermanager,
James Turnbull aged 41 years, fireman,
John Gemmell aged 48 years, miner.,
John Gemmell aged 23 years miner,
Boyd Crummock aged 21 years, miner and
John Todd jnr., aged 34 years, oncost worker.

On examining the stopping after the explosion, all had been blown down and there was no indication of where they had been placed. It was found that the shots had made an opening four feet wide by two and three quarters feet high right through. There seemed to be no doubt that the first explosion was caused by the firing of the shots igniting firedamp on the lower side of the stopping. Mr. Ronaldson went on to say-

"About an hour elapsed before the second explosion but I have been unable to ascertain what was the cause of it. It seems evident that a body of firedamp accumulated behind the stopping, on being released by the shots, worked its way upwards until it came into contact with a naked light, and the explosion was thus initiated was carried on and intensified by coal dust as these workings are both dry and dusty. There was evidence that the force of the blast radiated from a point and there was a possibility that the first explosion set fire to some timbering or brattice cloth which kept burning until the body of firedamp reached it and became ignited."

The inquiry brought to light several contraventions of the regulations and proceedings were taken against manager for being responsible for these. After the evidence was heard he was convicted on each case and fined £15.

GLENAVON. Rhondda, Glamorganshire. 24th. October, 1900.

The colliery was the property of the Glenavon Rhondda Collieries Company, Limited, and five men were drowned by an inrush of water from an old colliery. At the time of the accident, a heading was being driven on three shifts towards the Caerau old workings which were known to contain water. Boring operations were being carried out with a patent boring machine and up to few hours of the disaster they appeared to have been made in strict accordance with the provisions of the Act. One shift of men worked from 2

to 10 p.m. did nothing but bore and the other shifts worked the coal and shale which formed the seam which was 6 feet 5 inches thick,.

There was a fault between the Glenavon heading and the old workings which had an upthrow of at least 18 to 20 feet at the point where the Glenavon straight heading first touched it. At a few yards back from this point, the heading altered its course and was driven almost parallel to the fault. At the date of the inundation the plan showed a distance of 15 yards between the face of the heading on the dip side and the face of the Caerau workings on the rise side of the fault.

On the evening before the disaster, the borers finished their shift at 10 p.m. and there were two front boreholes, one of which had struck the fault at a distance of 13 feet and the other, bored at a greater rise, about 18 feet in advance of the face. A fresh flank hole on the left had been started but it had progressed only four feet. The shift that followed worked on the coal and shale and the second which came in at 6 a.m. also began the same work. Although the face must have advanced about three feet when at about 9.15 a.m. water came from the roof near the left hand corner of the heading and began to pour into the place. It continued for some hours but long before the flow ceased a dip working and some stalls branching from it were completely flooded. The five men who worked in these places were drowned. All the other workmen, about 80 men, escaped by means of the upcast shaft.

Those who died were-

Thomas Curtis aged 58 years, collier,
Rees Jenkins aged 24 years, collier,
David Jenkins aged 43 years, collier,
David Jones aged 52 years, collier and
Evan Jenkins aged 36 years, collier.

It was later discovered that the fault, instead of being an upthrow of 18 to 20 feet, was one of not more than 7 feet. Possibly there may have been an attempt to prove this fault from the Caerau side by drifting downwards a few feet, which would have reduced the thickness of the intervening strata. The Inspector went on to say-

“I think the unfortunate occurrence was chiefly due to the presence of the fault in creating a feeling of security. Even if the last flank hole had been bored further before the face was allowed to advance it is uncertain whether this hole would have tapped the old workings. The ground in which it was bored was washed away by the flood, but according to the plan and section it would appear that its position was such that had it been continued a little further it would have struck the fault at a point below the face of the Caerau dip, and if continued still further would have been in solid ground below the seam.”

HILL OF BEATH. Fife, Fifeshire. 15th. February, 1901.

The colliery was the property of The Fife Coal Company, Limited and seven lives were lost as a result of an underground fire. The Lochgelly Splint and the Parrot Seams in Fife were subject to spontaneous combustion and a fire from this cause in the East section of the working led to the deaths. The top 6 feet of the seam was composed of coal and Blaes and was not worked, there was then 5 feet of the Lochgelly Splint coal, 22.5 feet of Blaes and 3.5 feet of bottom coal, the Lochgelly Parrot. The seam was worked by longwall in two ‘carries’ The bottom coal was worked first and the top coal was taken out from the same roads. The seam was inclined at about 1 in 7.

The East Section was separated from the other sections of the colliery by a fault across which there were only two roads, the intake which was the haulage road and the return way. The ventilating current along the intake measured before the accident was 9,625 cubic feet per minute and passed in one current round the faces. It was stated that there

was little loss of air and most of the current reached the faces. The seam was free from firedamp and coal dust and naked lights were used throughout the mine.

In July, 1900, a fire broke out in the section and the miners were removed nearer the shaft. In September, stoppings were built in both the intake and the return airways to isolate it. These consisted of two rough walls of stone, two feet thick and two feet apart. The space was packed with redd and the outer walls clayed over. These appeared to have damped the fire to some extent.

In December, 1901, another fire, or possibly an extension of the first, broke out there was the smell of a fire in the section and on the 15th., the oversman, Robert Birrell, reported this to the manager, Mr. Richardson, who gave orders to Birrell and Alexander Naysmith, the fireman of the section to make an examination of the stoppings, and try to locate the source of the smell.

After work had stopped about 2 p.m., Birrell and Naysmith made their examination and they appeared to have travelled to the shaft by the return airway. When they did not return to the surface, the alarm was raised and a search party consisting of W.E. Richardson, the manager, James Grandison, James Reid, Alexander Carr, Patrick Manson McRoberts, all miners and James McFarlane, a rope splicer descended the shaft about 4 p.m. and went into the section by way of the intake air way. They passed the stopping and waited a little while in the air current. Richardson stated at the inquiry that there was no consultation about the danger from gases, but it was suggested that they halt and see how their breathing was affected. They stopped for a few minutes and had no difficulty breathing and stated to travel out along the return airway. Richardson had gone about 135 yards when he was affected by gasses and at once turned round and told the others to go back. He struggled back and managed to get into fresh air beyond the gasses when he lost consciousness. Carr, McRoberts, Rennie and McFarlane did not get clear of the gas and were lost. Grandison managed to retrace his steps to safety.

When the search party did not return, other men went down and a member of one of these, Martin Rennie, a miner, was overcome and died but he does not appear on the official list in the appendix to the Report.

Those who died were-

Robert Birrell aged 33 years, oversman,
Andrew Naysmyth aged 34 years, fireman,
Alexander Carr aged 43 years, oncostman,
Patrick McRoberts aged 30 years, oncostman,
James McFarlane aged 44 years, oncostman,
Martin McTearn aged 36 years, oncostman and
James Reid aged 35 years, miner.

The oversman and the fireman were not instructed to inspect the return air way and may have decided to travel to the shaft by the shortest route and, because there was less difficulty in carrying a light. They probably had no thought of danger although a little knowledge of the probability of carbon monoxide, (carbonic gas) being present might have deterred them

Mr. Rowan, the General Manager of the West Section of the Fife Coal Company's Collieries, arrived at the colliery and went down with two canaries and after consultation with Mr. Riddell, manager of the Company's Cowdenbeath Colliery, and they decided to reverse the air current to get at the bodies. This was accomplished and the bodies of Birrell and Naysmith were the first to be recovered. they were 20 yards apart and about two thirds of the distance to the shaft by the return air way. The bodies of the rescuers were found near the face. The last was recovered at 2.30 p.m. on the 16th., when it was decided to isolate the district by building stoppings in the intake and return airways near the drawing shaft.

The stoppings were built the same night and the Inspector, Mr. Atkinson, arrived at the colliery the next day. It was soon evident that air was reaching the fire and that the products of combustion were entering the current of air as the stoppings were not sufficiently air tight.

Mr. Atkinson commented-

“The accident clearly indicates that great care is necessary in entering airways into which gas from an underground fire is finding an entrance. the only reliable precaution at present is the use of mice or birds as indicators for the purity of the air. The blood of small animals is more quickly saturated by the carbonic oxide and it collapses before a man is affected, and so allows some time to retreat.

Mr. Rowan, when he first went in by the intake and got past the stoppings, found the canaries affected when he himself felt no ill-effects and while the air was being reversed. The canaries were made use of by the leading man, and they dropped motionless in their cages on several occasions when carried forward.

Before this fire and fires in adjoining pits, Mr. Rowan made use of palladium chloride as a test for carbonic oxide and on several occasions, that the gases from a fire blackened the blotting paper on which the solution was poured immediately before the test was made but he had not previously used birds.

Since the accident, mice had been regularly used for testing in other sections of the collieries troubled by fires and with satisfactory results.”

UNIVERSAL. Senghenydd, Glamorganshire. 24th. May, 1901.

The colliery was in the Aber Valley about 12 miles N.N.W. of Cardiff. There were two shafts, each 535 yards deep and 18 feet 6 inches in diameter, sunk to the Steam Coal Seams of the South Wales Coalfield and equipped to deal with a large output. The operations to sink the shafts had begun about 1890 and coal had been worked since 1896. Until a few months before the disaster, Mr. William T. Rees, mining engineer of Aberdare, acted as agent for the owners, when ill health had compelled him to give up the position when Mr. Robert T. Rees was appointed agent and devoted much of his time there often living at the colliery. The certificated manager was Mr. Edward Shaw who succeeded his father on his death about 10 weeks prior to the explosion. before his appointment he had acted as undermanager, overman and fireman and although only 30 years of age had a lot of mining experience. There was no undermanager, Mr. Shaw did the daily supervision under the Act but there was an day and a night overman. There were eight firemen divided equally between the two shifts.

The explosion occurred about 5.50 a.m. on the 12th. May after most of the night men had left the mine and before any of the day men had descended, except for the firemen who had gone down to inspect the working places before any of the colliers were allowed down to work. At the time, 450 men and boys were employed underground during the day and 240 at night. The colliery produced 6,200 tons per week. The coal came from the Four Feet Seam which was about 6 feet thick and the Six feet Seam, which was 3 feet 6 inches thick and 25 yards below the former seam. Both were fairly horizontal but undulated to some extent in some places. The field was also traversed by several faults which brought certain area of the upper seam nearly opposite the lower seam in certain areas at the faults. at the time, the workings in one seam did not overlap those of the other but in some districts, one seam was connected to the other by short headings driven through the intervening strata..

An area with a diameter of 500 yards, centred on one of the shafts had been left unworked to avoid movements of the ground through which the shafts were sunk and to prevent the buildings and engines at the surface from being affected by subsidence. As a result of these problems, the workings had become separated into a series of isolated districts labelled A to G. In each of these districts coal was worked.

The haulage was carried out by horses on all the level roads and haulage engines powered by compressed air were installed on all rising gradients and self-acting planes on the descending gradients on the east side of the winding pit. The gauge of the railway mine was 3 feet and the mine waggons weighed between eight and nine hundredweight empty and 37 cwt. when loaded. The end of the waggon was made of sheet iron and the other was open with two strong iron bars which were hinged and fitted with a pin and cotter to prevent large cobs of coal falling out. The result of piling coal high above the level of the sides and having an end that was open, was that coal was strewn along the haulage roads all the way from the face to the bottom of the winding shaft. This coal was continually being trampled and crushed by the hooves of the horses and the feet of the men and a fine powder was produced throughout the haulage roads. This carried the explosion throughout the whole of the colliery.

Coal was worked in both seams by the longwall method and an essential feature of this method was the maintenance of a continuous space in which the colliers work all round the edge of the solid coal in the districts. The colliers won the coal from the face and loaded it into the waggons standing near the face. Each waggon stood at the inner end of a roadway or gallery 10 or 12 feet wide which was made through the pillars of debris which supported the roof in the space from which the coal had already been removed. The roof in the roadways was supported by timber where necessary. The roadways were 14 to 15 feet apart and most of them were at right angles to the face. They ended in an open space at the face at one end and in a cross heading, which was a branch of one of the main haulage ways on the other. The roof of the seam rested on solid coal at the face on one side and on the packing debris, built between the stall roads on the other. The solid coal made a good support for the roof but the debris put pressure on the roof and it was known, that at about 100 yards from the face, the debris had become so compressed, that it was about half its original bulk and completely solid and was found to have sunk to half the thickness of the seam. In the 100 yards from this region to the face, the roof was slowly sinking and the height of the stall roads gradually diminishing.

To preserve the height of the roadways in this zone, the roof was taken down and the resulting debris carried forward to fill the space behind the colliers with the space between the pack and the colliers maintained at a convenient width for the colliers to work. In seams of soft coal the roof can be got down with picks and wedges but where the roof is hard, blasting had to be carried out. This was the case at the Universal colliery.

The blasting operations consisted of boring a hole 2 to 4 feet by one and a quarter to one and half inches in diameter in the ground above or below the seam, charging it with explosive, tamping it firmly with clay or other material, and firing it by a fuse or an electric battery. As a rule the ground is broken by the explosion and the shothole destroyed but it occasionally happens that the tamping gives way resulting in blown out shot and the shot hole remains almost intact. On the day of the explosion, there were two night firemen in the pit and the four day firemen had descended. All six firemen were killed in the explosion. One of the firemen was Gwilym Jones who acted a shotfirer in the Pretoria district which was the only district in which shotfiring had been sanctioned by the management during the interval between the close of the night shift at 4 a.m. and the start of the day shift at 7 a.m.

The ventilation was provided by a Walker fan, 24 feet in diameter. with the engine making 33 revolutions per minute, the total quantity of air circulating was about 120,000 cubic feet per minute. The intake and the return airway passed through the pillar that had been left to protect the shaft to connect with the workings. The air from the surface divided into two currents at the bottom of the downcast shaft, one went east and one west. Part of the return air from B district ventilated A district and the whole of the return air from D district ventilated E district. Each of the other districts, C, F and G were ventilated by its own current. There were five ventilating districts with the meaning of the Coal Mines Regulation Act, 1887. No.1 took in all the workings on the east side of the shaft and the total quantity of air passing into this on the last measurement before the disaster was

39,900 cubic feet per minute. No.2 comprised all the working on the north side and was called 'Ladysmith' and had 11,200 cubic feet per minute. No.3. was comprised of workings on the west in two separate areas named, 'Kimberley' and 'Mafeking' districts and through which 9,120 cubic feet of air were passing. No.4 was called 'Pretoria' and had 9,900 cubic feet. No.3 consisted of the working on the extreme south-west called the Six feet of the No.2 South District through which passed 9,000 cubic feet. In addition to these districts there was a small area of discontinued Six feet workings ventilated by a split taken from the main west intake and joined the return from 'Ladysmith.' Air doors, consisting of a wooden door hinged to a wooden frame surrounded by a brick wall made an air tight between the frame and the roof and sides of the passage and were set in all roads necessary for the transport of coal between the intake and return airways. Brattice sheets were also hung in those passages in the workings through which only a limited quantity of air was intended to pass. At two pits where the return air passed over the intake, air-crossings were built. One of these was an iron tube and the other was built out of wood.

The shafts were 535 yards deep and the temperature of the strata at that depth was about 78 degrees Fahrenheit and the air was dry and dusty. There were one or two areas where water dripped from the roof or oozed from the floor but the mine was generally dry and dusty.

The explosion occurred a little after 5 a.m. on the 24th. May. most of the men on the night shift which had commenced at 7 p.m. the previous night, had finished their work and had gone up the pit. one of them, John Morgan, the night fireman, had reached the top of the shaft and had stepped out of the cage before the blast reached the surface. Though he was knocked down and injured, he survived. According to those who heard the explosions and saw the effects at the surface, there were three loud reports, the second immediately after the first and the third coming after an interval which was variously estimated at from 15 seconds to two minutes. at the same instant a cloud of dust and smoke issued from the shafts and rose high into the air. The plank floor at each shaft was blown up and a considerable amount of damage was done. of the 83 men and 52 horses in the mine at the time, 81 men and 50 horses were killed. The one man and two horses that survived were near the bottom of the downcast shaft at the time. He was William Harris who the explorers found 160 feet from the bottom of the upcast shaft.

No time was lost making the repairs to the top of the upcast and fan drift. One cage had been damaged and had to be taken off the rope and work started with a single cage. Within three hours the first descent was made by the manager, the two day overmen and some others, and by sliding down the guide ropes for a few yards at the bottom where the shaft was blocked, they reached the bottom. It was here that they found William Harris. Mr. J. Dyer Lewis, an Assistant Inspector, arrived at the colliery on the morning of the explosion and Mr Robson arrived early in the afternoon and were joined by Mr. Gray and Mr. White. At least one of the Inspectors or Assistants were underground during the whole of the rescue operations.

They found the mine filled with gas and it was over a week before the west side workings could be reached and only then when the full ventilation was directed into it. The greatest difficulty came in exploring the Pretoria district which was eventually done by reversing the current, partially clearing an enormous fall and sinking through it to the roadway below. Except for a few hours on the 31st. May when it was first entered and the following day when all the bodies were found and removed, the Pretoria district remained full of gas as the return, which was originally the intake, had become completely blocked by a fall where it rose 1 in 1 through a fault. Mr. Robson commented-

"Some of my assistants and myself were with the parties who first reached and explored the district and it may at once be stated that what we saw proved conclusively that whatever was the initial cause of the explosion, it was not the firing of the shot in the hard heading there.

As is always the case with disastrous explosions in coal mines, it was found that the main haulage roads were damaged and blocked by falls of roof, only here the falls

were both high and more continuous than I have ever seen after an explosion in South Wales or elsewhere.

Notwithstanding the enormous difficulties, small passages were made over the falls and the ventilation sufficiently restored to enable several districts to be traversed and the bodies recovered within a few days. At the end of a fortnight, the bodies of all those lost with the exception of three had been found. Two more were reached on the 30th. July below a very large fall on No.2 south engine-plane. These were the bodies of Gwilym Jones, shotfirer and his assistant. They were apparently struck down on their way out at the close of their shift. The firing cable, which was rolled up, and the warming pan with some explosive in it were all found near the bodies. Up to the present time, one body has not been found and it is believed to be under a fall in the Pretoria district where he worked that night and may eventually be recovered”

Those who died were-

George Warren, ostler.

John Jones, timberman.

Thomas Coombes, assistant timberman.

George Griffiths, ostler.

John Davies, timberman.

David Morgan, ripper.

Lewis C. Hurley, waller.

William T. Evans, haulier.

Bob Rowlands, haulier.

Llewellyn Llewellyn, haulier.

Albert Edward Lee, haulier.

John Evans, fireman.

David Jones, repairer's helper.

David Jenkins, repairer.

George Griffiths, repairer.

John Phelps, haulier.

Thomas Fullerlove, repairer.

Joseph Fullerlove, repairer's helper.

William J. Lewis, haulier.

William Morgan, repairer's helper.

John Harvey, labourer.

Philip Lower, waller.

William John, repairer's helper.

James James, haulier.

James Edwards, repairer's helper.

Henry Layman, repairer.

William Charles Jones, repairer's helper.

Edward Bennett, repairer's helper.

William Trotman, repairer.

Jacob Lewis, waller.

George Filer, waller.

David Vaughan, repairer.

Rowland W. Rowlands, repairer's helper.

Thomas Fisher, waller.

John Davies, repairer.

Charles Henry Crocket, repairer's helper.

William Davies, fireman.

David Bowles, rider.

Benjamin David Griffiths, repairer's helper.

David Skym, haulier.

Thomas Trefoil, repairer.
George Lower, waller.
William David Rowlands, haulier.
David James, fireman.
Albert Lewis, waller.
George Whitfield, repairer.
William Davies, repairer's helper.
Jonah Davies, ostler.
William Schiel, ostler.
Evan John Jenkins, repairer's helper.
William Anslow, repairer.
David Griffiths, haulier.
Evan Williams, repairer.
William Thomas, repairer's helper.
Robert Jones, waller.
John Pugh, waller.
William Crook, repairer.
Thomas Williams, repairer.
Henry Jones, repairer's helper.
Thomas Morgan, repairer.
Rees Thomas, repairer's helper.
Franz Muller, repairer.
Thomas Dobson, labourer.
John Thomas, waller.
John Walters, haulier.
Albert Blackmore, waller.
William Williams, repairer's helper.
Andrew Diegan, waller.
John Thomas, repairer.
Gwilym Morgan, haulier.
William Parry, hard heading.
William Jenkin Jones, hard heading.
John Thomas, hard heading.
Thomas Jones, repairer.
George Evans, repairer's helper.
Thomas Jones, ostler.
Ebenezer Davies, fireman.
Christopher Martin, fireman.
Gwilym Jones, fireman.
David Davies, waller.

The inquest and inquiry was held at Senghenydd and lasted for four days from the 21st. October and all interested parties were represented. There was evidence that the explosion had passed through every district of the mine and had traversed every working road and face. The return airway had escaped to some extent, a fact that had been noted in many large explosions. Every one that was killed was burned with one exception, John Evans, fireman. In every district there was evidence of severe heat. Timbers and canvas sheets were burned and charred and props coated with coke dust. Doors and stoppings were blown apart and trams derailed. Heavy falls of roof occurred and the wooden air crossing was totally destroyed but the one built of iron tubes was only slightly damaged.

No lamp was found to be open and none of those recovered were defective. It was suggested by Mr Thomas Griffiths of Cymmer, a colliery manager of large experience, that the lamp carried by William Davies, a fireman, had caused the explosion by igniting an inflammable mixture on the No.2 south engine plane. He thought the gas came from a

sudden outburst where the fault crossed the road. Professor Galloway made an examination of the mine and suggested that the point of ignition was on the east side and suggested that the explosion had been caused by a blow out shot. Mr. Robson did not think that evidence pointed to this as the shotfirer was found well away from the place. Mr Robson thought that it was an explosion of coal dust.

After a searching and exhaustive examination, the inquiry terminated on the fourth day and the jury returned the following verdict-

“That George Warren, on the 24th., May, 1901, in the parish of Eglwysilian, in the county of Glamorgan, at the Universal colliery, met with his death by burns and suffocation by the afterdamp resulting from an explosion at the said colliery on the 24th. May, 1901, but we are unable to locate the exact spot, or form an opinion as to how it originated, but agree that it was carried through the workings by coal dust.”

The Jury added the following rider-

“The jury considers that the colliery was not watered in a satisfactory manner, and would suggest that the present pipes be at once extended to the point recommended by Mr. Gray. The jury does not consider that the system of watering by means of casks, and allowing the water to run a long the centre of the roads is in any way sufficient, and would in this case suggest the use of an appliance similar to the one proposed by Mr. Gray. The jury strongly urges the Members of the British Parliament to make it strictly compulsory to have the bottom, sides and top of the roads of collieries are so well watered as to make it impossible for coal dust to spread an explosion. The jury also recommends the present system of giving out explosives, and considers that a correct record should be kept of all explosives issued, used and returned.”

DONIBRISTLE. Cowdenbeath, Fifeshire. 26th. August, 1901.

The colliery was the property of the Donibristle Colliery Company and eight men lost their lives when there was an inflow of moss into the mine. The colliery was in the Parish of Aberdour near the Borough of Cowdenbeath. The partners of the Donibristle Company were James Armstrong Nasmyth and his son Alexander Hogg Nasmyth both of who held Mines Managers Certificates and had experience of managing mines. The senior partner was too old for him to take an active part in the running of the colliery but the junior partner, who was his nephew, directed all the main operations in his capacity as the owner. No undermanager was appointed by Thomas Rattray, the oversman of Nos. 12 and 15 Pits, which included the district in which the accident occurred, held an undermanger's certificate.

The mineral area leased by the Company lay on the southern edge of the Fife Coal Field and the seam that were worked lay in the Lower Carboniferous Limestone series of the Carboniferous System of Scotland. The Donibristle coal field was intersected by several large faults and the inclination was irregular but on the whole, the rise is to the south with all the seam outcropping that direction within the limits of the field that was leased.

A feature of the coalfield was that most of the workings lay under moss, 450 feet above sea level. A rough square about a mile each way, which was known as Moss Morran and consisted of flat moorland which was the home of a few grouse. On an old map dated 1662, Moss Morran was show as a sheet of water, The map was Timothy Pont's map of Fife, published at Amsterdam as past of Blaeu's 'Atlas' in 1662.

The colliery had been in operation for many years and numerous shafts and daylight mines had been in use for working the various seams. At the time of the accident there were the James and the Marion Pits to the north, Nos. 12 and 15 Pits which had recently been sunk deeper from the Mynheer to the Dunfermline Splint and during the sinking were in turn used as coal winding shafts, the Fan or Isabella Pit and the Day Mine on the Moss.

There were about 270 men and boys employed underground at the colliery and about 80 on the surface.

The part of the colliery that was affected by the accident lay to the north and east of a large fault known as the Moss Morran Dyke. The Nos. 12 and 15 Pits, sunk to the Dunfermline Split Seam at 97 fathoms and intersected the Mynheer Seam at 77 fathoms. A level in that seam extended east from No.12 Pit for 120 yards and from this a stone mine was driven flat for about 310 yards, crossed the Moss Morran Dyke which had an upthrow of 20 fathoms up to the east and caught the Mynheer Seam on the rise side.

Levels were driven in the Mynheer Seam on each side of the stone mine, and headings from the levels enabled the coal to be worked across the hill on the longwall method. To the north west, the coal was exhausted. To the east the level continued for 540 yards to the working heading and terminated at a large fault a few yards further in. a portion of the coal still remained to be extracted near the outcrop and the rise to the extremity of the level.

From the Mynheer level, inside the Moss Morran Dyke, two stone mines were driven to the Parrot Seam, which lay above the Mynheer Seam and also intersected the Glassee Seam. The first stone mine was a continuation of that across the Moss Morran Dyke and was driven level. The second was 227 yards further in and was driven at an inclination of 1 in 3. The workings were of a considerable area in the Parrot Seam but less in the Glassee Seam and the inundation of moss did not penetrate them. The workmen employed in these seams at time of the accident escaped without difficulty.

The older workings to the east were worked many years before from a higher level and had been worked by the stoop and room system. They extended from the level at which they were won to the outcrop but had not been exhausted to the east so that the innermost heading of the current working passed then and was driven into the coal at the outcrop. The outer headings stopped when they reached the older workings. It was from the innermost heading that the moss burst in.

Through older workings there was an intake airway from the surface which continued along the upper roads of the longwall workings to the working faces. The inclination of the innermost heading was 49 degrees at which rate the outcrop was soon reached. The Mynheer Seam was 5 feet 10 inches thick near the burst and was directly overlaid by a blaes or shale roof. The coal was of a very good quality and was worked on the longwall system across the hill. At intervals of About 10 yards on the slope, levels, directly opposite to each other, left the heading at right angles on each side. At the working face, 14 inches of coal was left as a roof but this was worked in the heading and levels and in addition 2 feet 4 inches of the roof stone was blasted down and built on the low side of the levels while wood pillars were put on the rise side.

The heading into which the moss burst did not extend in a direct line to the main level but was worked as a '*cut chain brae*' (a self-acting incline arranged from the running if hutches of coal from several points along its length) for 40 yards on the slope to an upper level along which the hutches were taken by hand from 14 yards to a lower heading worked as an ordinary self-acting incline and 104 yards long on the slope, to the main level. The miners and the drawers worked the cut chain brae and a wheeler named William Forsythe took the hutches from the bottom of the upper heading along the short upper level to David Rattray who ran them singly down the second heading where a bottomer, James Bowman McDonald was stationed. He coupled the hutches in rakes of six and they were led to the shaft in three stages by horses.

The air current ventilating the Mynheer, Parrot and Glassee Seams, inside the Moss Morran Dyke entered by the day mine, passed down through the old stoop and room workings, along the upper levels of the longwall workings and round the faces of the Mynheer Seams. It the passed down the headings and along the Mynheer level and into the inside Parrot Mine. After passing round the Parrot and Glassee faces it came out by the outer Parrot mine and along the stone mine, across the Morran Moss fault to the upcast shaft, at the top of which there was an exhausting fan.

In going to and from their work, the miners in the Mynheer Seam made use of the Nos. 12 and 15 Pits and the roads along which the coal was led. Access to the workings was available by the day mine and the airway but this route was not used by the miners although the officials made periodic journeys through it.

The officials in the workings inside the moss Morran Dyke under the manager were, Thomas Rattray, oversman, David Campbell, fireman for the Mynheer workings, Alexander Mitchell, fireman for the Parrot and Glassee workings and two roadmen, James Rattray and James Dick. Thomas Rattray and David Campbell who would have been important witnesses as to what happened, lost their lives in the disaster.

The heading in the Mynheer Seam reached the outcrop about October, 1900 and operations were suspended in it until a few days before the accident. When the outcrop was reached the question of connecting it with the surface was considered. This would provide a ready means of ingress and egress to and from the workings and improve the ventilation. Neither of these were urgent. The miners would certainly have welcomed the new road as it would relieve them of a toilsome journey underground, including the long climb up the inclines..

Mr. A.H. Nasmyth, the junior partner, Mr. Alexander Nasmyth, the manager and Thomas Rattray, the oversman, discussed the matter. They did not agree to anything being done that was unsafe and that the connection to the surface was to be ascertained by tests on the thickness of the moss and if it proved thicker than where the shafts had been sunk, nothing was to be done. The manager and oversman, after locating the position of the heading face on the surface, probed the moss in November, 1900 with an iron rod, 15 to 18 feet long and found no bottom. The result of that was reported to A.H. Nasmyth and he concluded that the conditions were unfavourable and that nothing was to be done. The manager told Rattray that there was no use putting in a pit there and the matter was never discussed again.

Operations were resumed in the heading on Thursday, 22nd. August and were carried on by David Campbell, pit inspector for the Mynheer workings, and by Alexander Smith, a oncost man, who had been the pit inspector in the west side Mynheer workings, James Dick and James Rattray, roadmen who occasionally assisted. A barricade was erected above the incline wheel to prevent the material worked going down the heading which was later removed to the ribsides on either side of the heading. The sand and gravel were worked away following the hard pavement of the seam and the bottom of the moss was reached on Saturday the 24th. On that day James Dick probed it by pushing forward in a slanting direction with a 17 foot long iron rod. Dick reported this to Rattray before starting work on the day of the accident and Rattray asked him if he had found any water and if he required a spade to dig out the moss. Dick said no to both questions and added that there was still 6 feet of sand to dig out. Operations continued on the 26th. and about 1.40 p.m., while David Campbell and Alexander Smith were working at the face of the heading, the roof gave way and was immediately followed by a rush of moss.

The barricade appeared to have prevented the moss flowing directly down the heading and forced it along the rib sides of the upper roads. On the east side it flowed round the two upper faces but was prevented from reaching the third face by a heavy fall of roof. This road and its face remained free from moss except for a few yards from its junction with the heading. On the west side the moss had a free course and passed round the faces and into the airway, cutting off in a short time all communication in the direction of the air shaft.

The barricade gave way an hour or two after the burst and was swept down the heading along with the wheel its frame, the timber, rails and sleepers. After this most of the moss would flow directly down the heading, along the short level and down the second incline and then in the direction of the drawing shafts.

Campbell and Smith, engaged at the face of the heading, were probably smothered instantly. Three of the miners on the west side of the heading escaped by the intake airway, two others on the east side escaped by the same route after crossing the heading.

The only miner who lost his life was George Herd Hutchinson who worked on the west side. He was swept down the heading and his body was found in this level. David Rattray, employed at the top of the second incline, was rescued from behind a stopping at the lower heading by his brother, James and James Dick who entered the workings by the day mine. William Forsyth the wheeler on the short level between headings, seemed to have attempted to escape down the lower heading. His body was found in a refuge hole 10 yards below the point from which David Rattray was rescued. James Dick and James Rattray nearly rescued Forsyth but were beaten back by the moss.

The remain six miners, John Farquhar, John Coleville, Thomas Bauld, Andrew Love, John Beverage and Alexander Bauld, of whom only John Coleville worked on the west side, took refuge in the No.3 road on the west side where they remained until they were rescued. The road was dry and the air was good, and except for the terrible risk they ran of the moss not getting away but rising and engulfing them and the want of food, they might have been in an worse situation.

James Dick and James Rattray, the roadsman, were underground at the time of the accident but not in the Mynheer district. Rattary came up and told his father, Thomas, the oversman who was on the surface, of the accident and went with him to the point of subsidence. Dick went into the Mynheer level and met the moss flowing about 50 yards from the working head. he came up the pit, saw Thomas Rattray and let him know the position. Thomas Rattary, returned to the Nos.12 and 15 Pits, saw the manager and told him of the situation then a rescue party consisting of Thomas Rattray, oversman, William Hynd, pit bottomer, James Bowman McDonald, incline bottomer and Andrew Paterson, ostler, had broken through a stopping on the rise side of the haulage level about 185 yards outbye from the work heading. They had gone up this old heading to the first of the old levels above the haulage level, and then travelled inbye 119 yards to a point where the level rose close to a fall. They then retraced their steps to find that in the interval, the moss had flowed out on the haulage level, past the stopping they had removed and had entered the heading and the old level they were in. They built a light stopping or dam in the level that they were in, 96 yards from the old heading, to check the flow of the moss, and seven yards further in, excavated a road through the waste, a distance of nine yards up the hill to the next level. They arrived at the second level above the haulage level and tried to travel out towards the old heading, but 57 yards from the road they had made, they again encountered the moss.

Their bodies were found here on the 14th. December, Rattray and Paterson lying in the moss and Hynd and McDonald near them. The moss was all around them and had flowed up the old heading and into the level but had also come out above them, direct from the workings by the upper levels.

When the manager was informed of the accident about 2.40 p.m. he went to see the subsidence at the surface. He then returned to No. 15 Pit and went down to join Rattary and the rescue party but could find no trace of them. He found that the moss had advanced about 400 to 500 yards from the foot of the incline. He went to the surface and with A.H. Nasmyth went to the point of subsidence and found that the moss was still flowing into the mine. He then went down No. 15 Pit and caused a stopping or a light dam to be built in front of the moss in the level. The moss never extended past this and did not exert much pressure on it.

During the afternoon, two square pits were started in the moss near the edge of the subsidence to try to reach the workings. Work on these went on during the night but they were abandoned on the 27th. owing to difficulties arising from the soft nature of the ground and the presence of water. A third pit was started and an old boiler with the ends removed was brought in to act as tubbing. This pit was also soon given up.

The plans of the workings were not in the office at the time of the accident but were in the offices of Messrs. Landale, Frew and Gemmell, mining engineers of Glasgow who surveyed the workings and were adding the results of the last survey which had been completed during the last week. A telegram was despatched and the plan arrived at the

colliery about 10 p.m. and a survey was made the next morning when it was found that the three rescue pit would go down into solid coal and would have to be driven for a considerable distance before the faces were reached.

A fourth pit, round in section, was started in amore favourable position but not proceeded with as it was decided to attempt to enter the mine by the hold in the moss. As a preliminary step, two pieces of wire rope parallel to each other, and about 6 feet apart, were stretched across the hole and made fast at the ends. A carriage was fitted on the ropes which was pulled back and forth by other ropes. The hole was examined from this carriage at 12 a.m. on the 27th. A few yards of the heading could be seen and it was free from any accumulation of moss which continued to flow in and disappear.

Operations were begun to secure the side of the hole by timber and eventually the bottom of the hole or pavement of the seam was reached and signals received from the imprisoned men. James Dick of Donibristle Colliery, John Jones, mining contractor of Hill of Beath Colliery and John Seddon, miner were lowered down the heading by A rope and five of the imprisoned men were brought to the surface. While Jones and Seddon were down the heading along with Alexander Bauld, the only man who was not brought up, the moss again began to flow into the hole in large quantities. It was thought that this movement was triggered by the large crowd that had gathered surging forwards and could not be kept back. The improvised shaft was wrecked and there some near escapes of people being carried down the hole.. another attempt was made to get down the heading by James Richards of Hill of Beath Colliery but he was not successful and the operations were suspended until the following morning when the hole was again examined from the carriage and found to have increased in size but a clear opening was still available.

Two beams 51 feet long and 12 inches wide, 6 inches deep were brought forward and laid in the moss across the hole, parallel to each other and six feet apart, nearly at right angles to the line of the heading. Two smaller beams were laid parallel to each other and 6 feet apart at right angles to the larger beams and to each side of the square that was formed, iron hangers were suspended and barring bolted to them to form a shaft. This was carried down to the pavement of the seam and the space between the barring and the sand and moss was roughly packed with brushwood.

About 2 a.m. on the 26th,. Robert Law, miner of Cowdenbeath, volunteered to be lowered down the heading on the end of a wire rope to which, at intervals above him, three short lengths of hemp rope were attached with the intention of bringing all the men up together. Law had a hemp rope fastened to his arm which he used for signalling. He was successful and the three men were brought to the surface shortly after 2 a.m.. During the course of the rescue at the hole in the moss, several parties explored the underground workings in the hope of finding Rattary and his party but no trace was found of them. This distance the moss had flowed from the face of the heading to the dam that was erected was 684 yards.

When the moss had stopped the lower part of the upper heading was examined and it was found that only a few yards of it above the short level was filled. The upper heading down to this point was clear but a considerable quantity of moss still remained in the faces and level roads above. The airway was choked with moss to within 16 yards of its junction with the lowest working level on the west side of the upper headings. Moss extended 56 yards up the inside Parrot Mine and the two old headings, nearer the shaft than the working heading, were filled for some yards up the level.

Mr Gemmell stated at the inquiry that an area of the subsidence was 2,378 acres, the quantity of moss and water that had entered the mine he calculated at 21,100 cubic yards and gave the depth of the subsidence as 17.5 feet. When the hole in the moss could be examined thoroughly it was found that 13 feet 9 inches of sand mixed with gravel near the bottom which had been proved by boring to be rotten rock, lay directly on the pavement of the seam, then 3 feet if peat moss so firm that it overhung the sand for about a foot or two, the came the soft moss and surface crust, together about 20 feet thick.

Comparatively little sand and gravel had entered the mine, the inflow was almost entirely soft moss with the consistency of cow dung

When Dick probed the moss from below he may not have penetrated the tough stratum and even if he did this he would have closed as he withdrew the rod and prevented the flow of soft moss and water. Steps were taken immediately to recover the bodies. The hole in the moss was permanently secured by a wood lined shaft, backed by concrete. It was up this shaft that the bodies of Smith and Forsyth were brought to the surface. Operations were also commenced at the dam on the main level. The moss was filled into hutches and sent to the surface and it was in the course of this work that Hutchinson's body was found. On the 11th November, 415 yards of the level had been cleared of the moss as well as the inside of the Parrot mine and parts of the old headings.

Those who died engaged in the workings near the inflow were-
David Campbell aged 54 years, fireman, Alexander Smith aged 48 years, oncost man, George Herd Hutchinson aged 50 years, miner and William Forsythe aged 20 years, wheeler.

Those who died forming a rescue party from the pit bottom were-
James Bowman McDonald aged 32 years, incline bottomer, Andrew Paterson aged 40 years, ostler, Thomas Rattray, aged 54 years, overman and William Hynd aged 52 years, pit bottomer.

They left written records in pencil in the time-book and in chalk on the shovel-

"This was case of taking out a stopping to give the a way when the moss came down. we cut up, and got into it was closed. We are ... choking."

Other records showed that the oil in their lamps was spent and they would have been in the dark. Many messages were sent to their families and other entries indicated that they had no hope of rescue.

Those men who were in the pit at the time of the flow at 1.40 p.m. on the 26th were-
John Farquar aged 40 years, miner who was imprisoned for 28 hours and rescued at 5.50 p.m. on the 27th,
John Coleville aged 33 years, miner who was imprisoned for 28 hours and was rescued at 6 p.m. of the 27th,
Thomas Bauld aged 36 years, miner imprisoned for 28 hours and rescued at 6.15 p.m.,
Andrew Love aged 40 years, miner who was imprisoned for 29 hours and rescued at 6.30 p.m. and
John Beveridge aged 32 years, miner who was imprisoned for 60 hours and was rescued at 2 a.m. on the 29th.

All the men had been at work for seven hours before the accident.

The rescuers who were imprisoned for 32 hours and rescued at 2 a.m. on the 29th. were-
John Jones, mining contractor and
John Sheddon, miner.

The Inspector said, that even if their exact position had been known at the time of the accident, they could not have been reached for some days and they would not have survived as the ventilation was cut off. The remaining body of David Campbell, pit inspector, who was working at the face of the heading where the moss burst in, was found on the same day as the others in the moss near the dam in the old level that had been put in by Rattray's party. His body had been carried down the working headings outward in the haulage level, and through the stopping that had been removed and so into the old level.

The inquest was held at the Dunfermline Sheriff Court on the 25th. September, 1901 when Sheriff Substitute Gillespie presided. All interested parties were represented and the jury returned the following verdict-

“The jury unanimously find that the deceased were killed in the Mynheer Seam of the No.12 Pit of the Donibristle Colliery on the 26th. August, 1901, by the subsidence of the mossy surface which flowed into the workings.”

Previous to the accident the knowledge of the surface deposits was that the immediate surface was of hard moss and heather. The sinking of shallow pits on the outcrops of the various seams had shown that soft moss was commonly found below the upper solid crust. Underground operations in the Mynheer and the seams had shown that a bed of sand or sand or gravel lay below the soft moss, separated from it by a bed of closer moss. The moss above the Mynheer heading had been probed. A flow of moss into the mine had taken place about 40 yards before which had not caused loss of life but filled a section of the workings. This inflow took place at a point 300 yards to the west of the present inflow. In one case a ‘*sit*’ or subsidence had taken place without any inflow of moss.

Mr. Atkinson came to the following conclusions-

“Mr. A.H. Nasmyth, the manager was responsible for the control, management and direction of the mine under The Coal Mines Regulation Act, 1887 and was required to exercise daily personal control of the mine. he stated at the inquiry that with the knowledge of the moss he had before the accident he would have considered it dangerous to attempt putting through it from below and he denied on oath, any knowledge of the operations that led to the accident and stated that the oversman alone was responsible for the work that had been undertaken, expecting, that if it was successful, it would have been a feather in his cap.

On the other hand, the oversman was stated to be a prudent man of large experience, he was present when the great thickness of soft moss was proved by probing it from the surface and it is difficult to conceive of his undertaking on his own responsibility dangerous work, when, even if successful, he might have expected blame for taking the matter into his own hands. David Rattary, one of the oversman’s sons, stated that his father had told him that the manager had given him permission to put up a road, and another witness said that Rattary told him he was going to ask for permission.

The resumption of the work in the heading was known to the other miners. it was for some days, within the knowledge of all the under officials, of whom the only survivors, James Dick and James Rattary, roadsman, had not mentioned it to the manager, not except for David Rattary’s statement, was there any evidence that the manager knew of the matter.

The manager’s denial must be accepted but he can not relieve himself of a measure of responsibility in respect of the discipline of the mine must have been defective if an oversman undertook such work without his knowledge and a more frequent examination of the faces would have brought this to his knowledge.

It may be that there may have been some misunderstanding which owing to Rattary’s death will never be cleared up.”

LLANBRADACH. Cardiff, Glamorganshire. 10th. September, 1901.

The colliery was the property of the Cardiff Steam Coal Collieries Company Limited and was near the Llandbradach station about 10 miles from Cardiff on the Rhymney Railway. The Senghenydd Colliery was on the west where 81 lives were lost in 1901. The colliery was commenced in 1887 under the general direction and management of Mr. William Galloway, M.E. of Cardiff who continued until 1895. It was thought that the coal would be struck at 300 to 350 yards but when the shafts were sunk, No.1, the upcast, 17 feet in diameter was sunk to 570 yards and No.2, the downcast, 20 feet in diameter, was sunk to 584 yards. They were completed in 1890 and costs had run far over the original estimates because of the greater depth and the large amount of water that had been encountered.

The seams that were met were the Little Rock which was house coal at 260 yards, the Four Feet which was steam coal at 505 yards, the Six Feet, also steam coal at 522 yards and the Nine Feet, steam coal at 550 yards. The seams dipped to the south west about one inch to the yard and all gave off firedamp. Coal winding was started from the Little Rock in 1893, from the Four Feet in 1894, the Six Feet in 1896 and the Nine Feet in 1895. The Little Rock was abandoned as uneconomical in spring 1895 and the Four Feet seams had been worked through the No.2 downcast shaft. The Six Feet, which was proving disappointing and the nine Feet seams were worked through the No.1 upcast shaft.

Then Little Rock seam gave off firedamp but not as much as the lower seams and under the direction of Mr. Galloway it was worked by pillar and stall with naked lights. Some men had been injured by explosions at the mine and at the instigation of Mr. J.S. Martin, the Inspector for the District, the management introduced safety lamps. The seams were dry and dusty but near the face in the Four Feet workings a little water was encountered.

In 1895 Mr. Galloway was succeeded by Mr. Lancaster and Mr. William Thomas. M.B.E of Aberdare who acted a Agent. Mr. Samuel Gregory was later appointed manager and Mr. W. Llewellyn as undermanager. The staff consisted of an enginewright, five overmen and sixteen examiners and four assistants. On the day shift from 6.30 a.m. to 6 p.m. there was an overman, five examiners and two assistants in the Four Feet, an overman, examiner and assistant in the Six feet and an overman two examiners and one assistant in the Nine Feet. On the night shift from 6.30 p.m. to 6 a.m. there was a overman and five examiners in the Four Feet, one examiner in the Six Feet and one overman and two examiners in the Nine Feet. All the examiners were certified shotfirers.

There were 1,608 people employed of whom 245 were on the surface and 1,363 worked underground. The explosion took place in the Four Feet seam into which a level, 1,120 yards long had been driven from the no.2 shaft to the west which was the Main Haulage road and the intake. About 115 yards from the shaft two branching headings had been driven, No. 10 to the dip in a south westerly direction and No. 11 to the rise for about 570 yards to the north east. Further along another headings had been driven at 325 yards from the shaft the 'Greens' which extended about 900 yards, at 690 yards 'Shannons' which was 640 yards long and was used a return, at 840 yards 'Frances', 350 yards long and at 990 yards 'Stricklands' which was driven for 190 yards to the south west.

The colliery was ventilated by a Guibal fan 40 feet in diameter 12 yards wide which ran at 40 to 41 revolutions per minute. According to the records for the 14th. August there were 183,557 cubic feet per minute passing down the fan drift. At the time of the accident the fan was running normally and was fortunately not damaged in the disaster.

Locked Ackroyd and Best's safety lamps were exclusively used in the mine and were locked by a spring that could only be opened by the use of a strong magnet. They were relit in the mine by an electric spark for which batteries were provided at certain lamps stations. The lamps were not opened in the mine and could only be opened at the lamp room at the surface.

The explosion occurred in the Four Feet Seam and some slight damage was done to the No.2 shaft at the surface but it was not serious. At the time there were fourteen men in the seam, five examiners and assistants who were firing shots, six in the stables attending to the horses and three in the No.11 heading who had been sent there by the examiner to complete some work.

The shot that caused the accident was fired in the Main Haulage road between 5 and 6.30 p.m. Isaacs and Evans were the men who fired it and there were a number of shots to be fired in several districts. In No.10 district Rees was found on Davie's heading. In No.11 district, Farrell fired eight shots and had gone to the surface about 10 minutes before the blast. In Greens heading Constance was found in a manhole about halfway up the heading, evidently on his way out and on the west level Moores, an assistant examiner was found. He had taken the place of the regular men who had to go home through illness.

Of the fourteen men who were in the seam at the time of the disaster, seven were found dead. They were-

Thomas John Rees aged 60 years, fireman.

George Constance aged 35 years, fireman.

William James Moores aged 26 years, spare fireman.

Alfred Kemp aged 33 years, ostler.

David William Evans aged 31 year, repairer.

William J. Isaacs aged 31 years, fireman.

Charles Henry Biddle aged 36 years, an ostler, who was rescued alive from the pit but died the following day.

David Davies,

David Williams and

David Rees were injured and three men Seaborne,

Filer and

Newton were in No.11 heading at the time and escaped injury.

There were forty two horses killed in the stables and there was considerable damage for about 900 yards along the Main Haulage Level. All the bodies were recovered in about 36 hours.

Report on the circumstances attending an explosion which occurred at Llanbradach Colliery, near Cardiff on the 11th. September 1901, was presented to Her Majesty's Secretary of State for the Home Department by J.S. Martin, Her Majesty's Inspector of Mines.

The inquest was opened on Friday 13th. September before Coroners from Aberdare and Cardiff. All interested parties were represented and the Jury brought in the verdict-

"That the deceased met with their deaths by an explosion of coal dust caused by shot firing, the place where the shot was fired being insufficiently watered at the time."

They did not see that they could attribute culpable blame on anyone but added the following rider-

"That a system of pipe watering or some other more adequate means be adopted in the future."

KEMBERTON. Shifnal, Staffordshire, 4th. December, 1901.

The colliery was the property of the Madeley Wood Colliery Company and eight men lost their lives in a cage accident. The manager of the colliery was Mr. John Cox and the shaft was 338 yards deep and eight feet in diameter. The cage was attached to the rope by two wire guide rods each one and one eighth inches in diameter. The rope was of the best plough steel and was manufactured by Messrs. Haggie brothers Limited of Newcastle. It was first put into use on August 16th. 1909 and had been in use for fifteen months. It was recapped in December, 1909 and again in April, 1910 and at each recapping the rope was found to be in excellent condition. The chain was made up of six strands, each strand was made up of seven wires, each wound round a core of smaller wires, and each strand was wound round a central core of galvanised steel wires.

The winding drum was 15 feet in diameter and was made of wood. The rope of the downward was tested in January and broke at 61.8 tons. The last upcast rope was on for two years but was in good condition and had been seen since used to wind water. The rope was examined every morning by the rope examiner and a written report made. The report for December 4th. was that the machinery was safe and that the headgear, ropes and chains were good. The report was signed by the engineman and William Stephen, the banksman for seventeen years. He had never known the drum to be damaged and no broken wires were reported. On this particular Saturday he went to work at 6 a.m. and

examined the rope before the men went down the pit. It was in good condition and he left the pit at 1 p.m. The cage had gone up and down three times while he was at the pit head.

Mark Davies, the engineman, had been an engine driver for ten years and had been at the colliery for six months. He was in charge of the engine on the 4th. December and started work at 6.20 a.m. he examined the machinery and made an entry in the book to the effect that all was safe. The rope inspector inspected the rope was the custom before the men entered the cage and when all was found to be satisfactory, two horse fettlers went down. After that, he drew after for an hour. Two pumpers went down at 8 a.m. and then the blacksmith and banksman did some repairs to the cage. Two rivets were taken out and replaced. When they finished, the cage was in his opinion, perfectly safe. Two pumpers were then brought up and at 12.30 p.m. he loosed the cage at the bottom of the shaft and went home for his dinner.

He returned at 10.10 p.m. and drew the cage from the bottom of the upcast shaft. Seven men got into the cage to go down the pit. When it was about three or four revolutions from the top of the pit, there was a sudden snap which almost brought the engine to a standstill. As far as he could judge, though he could not say for certain, the cage was then about 30 to 40 yards down the shaft, when he felt a sudden check to the engine and he stopped to find that the cage had parted from the rope and gone down the shaft.

The men who died were-

George Gough, fireman, aged 53 years.

Richard Rogers, filler, aged 41 years.

Arthur Wilton, daywageman aged 48 years.

Thomas Glenister, collier aged 37 years, all of Madeley.

Alphonso Stanley trammer aged 19 years of Shifnal and Randolph Cecil Miles, danner aged 14 years.

and Albert Jones, danner aged 14 years. of Dawley.

Coroner J.V.T. Lander held the inquest into the men's deaths at Shifnal when the jury heard that the rope had been working daily for sixteen months and for about two hours at night. The ordinary working load was 3 tons. 11 cwt., with the cage, in all about 5 tons. The number of men authorised to ride in the cage was eight on the top deck and six on the bottom. At the time of the accident there were seven men in the cage and the total weight would have been about 27 cwt.

William Stephen, the banksman, said there was no evidence to show what caused the accident but the most probable cause was that the cage caught the legs and did not get clear but he saw the legs the day before the accident and they were in good working order. The distance between the legs and the cage when the cage was fastened was between 5 and 6 inches. The cage was 4 feet wide.

There was no evidence that the cage had collided with the shaft. After the accident Stephen had found that the pieces of the broken rope had been twisted off and taken away for keepsakes, he immediately took steps to recover them.

Evidence was heard from Henry Green, an inspector with the Lloyd's Testing House, Birmingham and Stephen Dixon, Professor of Civil Engineering at the University of Birmingham. They concluded that while the rope would stand 54.25 tons, a drop of six to ten feet would cause the rope to fail.

Mr. Johnstone, H.M. Inspector of Mines called attention to Special Rule 161 relating to the duties of the engine man, which stated-

"When raising and lowering person he shall use extra care, and after an intermission of working for four hours shall run the ropes of the pit up and down before raising or lowering persons."

The witness said he did not know of the rule until after the accident but added that when there was an intermission of work he always ran the ropes up and down before winding people.

George Richards, stoker, acted as banksman on Sundays, gave the signal for the cage to be lowered. Nothing seemed wrong to him and the cage passed into the shaft. The first thing he heard was a crash above his head like breaking wood. Richard Tranter, fireman, made a weekly examination of the shaft but it was six months since he had made a written report. Mr. Wynne H. M. Assistant Inspector had examined the shaft and did not find anything to account for the accident. he had also examined the rope and found nothing but normal wear.

The jury brought in a verdict of 'Accidental Death' and called attention to the fact that the engine driver, the banksman and the stoker did not seem conversant with the special rules relating to their duties. They further suggested that the Company might adopt some device for safeguarding the persons who had to travel the shaft.