

### **WHARNCLIFFE SILKSTONE. Barnsley, Yorkshire. 30th. May, 1914.**

The colliery was about five miles to the south of Barnsley and had been working for a considerable time since sinking operations started at the colliery in 1854. It was the property of the Wharncliffe Silkstone Colliery Company Limited with Mr. G. Blake Walker as the managing director and agent and Mr. Johnathan Wroe was the certificated manager.

The colliery had four shafts Nos. 1, 2, 3, and 4. Nos. 1 and 2 were downcasts and about 45 yards apart and were also used for winding purposes. No.3 was a similar distance from No.1 Pit and was the main upcast shaft. No.2 was also an upcast shaft and use a separate fan to keep the goaf of the former workings clear of gas. The shafts connected with the following seams the Fenton Seam at 26 yards, the Parkgate Seam at 61 yards, the Thorncliffe Thin Seam at 89 yards, the Silkstone Seam at 151 yards and the Whinmoor Seam at 218 yards. The No.1 shaft was 12 feet in diameter and sunk to the Silkstone Seam at 151 yards and the seams that were worked from the shaft were the Fenton, Parkgate and Thorncliffe Thin. Below the Silkstone there was a staple pit to the Whinmoor. No.4 shaft was 14 feet in diameter and sunk to the Whinmoor at 218 yards working the Whinmoor and the Silkstone. The Whinmoor was the only seam that was affected by the disaster and the coal in that seam was about two feet six inches thick, the roof of bind which broke in lines parallel to the face as the coal was worked. The holing under the coal was fireclay and coaly matter with pyrites.

The Athersley Whinmoor District, where the explosion occurred was the only part of the seam that was being worked. Longwall method was used and a face length of just over 900 yards had been opened up. The dirt produced by the holing and the ripping of the roof and floor of the gates filled the large spaces in the goaf. Blasting was done by 'Kentite' to break down the holed coal and in ripping the roof and roadways but no blasting was done on the afternoon of the explosion. The holing was done by electric coal cutting machines and electrically driven conveyors were employed on the face to take the coal to tubs at the gatend. There was a cutter driven by compressed air on the face.

The main haulage road into the workings ran from No. 4 shaft straight in an south easterly direction for 1,700 yards and the road was fairly level and was used as the intake airway for the District. For 1,200 yards the haulage was by endless rope driven by an engine at the surface. the speed of the rope was two and half miles per hour. Beyond the terminal wheel the haulage was done by horses and this part of the road was known as No.2 Level.

The colliery was ventilated by a Capell fan at the top of the No.3 Pit and this ran at 251 revolutions per minute and delivered about 130,000 cubic feet of air per minute at a water gauge of fine and half inches. The fan was driven by a rope from a Korting two cycle double acting gas engine made by Mather and Platt capable of delivering 300 B.H.P. The engine was fuelled by cleaned coke-oven gas. A steam engine was held in reserve and was used periodically when the valves of the gas engine had to be cleaned. The average number of people employed during two coal shifts and repairing shift was 299 but during the largest shift the number was 207.

The main air intake travelled up No.2 Topside Slant and No.3 Topside Slant and the remainder was conducted by two doors in No.2 level up No.4 Topside slant to William Foster's gate. From that part it travelled down part of the coal face traversed by the explosion to the working places beyond. This was called the No.2 Section and for four days after the explosion, when the ventilation had been restored, the velocity of the air was found to be 5 feet per second and the quantity 3,200 cubic feet per second.

Electricity was used for underground lighting, pumping, coal cutting and conveying and there was no cause to think that they had been implicated in the explosion as they were far removed from the scene. The power that was used in the pit was generated at

the surface at 500 volts and the main cable taken down No.4 Pit, along the main haulage road and terminated in that level at a junction box a few yards inbye to the entrance to No.4 Topside Slant. At this point there were switches in the cables for the cutters and the conveyors. Three electric coal cutters were employed in the Athersley Whinmoor workings but the only machine at work at the time of the explosion was in the No.2 Section. It was near J.T. Fisher's gate and was a disc type machine made by Messrs. Clarke and Stevenson and had made a cut 4 feet 6 inches deep by 5 inches in the holing dirt below the seam. The whole of the coal except that above J.T. Fisher's gate which was filled out by hand and sent out to the two top gates, was carried along the face on a canvas belt conveyors which were electrically driven and loaded into to tubs at the No.2 Level where the motors operating the conveyors were placed.

There was a fair amount of dust produced at the loading place in No.2 level which was caused by the coal falling on to the conveyor and also on the face due to the cutting machine even though some moisture oozed from the coal. The main level right from the pit bottom was damp and the floor wet. The water percolated from the roof from the Silkstone waste 67 yards above. Dust samples were taken and analysed. the dust at the loading points would have been pure coal dust but because the bottom 2 feet of stone and 1 foot of top stone were ripped in the roads, this added stone dust would tend to render it harmless.

The main level was lit by electric lamps from the pit bottom to a point 210 yards inbye. As firedamp a given off in the working safety lamps were used throughout the colliery. There were 200 approved electric hand lamp of the Gray Sussmann Type, 700 approved oil safety lamps which were bonnetted Mueselers and 1,022 unapproved oil safety lamps which were unbonnetted Mueselers. All the lamps were re-lit at the surface and after the explosion 13 unbonnetted, 5 bonnetted and 3 electric lamps were found in the No.2 section. the electric lamps were still burning but all the others were extinguished. they were found undamaged and tested at Eskmeals and others at Leeds University.

In addition agent, Mr. G. Blake Walker, and the certificated manager, Mr. Johnathan Wroe, there were separate undermanagers for the Nos. 1 and 4 Pits. Mr. Thomas Fearnley was the undermanager who supervised the Athersley Whinmoor workings and under him there were six deputies, two in each of the three shifts, and two spare deputies, one each for the morning and afternoon shifts who acted as shot firers. As well as these officials there was chief engineer, Frank Faure Mairret who was in charge of the electrical apparatus and Albert Otway as the electrical foreman. Otway had one assistant to make inspections and three assistants for repairs but was responsible for carrying out the inspections himself. Some of the drivers of the coal-cutters had written authority to adjust the apparatus.

The explosion occurred on Saturday 30th. May, 1914 at 10 minutes to 2 in the afternoon. Up to about 1 p.m. on that date there were about 108 people in the Athersley Whinmoor workings. After the workings had been inspected by the night deputies William Mellor and William Belcher in the early morning, the day shift started work between 5 and 6 a.m. under the charge of two deputies Dewis Slack and William Clayton. Slack had charge of 62 men in Nos. 1 and 2 Sections and Clayton 34 in No 3. Two of the 26 men under Slack's charge, Harvey and Lang went to work at 10 a.m. and six others who were killed in the explosion went into the workings at 1 p.m.

During the morning work went on as usual and preparations were made to clear the face and move forward the cables, conveyors and other equipment. It was the Whit holidays and advantage was taken of the moving of the haulage rope in the man level to a new side slant. Two inspections were made of all the workings by Slack and Clayton. Slack's inspection of the No.2 Section began about noon and was completed by 1 p.m. by which time he had arrived at the 'box-hole' in the Level where he reported having

found a trace of gas at the top of No.3 Top Slant but the general condition was reported in a satisfactory condition.

When the deputies left the coalfaces many of the men were preparing to leave work and a considerable number which was not known, were actually at the box hole on their way to the pit bottom after the deputies arrived there but it was learned afterwards that at the time of the explosion fourteen men remained in the No.2 Section and several men whom Clayton had left working at the coal face in No.3 Section had continued to work after the others had gone out.

When Slack went down the coalface in No.2 Section, preparations were being made to start an electrical coal cutter. Walter Bailey was running a rope in front of the machine and Slack estimated that the machine had about 15 to 20 yards to cut in the forty five minutes which remained to the end of the shift. After Slack left the face the coal cutter was started to complete this work.

At about 1.45, after Slack had made his report and went to the pit bottom, and when Clayton was alone in the box-hole, there was a rush of wind from the workings and a reversal of air in the Main Level. Clayton knew something was wrong and went to the telephone which was about 25 yards away and called the manager under-manager. The colliery engineer, Frank Faure Mairet was in the engine house at the surface when he saw the automatic circuit breaker trip indicating that there had been a surge of current. After three minutes had elapsed he closed the circuit but observing his instruments, he concluded that there was something wrong and he opened both switches leaving orders that the switches must not be closed.

Shortly after Clayton rang the surface, he was joined by Joseph Sellars, the afternoon deputy who went down the pit at 1 o' clock with others, they met Thomas Fearnley who happened to be in the pit about 150 yards from the pit bottom. These two men with eight others were about to take a new haulage rope into the workings.

An inspection was made of the workings by the officials and others and it was found that an explosion had taken place in the No.2 section. One man, Pat Maycock, was found slightly injured in the No.2 Level between Nos. 2 and 3 Topside Slants. Further in between Nos. 3 and 4 Topside Slants, John Thomas Fisher, who had been seriously injured and later died, was being brought out by two men, Harvey and Lang who, at the time of the explosion had been working in the dummy gate of No.4 Topside Slant and had escaped uninjured. They found Fisher during their escape down the No.4 Topside Slant.

Meanwhile, all the men had safely left No.2 Section but the remaining eleven in No.2 Section were found to be dead.

Those who died were-

John William Wordsworth aged 24 years, a trammer,

William Fisher aged 32 years, collier,

Walter Bailey aged 19 years, machineman's assistant,

Joseph Siddall aged 18 years conveyor belt remover,

Oscar Wood aged 24 years conveyor belt remover,

Fred Walker aged 20 years conveyor belt remover,

Harry James Gardiner aged 40 years labourer at the back of the cutter,

Henry Littlewood aged 27 years ripper stoneman,

George Bailey aged 52 years machineman,

John Fearnley aged 23 years ripper stoneman

and John Thomas Fisher aged 40 years collier who died from his injuries on the 10th. June 1914.

The ventilation was easily restored by the erection of brattice sheets, the rescue work presented no serious difficulties and there was no need to use the rescue apparatus with which the colliery was amply provided.

Notice of the disaster was received at the Divisional Office in Doncaster between 4.30 and 4.50 on Saturday afternoon. By 5 p.m. the information was telephoned to Mr. H.A. Abbott, the Senior Inspector in Sheffield who immediately went to the colliery. Mr. C.L. Robinson was on leave at the time and Mr. H.M. Hudspeth and Mr. Charles D. Mottram went straight to the pit on motor cycles as there was no suitable train. They arrived at the pit about 6 p.m. By this time the bodies had been brought to the surface.

An inspection was made by the Inspectors along with Samuel Roebuck and Mr. Matthewman representing the Yorkshire Miners' Association. These inspections showed that up to the No.4 Topside Slant in the No.2 Section there was little damage but beyond this the effects of the explosion were quite considerable. The electrical power cable was blown down and disconnected from a junction box in the No.2 Level. Two doors in No.2 level were blown out by and a tub was found on the top of another about 50 yards from the face. Other tubs were overturned and some were blown from the empty to the full road. A full set of 21 tubs had their buffers locked at the end nearest the face. There were indications of crusted coke dust on the roof girders, the packs and on the coal at the face of the level. All this indicated that the blast was out by from the coalface along the level.

The ventilation when it had been restored was in good order except at the top of No.4 Topside Slant and the cutting side of William Fisher's gate. The lamps used by the dead men were picked up and their position noted. They all appeared to be intact, in good order and locked. At the face immediately on the low side of J.T. Fisher's gate, there was Clarke-Stevenson electric coal cutter. The starting switch was in the 'on' position indicating that the machine was working at the time of the explosion. It was noted that the cover of the switch was secured by only one bolt instead of six and that the cover did not appear to be flame-tight. In the dummy gate there was also a switch which was not flame-tight.

It was ascertained that at the time of the explosion the ventilating fan had been stopped for about 16 minutes to allow it to be changed over from gas to steam. Experiments were carried out by the Inspectors in the presence of Professors O'Shea and Armstrong of the University of Sheffield, to find the effect of stopping the fan for a short period and the result was that they found that gas accumulated quickly in the face in William Fisher's gate and that it quickly cleared when the fan was restarted.

In view of the defective coal-cutter and the accumulation of gas when the fan stopped it was decided that there was a contravention of Section 29 (1) of the Coal Mines Act, 1911. Gas had accumulated in the cutting side of William Fisher's gate and when the fan was restarted, the gas was carried over it. There was defect in the coal-cutter which was against General Rule 132.

The inquest into the causes and circumstances of the deaths of the victims was opened by Mr. P.P. Maitland, H.M. Coroner for the Honour of Pontefract and the West Riding of Yorkshire on the 1st. June, 1914 and after a further sitting on the 11th, following the death of John T. Fisher was adjourned until the 30th. June. The formal inquiry was opened on the 30th June at the Miners' Institution, Hoyland Common near Birdwell and resulted in 'The report on the circumstances attending the explosion at Wharnccliffe Silkstone Colliery on the 30th. May 1914' and was conducted by Samuel Pope, Barrister-at-Law and Thomas H. Mottram one of His Majesty's Divisional Inspectors of Mines. The final report was presented to Right Honourable Secretary of State for the Home Department on the 11th. November, 1914. All interested parties were represented.

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

“The twelve men lost their lives by an explosion of coal gas on the 30th. May 1914, caused by the stoppage and restarting of the fan with a defective coal-cutting machine running at the face causing ignition, and the jury are of the opinion that the whole of the management have been very negligent, but not criminally so.”

The following rider was added-

The jury trust that the Home Office will give instructions so that the Management will be more careful in the future.”

The inquest and inquiry were thorough but no witnesses were called for the Miners' Federation, Mr. Pope and Mottram concluded their report by saying-

“The grave question of criminal responsibility for the deaths occasioned by the explosion was answered by the jury in favour of the Management. we, on our part, have given much thought to this question as it affects the position of the different officials for the care and safety of the men in the district visited by the explosion and we find no grounds to take a different view from the Coroner and the jury.”

### **MINNIE PIT. Podmore Hall, Halderbrand, North Staffordshire, 17th. January, 1915.**

The colliery was the property of the Midland Coal, Coke and Iron Company. There was an explosion at the colliery which appeared to have originated in a section of the Bullhurst coal workings about 2,600 yards from the shaft and in which there was no one working at the time but nine lives were lost among men who were working in the Seven Foot Banbury seam. As the Bullhurst section of the workings was not recovered after the explosion, it was impossible to ascertain the cause of the explosion, but there was little doubt that it was caused by a gob fire.

Thirty men in all were in the pit at the time, twenty six of whom were employed at and in the neighbourhood of an underground haulage engine room about 1,800 yards inbye. They were repairing the haulage engine that had broken down. The explosion was accompanied with considerable violence but no actual flame appeared to have reached the men. Three of the deceased appeared to have been killed instantly or severely injured by the explosion, and several of the bodies showed slight signs of singeing, but not more than might result from a blast of hot air. The others died of carbon monoxide poisoning. The Bullhurst seam in this district was known to give off firedamp freely, and also very liable to spontaneous combustion in the goaf, but there had been no previous indications of heating in the section in which the explosion is believed to have originated.

Rescue teams were organised immediately after the explosion under the direction of Mr. W. Barker, the colliery manager who descended with Joseph Smith and C.H. Weaver, undermanagers and, Ralph Lawton of Brierly Pit. They succeeded in penetrating the workings without the help of rescue apparatus. On arrival at the seat of the accident it was found that nine men had lost their lives. Later rescue brigades arrived from Apedale and Podmore Hall collieries and the bodies were recovered and brought to the surface. Although the damage to the workings was slight and there was little interruption of work anticipated.

Those who lost their lives were-

John White aged 49 years, married, colliery engineer.,  
Alfred Bostock aged 43 years, married assistant engineer,  
Frederick Cheadle aged 53 years, married, ropesman,  
James Nevitt aged 36 years, married,  
Raph Proctor aged 55 years, married,  
Joseph Bates aged 23 years,  
John Daniels aged 40 yaers, married, pumpman,  
Frank Brindley aged 55 years, assistant pumpsman

and Arthur Shufflebottom aged 16 years.

At the inquest into the men's deaths it was heard that a collier named James noticed a slight stoppage in the air about 5.30 and he thought that a fall had taken place on the haulage road. He worked on for about 20 minutes when some men came out and told him that there was something wrong. He and a man named Sutton went down the haulage road and came across two sets of men who told them that there were others further along. When they arrived at the bottom of the Banbury haulage they found Bostock unconscious and his leg injured. They then went to the engineroom where they found the nine men dead. They got all the men out with the exception of Daniels.

The coroner commented that Genders, the fireman had not carried out his inspection thoroughly but an inspection had been made by others and everything found to be in good order. The verdict was that the men died as the statement of the doctors and there was no evidence to show how the explosion occurred.

### **NEW HEM HEATH. Chesterton, Staffordshire, 25th. February, 1915.**

The colliery was small, employing only about 120 men and was the property of Messrs. Hodkinson Brothers. It mined both ironstone and coal and at the time of the accident men were loading ironstone which had been won during the day. It was regarded as a safe pit and naked lights were used. The loss of life was caused by a fire which broke out in an underground engine house, the roof supports and lagging and the flooring of which was largely timber. The haulage engine rested on four timber cross beams was driven by compressed air. Trouble had been experienced due to the exhausts becoming choked with ice and to meet these circumstances, two paraffin oil stoves, resting on brick pillars were kept burning under the exhaust pipe. One of these stoves was accidentally upset and set fire to the timber.

The return air was carried across the engine room in an air crossing and this collapsed when the roof timbers were burnt through and the arrangements for reversing the air became useless. The smoke was carried down the engine dip which was the main intake and the twelve men lost their lives by carbon monoxide poisoning.

The opening of a ventilation door immediately on the inbye side of the engine room would probably have diverted the smoke straight into the return airway and prevented any loss of life but unfortunately, the importance of this did not immediately suggest itself to anyone in the neighbourhood of the engine room at the time and by the time the day fireman, who had completed the shift and gone home, reached the pit, it was impossible to reach the door in question without a smoke helmet or rescue apparatus although several attempts were made to do so. Unfortunately the mine had not been equipped with either a smoke helmet or rescue apparatus.

Mr. Arthur Hassan, the manager, gave the following statement on the accident on behalf of the firm-

“By some means or other a fire originated in the compressed air engine house and burned fiercely burning the timbers away and causing a very heavy fall of roof at the top of the main dip, consequently blocking the ingress and trapping the men. Ingress was obtained by a circuitous route through the Red Shag seam and all the men who were rescued came out along this seam.”

Continuous efforts were made to pass the fall on the main dip and their efforts were rewarded on Friday night when rescue brigade recovered the bodies when the fire was under control but not fully extinguished.

The men who died were-

Claude Hodkinson aged 40 years, married, colliery proprietor,

Ernest Brown, aged 32 years, married, engineman,  
Joseph Cornwall aged 14 years, pump attendant,  
Jacob Cobnall aged 42 years, married,  
Walter Griffiths aged 25 years,  
Levi McCreadie aged 27 years, married,  
George Skidmore aged 43 years, fireman,  
John Kennedy aged 45 years, married,  
William Hyde aged 35 years, married,  
James Brown aged 42 years, married,  
Albert Poole aged 34 years  
and Robert McCreadie was rescued alive but died in the infirmary.

Conspicuous gallantry was shown by Harry Bickerton, the day overman in the Red Shag mine. he descended the pit and fought his way through the smoke to direct several men to safety. Engineman Brown lost his life trying to warn his fellow men of the danger and went forward without breathing apparatus but did not return.

At the inquest into the disaster Mr. W.J. Hassan said that the fire broke out at 3.10 p.m. about 40 yards from the shaft bottom. Harry Bickerton told the court that in the 37, he found John Kennedy , William Hyde and James Cork. Hyde was dead, Kennedy just alive and Cork was breathing heavily. he tried to get Cork out but found that he was going very weak so he went back into the 45 where he stopped until he was rescued by the rescue brigade who he told where Cork was.

The jury found that the men had died from carbon monoxide poisoning due to the fire. They recommended that Bickerton's bravery should be recognised and the rescue brigades work also.

Proceedings were instituted against the owners and manager for breaches of Section 70 of the Coal Mines Act, 1911 as amended by Section 3 of the Coal Mines Act, 1914, and of the Rescue Regulations. Th defendants pleaded guilty to the first offence and the owners were fined £10 and 7 guineas costs. The manager was fined £5 with 5 guineas cost. The summonses for the offences against the General Regulations were withdrawn on consent of the owners giving an undertaking approved by the Home Office to maintain the requisite brigade and rescue apparatus and also to pay 10 guineas costs.

#### **BRAYTON DOMAIN No. 4. Cumberland, 26th. April, 1915.**

The explosion occurred about 11 a.m. in a district of the Yard Band Seam which was about four feet thick with a strong blue shale roof. The coal was worked by board and pillar. The pillars were extracted alongside a ten feet down throw fault against which the goaf had been laid for some years. The goaf was left to the rise so that any gas which was given off would rise into it. The roof was so strong that no falls occurred in some cases for three months after the timber had been withdrawn. adjoining the pillar which was being extracted there was an open area of at least 700 square yards. No gas had aver been reported in the district but it had been found in other districts of the same seam. No naked lights were used in the mine.

On the day of the accident, the district had been inspected twice by the deputy. Fortunately only eight men were at work, six hewers, a putter and a shot-firer. A four yard lift had been taken off the pillar, and the coal at the face of the lift was undercut on the loose side right through to an old bord, and on the fast side to within 6 inches of the old bord. into this thin rib a slightly rising shothole was drilled until it penetrated the roof and this at a point where a break extended vertically through the coal and into the roof for 20 inches to a horizontal parting in the stone which communicated with an open space above a fall on the old bord. This was a most likely place for gas to accumulate. It

was gathered from the only survivor that a charge of gelignite was fired in this shothole and immediately there was an explosion in the old bord which communicated with the goaf next to it. All seven men died within the next few weeks from severe burns.

Those who died were-

James Wilkinson aged 59, married of 71, Lawson Street,  
Joseph Rumney aged 60 years of Springkell,  
Henry Wilkinson aged 32 years, married of 71, Lawson Street,  
Thomas Burney aged 64 years, married of 16, Harriston,  
Paul Rayson aged 25 years, single of 16, Harriston,  
Thomas Herbert Little aged 29 years, single of 8, Springkell,  
and Robert Lightfoot aged 20 years, single of 36, Harriston.

The inquest took place before Mr. E. Atter, Coroner for West Cumberland. Mr. Thomas Edley, the assistant manager produced a plan of the workings for the court. William David, the deputy in the No.4 Pit said that on the morning of the explosion he went to work at 4 a.m. and worked until 12 noon. he had tested for gas in Jackson's drift, where the explosion took place and did not find any. he had never found gas in the mine.

Joseph Hillary who had been overman at the pit for nine years said he had become aware of the accident by a change in the air. David had come to him and said that he thought there had been a fall somewhere. he telephoned the manager and sent the 150 to 160 men out of the pit.

Thomas Harris was working when the explosion occurred. He said he could recollect the explosion but fell down as a stone hit him on the head and shoulder. He tried to get back but became unconscious.

There were practically no indications of violence resulting from the explosion, but there was evidence of flame and heat for some 180 yards from the point of origin. It was alleged that the back of the rib in the old bord could not be examined on account of the danger from a possible fall of roof and therefore, the state of the adjoining goaf was unknown. The Inspector was satisfied that no attempt had been made to make an examination and he found no difficulty getting through to where the shot had blown through after the accident. Coal dust played a very subsidiary part as the mine was quite damp, otherwise the consequences could have been much more disastrous.

The jury brought on verdict that the deaths had been caused by an explosion and recommended that no shot should be fired in a rib next to a goaf unless an examination had been made on the ribside of the goaf.

Mr. Wilson, the Inspector, commented-

'The points to be specially noted in connection with this accident are

- 1) that the attempt to blast down a rib of coal which was almost entirely undermined should not have been allowed.
- 2) that a powerful explosive like gelignite was most unsuitable for the purpose,
- 3) the discipline of the mine should have prevented a shot being fired next to a goaf, the condition of which was unknown.'

### **BENTINCK. Kirkby-in-Ashfield, Nottingham, 30th. June, 1915.**

The colliery was the property of New Hucknall Colliery Company, Limited and the accident occurred in the No.2 winding shaft when the cages collided when fourteen men were descending to work and two others were ascending at the end of their shift. Ten lives were lost and six others were injured.



The No.2 shaft was 440 yards to the Low Main Seam mouth and after being sunk to that seam in 1895, it was deepened to the Blackshale Coal Seam at 500 yards the following year. The Blackshale seam was worked for only five years and abandoned in 1901. The water rose in the shaft to a considerable height above the Blackshale mouth when it was abandoned. The shaft was 14 feet in diameter, though parts near the surface and between the meetings were a foot wider. It was fitted with two double-decked cages 9 feet 3 inches by 3 feet 6 inches, each carried on six chains coupled to a detaching hook and a steel winding rope four and half inches in circumference. The clearance in the shaft between the projections on the cages was about 11 inches. men were carried on the lower decks only, both of which were fenced by iron gates which opened outwards. Each cage ran on three wire rope conductors, two on the outer side and one on the inner, clamped underneath by string timbers at the Low Main inset and tightened in the headgear by screw bolts on helical springs. The cages were guided up and down the conductors in the shaft by brass lined thimbles fitted in six brackets attached to each cage.

Originally the conductors or guides were one and one eighth inch in diameter. They were installed in 1896 to the Blackshale, each being weighted at the bottom with about 4.5 tons of metal.. With the exception of one conductor which was replaced in 1913, they remained as originally placed and showed considerable signs of wear. One in particular was found to have been reduced to 1 inch in diameter in some parts when it was taken out.. It should be noted that after about eight years when the weights and lower parts became immersed in water, the conductors were secured by clamps under the strong timbers previously referred to. The weights had not been seen for five years and the management, in view of the insertion of the clamps, no longer relied upon them for tension.

In addition to the wire conductors, the pit top and pit bottom were fitted with wooden guides or spears for a short distance. The cages were operated by a pair of large winding engines, fitted with an automatic contrivance to prevent overwinding. The speed of the winding was said to have been normal, 440 yards in about 55 seconds. The pit top was enclosed by an airlock, the wooden erection forming the enclosure being carried up nearly to the pulleys. The entrance to the shaft was gained by a porch fitted with double doors at the landing level.

When the accident happened a terrible bang in the shaft was heard both by the banksman and the onsetter. Lamps and parts of the cages fell into the bottom along with some of the men. The winding engines were quickly stopped and the cages remained suspended on the ropes and the conductors retained their position though they were found to be slack. Seven men had been knocked out of the descending cage and killed, leaving two dead men and five injured inside the cage. The two men in the ascending cage were also injured, though not dangerously.

Charles Simpson, one of the men in the down cage said-

“The first inkling I had that anything was the matter was when a vivid flash lit up the shaft. Then came the tilting of the cage and the iron door by which we enter was flung open and several men standing on that side jerked out, while the next moment part of the floor was torn away and a number of others fell through. I happened to have my feet on a piece of flooring, which, although shaky, did not give way and I clung like grim death to the hand railing until it snapped. Then I clutched a piece of the iron framework to which I held on for two hours until the cage was lowered to the bottom. I was the only one of six men left in the cage who was able to speak and I returned answers to the shouts of the night men who were in the cage above. My feet were pinned down in the ironwork but I managed to get them out myself and to give water to one poor fellow who we found half hanging out of the cage. Every moment I expected to fall and how it came about that a narrow piece of flooring left

after the collision did not break away, I am at a loss to explain. When we got out two of our party were dead.”

The men who died were-

Willie Sysan aged 18 years,  
William Bacon aged 40 years who left a widow and seven children,  
Harold Brown aged 14 years,  
Ferdinand Wright aged 45 years who left six children,  
Percy Staton aged 32 years who left a widow and four children,  
Amos Allen aged 32 years who left a widow and a child,  
George Simpson,  
Willis King aged 25 year  
and John C. Fletcher aged 39 years.

The injured were:-

W. Bacon aged 60 years who had a broken leg and head injuries  
and C. Baron who was seriously injured and taken to hospital.

Five others were sent home. James Smith,  
E. Ainger aged 32 years,  
Robert Walker aged 24 years,  
Harold Shelton aged 28 years  
and Charles Simpson aged 37 years.

The inquest was held by Mr. D. Whittingham, H.M. Coroner. Percy Francis Day, the manager of the mine for the last three and half years, said that he was not aware of any difficulty in the winding apparatus up to the day of the accident but two years before a tub had caught the side and dislocated the gear. The competent persons appointed by the manager under Section 66 of the Coal Mines Act to make statutory inspections of the guides and shafts were the enginewright and three assistants whose work was to be supervised. The daily and weekly reports were signed by his three assistants and countersigned by him. According to the enginewright's evidence, the daily examination of the conductors was not altogether done during the hour stated in those reports and therefore they were incorrect so far as the times were concerned, but the inspection was made daily, except so far as a 6 feet length of the conductors below the Low Main inset was concerned. It also transpired that when any screwing up of the conductors or such matter as changing the brasses in the slipper brackets on cages was found necessary during inspection, such operations were not mentioned in the daily report books.

The Inspector pointed out to the witness in Court that the section referred to required 'the result of the examination' to be recorded, and if this was not done the reports of the condition were unreliable. Both manager and enginewright acknowledged having misread this requirements of the Act, and stated that the adjustments or changes were first done and the reports signed to show that everything was safe.

Following the accident Mr. Mottram, the Inspector, made the following recommendations to the management-

- 1) Than an additional guide be provided to each cage.
- 2) That isolating guides be installed to prevent the cages colliding again.
- 3) The substitution of weights to give adequate tension in the guides
- 4) The adoption of sliding gates of the cages in place of whose swinging outwards.

Mr. Mottram went on to say-

“After several inspections and many inquiries it cannot be definitely stated what was the real cause of the oscillation and consequent cause of the

collision of the cages. There was no clear evidence of anything having fallen down the shaft to obstruct the cages nor was there any evidence of the cages having caught the side of the shaft. It was suggested by the manager that one of the gates on the ascending cage might have opened while the cage was running, by acting as a lever against the side of the shaft, thrust the cage under the descending one at the meeting place. Certain vertical marks opposite one end of the cage and running in a straight line on the shaft wall were used as an argument in support of this theory. Such an assumption was not unreasonable, but the marks referred to were not in my view, conclusive, as parts of the cages, including pieces of sheet iron, fell down the shaft when the collision occurred, and the marks referred to may have been due to that cause alone.

It was suggested that as the conductor thimbles brasses on the cages were worn and not in a thorough state of repair there must have been accordingly considerable 'play' on the guide ropes. The worn condition of the brasses would not account for much more than half an inch of play and the accident could not be attributed to this. The thimbles were, however, held by steel brackets on the cage hoops, and if one or more of these broke loose on the ascending cage, especially a corner one, before the impact, it was probable the cause of the accident. Three of these brackets were missing but it was impossible to determine whether or not any of these had broken loose and cause the collision, but the slackness of the guides as discovered after the disaster did suggest that the oscillation of the cages had been caused by insufficient tension on the guides.'

The jury's verdict was that-

'The deceased were accidentally killed by reason of the two cages coming into violent contact owing to oscillation of the cages or the guide ropes whilst descending No.2 shaft at the Bentinck colliery and the jury regrets that the miners have not taken advantage of the Mines Act. We recommend that a better method of recording the examinations should be adopted.'

With reference to the expressed regrets of the jury that miners had not taken advantage of the Mines Act, the Coroner mentioned rumours he had heard of previous rubbing of the cages and the miners' representatives also frequently referred to the same matter in Court.

Mr. Mottram commented-

"The jury did not attach blame to anyone for the accident but it was evident from the statements of the colliery officials that the daily reports on the condition of the shaft fittings did not always accurately state either the correct time or the result of the examination, and some doubt was expressed as to whether the time, said to have been half an hour daily, was sufficient to enable a thorough examination to be made, though there was no evidence to show that the shaft was used for winding men before discovered defects were remedied. It transpired that the guides and clamps below the Low Main mouthings were not examined daily, but that the examination commenced at the surface and terminated at the inset. This was not as it should have been, and in all winding shafts ready means of access should be provided below the inset so that the daily inspection of the shaft guides can be thoroughly made.

I fear that in wet shafts this is not always done And that in some cases the water is allowed to rise in the sump top such a level as to render it impossible for the competent person to carry out entirely the examination of the guides and appliances in accordance with Section 66 of the Coal Mines Act, 1911.'

**EXHALL. Nuneaton, Staffordshire, 21st. September, 1915.**

The colliery was the property of the Betnall and Warwickshire Mines and was about four and a half miles from Nuneaton. A fire was accidentally caused at the colliery by the upsetting of a paraffin torch lamp in a wheel pit at the mouth of the downcast shaft. The wooden box of rhone containing the haulage rope was ignited and also the wooden guides in the shaft. The smoke was carried down by the air current and circulated through the mine for a short time until it was short circuited by the opening of separation doors near the bottom of the shaft.

Shortly after 2 a.m. a workman descended the shaft to oil some haulage wheels within a few yards of the surface. He had with him a paraffin torch which he dropped onto the woodwork. The draft quickly took the flames into the haulage which was burnt through.

A telephone message to the pit bottom told all the men to leave the mine by way of the Blank Bank shaft which was about a mile away through the workings. The men immediately left their work leaving behind their clothes. Some had three miles to go to the shaft. There where 375 men in the pit and they helped each other unselfishly to get out and by 3 p.m. all the men were out but many were exhausted and were sent home to recover.

The fire was fought with appliances and the Coventry Fire Brigade quickly arrived and the fire was extinguished but dense volumes of smoke were driven into the workings. Fourteen men lost their lives.

Those who died were-

H. Cardey,  
W.H. Smith,  
J. Smith,  
J. Sidwell,  
F. Hackett jnr,  
S. Beasley,  
H. Stew.,  
R. Tallis,  
C. Coat,  
H. Tipple jnr,  
S.J. Jackson,  
E. Marsden,  
C. Jennings  
and T. Tidman.

At the Inquest, the manager Mr. Jackson told the court that Charles Garner was told by the engineman to oil some bearings in the shaft. he went down carrying a naked light that was used at the surface. It did not occur to Mr. Jackson that the shaft was a dangerous place to use a naked light. Garner said that he put the light on a beam and it fell. He immediately went to the surface and down in the cage to try to get to back but he found that the guides, which were of pitch pine, were on fire. He went back to the surface and fought the fire and managed to get the flames out in about a quarter of an hour but the winding rope was broken through.

The jury brought in a verdict had men had died from pure accident and that the manager did all that was possible in the circumstances. They recommended that no naked lights were to be brought near any shaft.

**PENNANT HILL. Dudley, Staffordshire. 22nd. October, 1915.**

The colliery was the property of H.S. Pitt Limited and an explosion shortly before 6 p.m. took place about 120 yards from bottom of shaft. The cage was blown over the pulley and the headgear damaged. Some winding arrangements were restored and a party went underground and the men in pit raised to surface. The rescuers were hampered by falls and four men were found dead under debris. The explosion was caused by a blow out shot of compressed powder which was fired in man hole on the engine dip about 80 yards from the downcast shaft. This dip formed the main intake down which an air current of 18,000 cubic feet per minute was passing.

The engine plane was dry and dusty and the explosion obviously was one purely one of coal dust. Proceedings were subsequently taken against the manager and fireman who were convicted and fined. The circumstances connected with this accident showed a culpable neglect or disregard of the provisions of the Coal Mines Regulation Act and Regulations.

Those who died were:-

William Williams aged 50 years, loader,  
James Rose aged 25 years, loader,  
Charles Knight aged 22 years, loader,  
James Clarke aged 60 years, pikeman  
and Frank Clarke, rescued alive but died in Dudley Hospital.

At the inquest, Mr. B. Parker, the manager of colliery said that the shot which caused the explosion was fired while three men were enlarging a man-hole. Henry Thompson the deputy and fireman, said that he received instructions to fire the shot the previous night by Henry Williams one of the deceased. He used black powder for shot. Mr. Parker said that he had given no permission for a shot to be fired but that he was in the habit of giving such instructions verbally.

The jury returned a verdict of 'Accidental Death' and thought that manager was not guilty of wilful negligence but added rider that the question of the breach of regulations should be taken up by authorities.

#### **NEILSLAND. Lanarkshire, 26th. April, 1916.**

The colliery was the property of Messrs. John Watson, Limited and five men were killed by an interruption of water and liquid matter.

It was intended to work part of the E11 Coal Seam left when the workings of the Eddlewood Colliery was abandoned to the Neilsland shafts. The E11 coal had been reached in the vicinity of the No.3 Eddlewood shaft by mines and a blind pit. Boreholes were kept in advance but on the 26th. April the refuse with which the Eddlewood shaft had been filled which was sludge from a coal washer and was in a liquid state, burst into the E11 coal workings and blocked all the roads in the immediate area.

Four of the men who were killed were in the E11 Coal and the fifth was near the top of a brae in the Main Coal. The four men had no chance of escape and the fifth was overwhelmed by the flowing mud and carried to the foot of the brae.

The men who died were-

#### **5 victims are required.**

It is possible that the debris from a coal washer might, with an absolutely dry shaft, and an outlet for water at the bottom, to drain away the water carried by the debris, be a safe medium with which to fill a shaft even if the shaft were to be holed near the bottom some time later but under such conditions are very rare it would seem that if the

shaft was intended to be holed into, the shaft should first be emptied of the debris by working from the surface. It is probable in this case that the barring of the old shaft had collapsed and that the inrush was due to the failure of the roof above the Ell Coal seam

**WOODHORN. Ashington, Northumberland. 13th. August, 1916.**

The explosion occurred in the Main Seam at the colliery on the morning of the 13th. August. The colliery was one of the Ashington group of mines and work was going on by a repairing shift to set steel girders as roof supports. As the work was of a very special nature the shift was composed of eight deputies and five other men sent to assist them.

The shafts at the colliery were sunk to the Low Main seam and, in descending order, passed through the High Main Seam, which was not worked, the Main Seam, then the Yard Seam, which were worked as naked light mines. The Yard and the Low Main were extensively worked but nothing but headings had been driven into the Main Coal east and west at either side of a cross-measure drift which intersected all the seams, for the purpose of opening out workings in the seam. The Main Seam was ventilated by fresh air entering the top of the drift from the High Main Seam and returning down the drift to the shaft at the Low Main Seam

On the day of the accident, the men received their instructions in the Low Main seam about 6 a.m. from the master-shifter, and then proceeded up the drift to the Main Coal. About half an hour after the men had left the master-shifter, he was aware that something had happened, and he and others went up the drift. They found two men alive but unconscious in the drift below the Main Seam workings. They never recovered consciousness. The other eleven men had been killed outright by the explosion.

Those who lost their lives were-

David Armstrong, deputy overman, aged 46 years, married of 38, Rosalind Street, Hirst.  
Thomas Armstrong, middle overman, brother of David aged 43 years, married of 75, Rosalind Street, Hirst.

Robert Hindmarsh, deputy overman aged 46 years, married of 46, Rosalind Street, Hirst.

Edward Walton, stoneman aged 48 years, married of 48, Rosalind Street, Hirst.

Ralph Howard, deputy overman aged 44 years, married of 288, Sycamore Street, Hirst.

Joseph Hodgson, deputy overman aged 38 years, married of 33, Catherine Street, Hirst.

Daniel Harrison deputy overman aged 38 years, married of 152, Mapel Street, Hirst.

George R. Hudson deputy overman aged 38 years of 43, Catherine Street, Hirst.

Joseph Harrogate wasteman aged 29 years, single of 73, Sycamore Street, Hirst.

Walter Hughes stoneman aged 41 years, married of 146, Hawthorne Road, Hirst.

George Blair stoneman aged 41 years, married of Allinson's Yard, Newbiggin.

George Patterson stone cutter aged 21 years of 137. Sycamore Street. Hirst.

At the inquest which was held in Ashington, Thomas Proctor, the undermanger, stated that he was aware that the compressed air was not as usual on the morning of the disaster.

After a very careful inquiry and investigation, Mr. Wilson, the Inspector, came to the conclusion that the explosion originated through an accumulation of firedamp being ignited by a naked light near the face of the main heading. The force appeared to have travelled outbye, into each opening right and left, then across the drift into the east levels. At the face of the main east heading it is almost certain that there was another accumulation and the renewed force then travelled outbye, carrying all the girders in its

path which had not been removed by the first blast, until it met the afterdamp coming from the west levels, and was choked down.

Mr. Wilson said that the evidence leading to these conclusions were-

"The coal was so thick that the roadways were about 8 feet high and the main headings 12 feet wide. These headings were ordinarily ventilated by compressed air arranged in such a manner that a jet of air played into the open end of a 6 inch pipe and induce a current of air which was carried forward from the end of the last stenton.

On the date in question the air compressor was not at work as it was regularly stopped every other weekend from 5 a.m. on Saturday to 6 a.m. on Sunday, and further owing to the shortness of steam, due to the fact that four stokers had failed to turn up at work, the ventilating fan was running at a slower speed than usual. The compressed air being off, there would be no current of air passing into each heading beyond the last stenton, that is for a length of 58 yards on the east heading and 93 yards on the west heading. On the previous day, the fan had been off for repairs for six hours, and a furnace which would not give the same amount of ventilation was light in its stead. It is interesting to note also, though we have it upon high scientific authority that a change in pressure will not effect the exudation of gas from solid coal, that for the week ending the 13th. August the barometer has steadily fallen .75 of an inch.

Gas had never been seen in this seam and, therefore, it is likely that none of the eight officials made a very close search for it. I think it is certain that these officials never raised their lamps as high as their heads.

As a partly consumed candle was found near a full tub a few yards from the face of the main west heading, and the bodies of two men a little outbye of the tub, lying against a girder with their necks broken. I assume that one of the two men had probably stood upon a tub while making preparations for setting a steel girder, and had ignited a layer of firedamp lying next to the roof. There were little signs of either heat or force at this point. Outbye of this there had been a great heat and it is probable that near here the detonation was set up. Further outbye a man had been violently blown along the stenton from the direction of the main level to the back level, and was much burnt. Still further outbye there was fall of roof, the girders being displaced outbye. At the end of the main level next to the drift was upended in an outbye direction. At the drift end of the back west level a girder was displaced outbye. At the drift end of the main level a pony was found badly burnt, then covered by a fall of roof. Some yards from the face of the main east heading the bodies of four men were found showing signs of very severe burning and force. About this point there had been very intense heat. I feel convinced that this heat was due not to compression only but to compression of an explosive mixture. Had the explosion originated in this heading, as was suggested at the Corner's Inquest by a well-known mining engineer, the evidences of force along the west heading should have pointed in an opposite direction, and signs of heat should have been visible near the face.

The roof of these main levels was supported by 12 feet girders, some 2 feet apart, resting on running timbers each of which carried four girders, and a prop upon a footing was set beneath each girder. Along the east heading a fall, 4 feet in thickness and for a length of 90 yards, had taken place. The same witness offered the opinion that the fall of roof came away so suddenly that the air displaced by it had sufficient force to throw men to the ground and break their necks, also that the fall either liberated gas or was helped down by the pressure of gas behind it, and the gas ultimately became ignited.

The area of the fall was bonded by a depression in the seam due to the goaf in the coal workings beneath. Such conditions are most suitable for shaking the strata and steadily liberating any gas that may exist, and also loosening the supports to the roof. It is a fact however, that no gas had been seen in the cavities in the roof, neither before nor since the explosion. It is somewhat difficult to appreciate how it can be suggested, in a roadway such as I have described, that shale is going to descend like a piston in a cylinder, with such awkward obstacles in its way as all these footings, props, runners and long girders.

Prior to the explosion gas had never been seen in the mine, After the explosion it was seen at the face of the headings in both sets of levels, and at a time when the barometer had been falling for a week. On the 25th. August when the barometer had again been steadily falling for some days, and, moreover, when the normal quantity of air had been doubled, gas was seen again at the face of the headings, but was not discovered in any cavities of the roof outbye of the faces. It is a reasonable assumption, therefore, that on the date of the explosion firedamp had accumulated at the face of the headings.

Naked lights were used in this seam and although both safety lamps and candles were found near the men who lost their lives it was only because all the men concerned usually worked in the Low Main Seam that they had safety lamps in their possession.

The floor of the roadways were damp, but probably there was an amount of dry coal dust upon the flanges of the girders, sufficient to play some part in the explosion."

The inquest was held before Coroner Percy at Ashington and the jury returned the following verdict-

"That the deceased men were accidentally killed on the 13th. day of August, 1916 while working in Woodhorn Colliery, by an explosion of gas in the Main Seam, and that such gas had accumulated through want of sufficient ventilation and exploded through contact with a naked light and before any fall of stone took place. We are of the opinion that the management should see in future that written reports should be made for every shift, special or otherwise. We are also of the opinion that there has been a certain amount of laxity on the part of the management for not seeing that sufficient ventilation was being maintained."

The investigation into the accident uncovered violations of the Coal Mines Act, 1911 and legal proceedings were instituted against the manager and enginewright. The proceedings against the both were dismissed but the decision against the manager was the subject of an appeal.

Mr. Wilson commented-

"With regard to inspection, several deputies gave evidence that on Sunday morning shifts two of their number always made an inspection. They always looked upon these a special, as they were composed of officials (though in this case five others had joined them) it was unnecessary to make written reports. I found that there was an understanding common in the county, and I learned later that it was also accepted as the proper procedure throughout Durham. this, of course, was altered in both counties to conform to the strict requirements of the Act."

**CRONTON. Widnes, Lancashire. 11th. December, 1917.**



The colliery was the property of the Hulton Colliery Company and the explosion in the Pasture Seam occurred shortly after 8 a.m. and caused the deaths of eight men and injured another. At the time of the accident twelve men including a fireman, were at work in the Pasture Seam which was an entirely distinct district and had a separate ventilation system from the rest of the mine. The seam had been opened out for about nine months and the ventilation appeared to be adequate under normal working conditions and the last measurement showed that 5,400 cubic feet per minute were passing.

The Pasture Seam was reached by means of rise tunnels from the Florida Seam and opened out in bord and pillar workings. At the time of the accident there were only three stalls, Nos. 301, 302 and 303 and of these only the first one was being worked. The stalls were 15 yards wide, packed solid against the coal on the dip side and had an air road left against the coal on the rise side. There was 12 to 15 yards of solid coal between the stalls which were driven for 25 yards. The holing in stalls 301 and 302 was done by coal cutting machines worked by compressed air. The explosion occurred at the face of stall 301 where two Monobel No.1 shots were fired in the coal by an electric battery.

Beyond a few falls, very little damage was done to the workings and there was no doubt that the explosion would have been more serious but for the fact that the top portion of the intake tunnel and the level to the left of it was naturally wet for about 30 yards. The workings were also damp and the coal dust formed by the cutting machines did not affect or extend the explosion.

The ventilation was soon restored after the accident and stall No.310 cleared of gas by means of compressed air and an inspection was made within three hours of the event. It was found that two shots in the coal had been coupled and fired simultaneously. The battery with handles attached and cable were found coupled together. The firing cable was traced to one of the leads of an exploded detonator. The second lead from the detonator was not connected to the second wire of the firing cable. There was a stamp mark on the roof showing where the machine had been fixed when both holes were drilled. The top hole was about six inches off the roof and after the shot there was about an inch of socket remaining. The bottom hole was six inches above the floor and twenty inches of this remained but it had been enlarged by the shot to 3 or 4 inches in diameter. The detonator wires were still in the hole as was a portion of the clay stemming. Lying in front of this hole was a large block of coal with the other detonator leads lying over them, one of which was connected to the firing cable. The leads could be replaced and put in position for the top shot hole. This caused some doubt at the inquest but Mr. Nicholson had no doubt that the shots had been fired simultaneously.

Firedamp had been reported on several occasions in very slight quantities and the management had issued instructions that the presence of gas was to be recorded in the book on every occasion. Gas was reported in the ripping of the No.310 stall on every inspection for a week up to the day of the accident but on that day, no gas was reported. The amount of gas reported in the rippings was slight and easily cleared away, which was done on every occasion shots were to be fired.

After the explosion it was found that a seam, nine feet thick, existed seven and a half feet above the Pasture Seam. This seam was not encountered during the sinkings due to the ground being faulted. The ground between the seams consisted of clod and thin bands of coal which sagged down considerably on the roads and at the faces of the stalls. The top seam no doubt gave off a large amount of gas which collected in the space between the seams.

There was a large fall at the face of stall No.302 which extended across almost the whole width of the stall and reached the upper seam. It was suggested that this fall had occurred just before the shots were fired and released a quantity of gas which was

carried in the air current at the critical moment. This suggestion was strengthened by the fact that O'Neill's body was found partly under a fall close to the coal on the dip side of stall 302 and was burnt only where he was not covered by the fall.

Those who lost their lives were-  
Albert Ball aged 30 years, collier,  
Walter Pye aged 42 years, collier,  
James O'Neil aged 40 years, collier,  
John Harrison aged 36 years, collier,  
George Richard Jones aged 23, jigger,  
John W. Travis aged 24, haulage hand,  
Samuel Foulkes aged 63 years, waydrawer,  
Joseph Lowton aged 32 years, fireman and  
James Cummings aged 18 years, haulage hand was injured.

All the men in the workings at the time were severely burnt and subsequently died from their injuries except for the boy Cummings. The fireman, Lawton who fired the shots was an experienced foreman and walked out after the explosion to the cabin in the Florida Seam.

The inquest into the deaths of the men was held by Mr. Brighthouse, H.M. Coroner in the 15th. January. The manager put forward the theory that there had been some weighting in the roof which caused the fall at the face of stall 302 and was also responsible for bursting off the large coal block in stall 301. The Inspector thought that this was reasonable explanation.

There was a contravention of the Explosives in Coal Mines Order by firing two simultaneous shots in the coal and although this was not a direct result of the explosion, the possibility of such an occurrence would have been reduced if one shot had been fired at a time. It was difficult to account for the firing of two shots at once unless it was with the object of saving time.

The jury returned a verdict of '*Death from misadventure*' and attributed no blame to anyone.

#### **PODMORE HALL. Minnie Pit. Halmerend, Staffordshire. 12th. January, 1918.**

The colliery was at Halmerend in the Parish of Audley in Staffordshire at the north western end of the coalfield and was the property of the Midland Coal, Coke and Iron Company, Limited. This was not the first occasion that an explosion had taken place in the mine. In February, 1898 and in January, 1915 explosion occurred in the Bullhurst Seam. No lives were lost in the former but nine men lost their lives in the latter. Both explosions were attributed to gob fires.

The total number employed underground in the mine was 405. At the time of the explosion there were 248 underground. Mr. O.J. Bromley had been the agent since September, 1916, Mr. Joseph Smith, the manager since May, 1913 and Mr. Charles Herbert Weaver, the undermanager since February, 1908. There were two overmen, one on the day shift and the other on the night shift, 14 firemen, 2 shot shotfirers, one on the day shift and one on the night shift and one gob-stink examiner.

The seams that were worked at the colliery were the Four Feet, the Five Feet, Banbury Seven Feet and Bullhurst Seams. There were two shafts, No.1 was the downcast which was known as the Minnie Pit which was 16 feet in diameter and sunk to a depth of 359 yards and No.3 was the upcast shaft. The Minnie Pit was used from raising coal and water and lowering and raising man employed in the roads near the shaft and in the Four Feet and Five Feet Seams to the west which were not involved in

the explosion. The inset in this shaft was 339 yards from the surface and the remaining 20 yards were used as a water lodgement.

The other shaft was 280 yards deep and 845 yards to the south east of the downcast shaft but the hanging on was 20 yards from the bottom with the portion below this level used as water lodgement. No coal was raised at this shaft but it was used for pumping water and for raising and lowering men employed in the workings affected by the explosion in the Bullhurst Rear workings.

Two main intakes started at the bottom of the downcast shaft, one in the direction of the workings to the west and the other in the direction of the workings affected by the explosion. Both these intakes were used for the haulage of coal, and the one to the west played no part in the disaster. The other intake led to the explosion area and was flat and in line with the No.3 shaft for 45 yards and then turned slightly to the left and rose at an average gradient of 1 in 11 for 500 yards. It then turned to the left for 540 yards and rose at an average gradient of 1 in 4,5 when it was level for 260 yards. The last 60 yards were driven in the Ten Feet Seam, in which there was not work being done at the time of the disaster.

The Banbury Seven Foot and the Bullhurst Seams were cut by a crut or stone drift driven at this point where there were highly inclined and were known as the 'Rearers'. The Bullhurst was the only seam worked in this section and all the 57 men in it were recovered alive. The workings were damp and free from firedamp. The road was continued as a crut known as the Banbury Dip dipping at a gradient of 1 in 3 for 370 yards to where it intersected the Seven Feet Banbury Seam at about the same level as the 'hanging on' level at No.1 shaft. The road was driven level in that seam for 45 yards, it then turned to the left almost at right angles and continued as a level cross measure crut for 210 yards before it dipped at 1 in 6 for 60 yards to intersect the Bullhurst Seam which was 90 yards vertically below the Seven feet Seam. The roads from both shafts to the foot of the Banbury Dip Cruets were wet and damp and in consequence, this part of the mine did not suffer from the explosion. On the inbye side of this point the roads were dry and dusty and it was this area that was traversed by the explosion. The force and flame were confined to the Seven Foot and Bullhurst Seams beyond the bottom of the Banbury Dip Cruets.

The Seven Foot Seam was worked from this point by a modified longwall system. The main roads were driven in the solid and pillars left to support the roadways, the longwall face being opened up off the counter heads. In one section, owing to the undulating character of the seam and the large number of faults the pillar and stall method was adopted. At the date of the explosion the whole longwall work was completed and the pillars left to support the roadways were being extracted.

The section of the seam was a roof of 1 foot 6 inches of Rider coal, 1 foot of bass, 1 foot 3 inches of Top coal, 7 inches of holing dirt, 5 feet 6 inches to 9 feet 10 inches of Main coal and a floor of fireclay. The Bullhurst Seam had been worked in two directions from the bottom of the Banbury Dip. Some years before, a pair of cruets were driven and the seam was worked at the rise until the explosion of January, 1915 occurred causing the loss of nine lives and injury to three others. No one was in the workings which were allowed to fill with water. A pair of level cruets were driven and they intersected the Bullhurst Seam and were known as Nos. 1, 2, 3 and 4 districts.

Owing to the liability of spontaneous combustion, this area was divided into separate and distinct panels with 25 yards barriers of coal between them to ensure that the coal could be extracted as quickly as possible. Each panel had two roads in it, intake and return, in both of which were preparatory stoppings, four feet six inches thick which were built in readiness the speedy sealing of that panels soon as there were symptoms of heating. Each panel was formed into pillars 12 to 15 yards wide and the pillars were extracted by working from the barrier starting at the highest point and worked downwards thus allowing the goaf to be filled with gas in order to form an atmosphere

which would not support combustion. Four such panels had been headed out and only in a small area of them had pillars been extracted or partially extracted.

Shots were fired in getting coal in both the Seven Feet and the Bullhurst Seams. The explosive that was used was Roberite No.4 with a minimum charge of 14 ounces allowed by the Coal Mines Order. Explosives were issued in locked canisters by authorised persons to workmen and the keys and locks were only in the possession of authorised and certificated fireman and shotfirers. detonators were issued in locked cases to authorised personnel and clay from the surface was used in stemming. All the shots were charged and stemmed under the supervision of authorised shotfirers and were fired by them by means of a magneto-battery provided with a push button and removable handle.

Since some of the top working were closer to the goaf, shotfiring had been prohibited by the management for about three weeks but there was evidence that shots had been fired in this area a day or two before the explosion but it was clear that no shots were fired in this place on the day of the disaster.

The mine produced 630 tons of coal per day, 140 tons from the Banbury Seven Feet, 330 tons from the Bullhurst, 130 tons from the Bullhurst Rearers and 30 tons from the West District seams. The main haulage from each seam to the shaft was in the intake airways. The tubs were constructed so as to prevent dust escaping through their sides, ends and floor and they were not filled above the level of the top. For the first 1,300 yards from the downcast shaft, the man haulage was by two self acting endless rope haulage sets, 500 and 800 yards long with a speed of about two and half miles per hour. The haulage up the Banbury dip which carried coal from the Seven feet and Bullhurst Seams were hauled by an endless rope actuated by a rope band from the surface of No.3 shaft with a speed of about one and half miles per hour.

Secondary haulage was by means of horses, self-acting inclines and in three cases by direct rope. the drums for the ropes were revolved through friction clutches keyed on to a counter shaft which was driven by gearing off a main shaft worked by the Banbury Dip endless haulage rope. the speed of the direct ropes was about one and half miles per hour. For 210 yards along the Bullhurst Main Level Crut and 700 yards along the Main North Level the haulage was done by horses. At the time of the explosion none of the self-acting inclines was in operation in the Bullhurst Seam.

An electrical system of signalling was installed and used from the surface of No.3 shaft to the bottom of the Banbury Main Dip and the intermediate station and also from the Banbury Main Dip and the station. A telephonic system was also used at the same stations. There was an additional electrical system for the distribution engine house at the bottom of the Banbury Dip to the Bullhurst Seam but it was only carried into the seam itself about 70 yards in the direction of No.1 district. The voltage of the main system at the surface of No.3 Pit was said to be 24 volts and that of the secondary system, 12 volts.

The signal bells were Wigan Ironclad type, totally enclosed gas and dust proof. the telephones were 'Sterling' and 'General Electric' magneto instruments, ironclad and totally enclosed gas and dust proof. The ringing keys were ironclad stirrup type enclosed and gas proof and the cables were two and three core conductors with 600 Ohm insulation, single wire armoured and jute compound overall. There was no other electrical installation in the mine

The ventilation of the mine was produced by a Bumstead and Chandler fan placed at the surface of No.3 shaft. the fan was 9 feet in diameter and 2 feet wide and was driven directly by high speed steam engines which ran at 350 r.p.m. and produced about 60,000 cubic feet of air per minute at the bottom of the downcast shaft. There were provisions to reverse the air current if necessary. There was also a standby fan which was a Walker Indestructible type. This was 20 feet in diameter and 7 feet wide which was rope driven. It was run for about two hours every Sunday morning while the

Bumstead and Chandler fan and engines were examined. The quantity of the air entering the mine was maintained during the week ends..

It was required by the Coal Mines Act, 1911, Section 29 (2)-

“That the quantity of the air in the main current, in every split and at such points as may be determined by the Regulations on the mine shall, at least once a month be measured and entered in a book to be kept for that purpose at the mine. General Regulation 77 specified that these points should be a) in the main intake airways of every seam as near as practicable to the downcast shaft, b) in every split as near as is practicable to the point at which the split commences and c) in each ventilation district at or as near as practically possible to a point 100 yards back from the first working place at the working face which the air enters.”

Measurements in the Bullhurst Seam had not been entered in the correct form and so there was a breach of the Regulations. The manager's explanation was that these measurements were made by Jones, the overman, who was one of the victims of the disaster and were entered in his note book which was not recovered. Mr. Walker commented-

“As the notebook was not recovered I am unable to state the volume of air which travelled the faces of the various districts and whether or not there was undue leakage between the entrance to the ventilating districts and the faces.”

The safety lamps used in the mine were Richard Johnson, Clapham and Morris' Marsaut type. all the lamps were examined by the lampman, by the workmen and, at the shaft bottom, by the fireman. There was a book to record the nature and damage to lamps but there was no re-lighting stations underground.

The men were searched at the start of each shift by two men who were themselves searched before they made their examination. The number of men searched and the result of the search was entered in a book provided for the purpose. At least 25 per cent of the men were searched in each shift and a surprise search was made at least once in every three months for everyone on the shift. Every man not being part of a shift was searched when he descended the pit.

In working the Banbury Seven Feet and Bullhurst Seams, firedamp was given off freely. The manager's instructions were that the men were to be withdrawn when 2 per cent or more was detected in a working place and a report had to be entered in a book. The men were not allowed to return to a working place except to help the fireman in the removal of the gas, until the gas had cleared.

Rise and level places were ventilated by 18 or 12 inch pipes and a special pipe near the face that slid into these which enabled the ventilation close to the face. The manager's instruction were that wherever possible, the ventilation through these pipes must be by suction.

Water was wound in the cages of No.1 downcast shaft and this caused the shaft to be wet, so little, if any dust was made in screening the coal or dust from the full tubs ascending, was carried into the mine. The manager admitted that the boards of the tubs were not all tongue and grooved a dust could pass between them on to the roads. The faces of the No.4 District were dry and dusty and the roads in the Bullhurst Seam contained dry coal dust in sufficient quantities to allow an explosion to propagate.

The means of dealing with dust on the roads was to clean up the floors by means of shovels. the roof and sides were not cleaned at all and no watering was done beyond the slight spraying of the floor from water barrels. It was said that watering would cause the floor to heave up and the sides to fall to such an extent as to make the maintenance of the road impossible. The manager did not realise the dangerous condition of the roads and faces and he thought the cleaning of the roads in conjunction of the dust from the fireclay of the floor was sufficient to allay the danger. The Inspector commented-

“This was an assumption and not based on any sampling or analysis of the dust on the roads. He frankly admitted that, to prevent explosions of coal dust in this mine under the conditions that existed in the Bullhurst and Banbury Seven Feet Seams, systematic stone dusting should be done on the lines recommended by the Explosions in Mines Committee to prevent explosions of coal dust.”

The fireman's district in the Bullhurst started at the top of the Banbury Main Haulage Dip Crut. On the day shift in the Bullhurst Seam There were 97 men and boys including one fireman, one shotfirer and one gob stink examiner. In the afternoon shift the district was in the charge of one fireman who supervised the datallers on that shift made two inspections, the second being two hours prior to the start of the next night shift. In the night shift there were 71 men and boys including one fireman and one shotfirer which held a fireman's certificate. During the first part of the shift, the fireman made an inspection of the whole district which constituted the inspection prior to the day shift.

In the Bullhurst Seam the shotfirer held a fireman's certificate and he mad the first examination during the shift required by Section 65 of the Act, this was in the opinion of the Inspector, a breach of the Act.

In the Banbury Seam there were 45 men and boys in the day, 5 in the afternoon and 30 at night including a fireman on each shift. The fireman fired shots as wells as the shotfirer. There was evidence that the fireman fired 40 shots per shift. The fireman said that almost two hours of the shift were take up in firing shots. This was illegal as the regulations stated that a fireman in charge of a district should not have shotfiring duties that would interfere with his inspection duties.

The workmen in each shift were accompanied by the fireman who remained with them during the shift. The examination before the start of work on the day shift was made by the fireman on the night shift,

At the time of the explosion Mr. Smith, the manager, was in the office at the surface of No.3 Pit when he was informed that the haulage lads at the top of the first haulage were at No.1 Minnie Pit bottom and wanted to come up the pit. There had been a sudden gust of wind against the air current and pieces of small coal and dirt had been thrown outbye and they thought that there was something wrong. At the same time his attention was drawn to the soot and smoke issuing from the fan chimney at the upcast shaft. He went to the fan house, where he found the fan running but the fan attendant informed him that a few minutes before it had slowed down. He went to the hauling engine house, where the engineman told him that the hauling rope was fast and the engine could not be moved. Mr. Smith than rang the Banbury Haulage and in a few minutes was speaking to Frank Halfpenny at the top of the Banbury Dip who told him that the men and boys there were lying down in the dark as their lights had been extinguished. Halfpenny had travelled inbye for 800 yards. Mr. Smith told him not allow anyone to go through the separation doors into the return airway and told the winding engineman not to allow anyone to go down the No.3 upcast shaft. He also rang the Central Rescue Station at Stoke-on-Trent and asked for rescue apparatus and teams to be sent to the Minnie Pit immediately.

The agent, manager and undermanager went to the Minnie Pit and after a brief consultation, decided that the agent and undermanager should go down the pit and the manager should remain at the surface to take control of the rescue arrangements.

On descending the pit, the undermanager and the agent found a party of men from the west district and went to wards the explosion area through the haulage road. A lad was found dead about 20 yards outbye of the Rearers junction, three bodies were found in the entrance to the stable at the Rearers junction and close by, seven men and boys were alive though suffering the effects of afterdamp. The party arrived at the top of the Banbury Dip where one went to the Rearers district and the other down the Banbury Dip. No one was found alive below the top of the Banbury dip haulage road, but all the men and lads in the Rearers Districts were alive and safe.

At the surface, Mr. Smith made arrangements to receive the injured men and the rescue apparatus arrived from the Stoke Rescue Station and the Minnie Pit Brigade. They were fully equipped and descended with instructions to travel as far as they could in the direction of the workings. The top of an old shaft was removed which connected with the Bullhurst Rearers workings. This acted as a downcast and provided a direct supply of air to the men in those seams.

By noon all the injured men had been brought out of the pit. The Minnie Pit Rescue Brigade returned about 1 p.m. and reported that there was a large fall at the entrance to the Bullhurst Crut but air was travelling through to the Bullhurst. They put on their apparatus at the bottom of Lockett's and went to the top of the dip where there was a large fall. They came back and went up the push-up for some distance. After returning they went into the Return Airway and saw smoke coming from the Bullhurst Seam.

After receiving this report, a conference was held between Mr. Saint, H.M. Senior Inspector of Mines, Mr. Henshaw, the managing director of the Talk o' th' Hill Colliery and other mining engineers. It was feared that there was a fire in the Bullhurst Seam and it was decided to temporarily seal off the seam.

To do this, the Silverdale Colliery Brigade with self-contained breathing apparatus went down the pit at 4.30 p.m. with Mr. Bull, the Sub-Inspector of Mines, Mr. Davies and the manager. They found the separation doors between Lockett's Intake and Return were blown out but 50 yards further inbye separation doors between the intake and the return were intact. Analysis of the air showed that carbon monoxide was present in high concentrations and the team returned to the surface at 7.30 p.m.

Another team from Burley Colliery went down with a canary which died in the air. At 10.45 p.m. the fan was speeded up to 300 r.p.m. and canvas brattice stoppings, later replaced by wooden ones, were fixed across the Bullhurst Main Intake and the Return Airways. The separation doors were temporarily repaired with canvas brattice. A man, boy and a horse were found dead at the top of Lockett's Dip. The Rescue Brigades continued their attempt to enter the Banbury Seven Feet workings as the air was advanced. By 8 p.m. Holland's Place up the Push-up was reached and here they found three bodies.

Early on Monday morning the Captain of the Birchenwood Team, Hugh Doorboy, lost his life while wearing breathing apparatus in the foul atmosphere of Lockett's Dip. The team of which Doorboy was a member consisted of six men and after Doorboy had a consultation with a team that was coming off duty, they went inbye.

On reaching the top of a fall in Lockett's dip, they noticed an unpleasant smell. They tested for firedamp but found none but a safety lamp burned dimly and so they decided to put on the breathing apparatus. The team then went on slowly and reached a point where the lamp went out. As they were going forward they heard a sharp report and Doorboy said, "*Oh! My apparatus.*" The rest of the team tried to help him but he struggled violently. Efforts were made to get him back to fresh air but during the struggle he repeatedly knocked off the nose clips of the other men and actually knocked one man down. They were not successful in their efforts. The removal of the clips meant that the men were being affected by the atmosphere and they finally had to leave him. When they left him they knew he was dead. The body was recovered by Birchenwood No.2 Rescue Team the following day.

On the 16th. January, the Chairman of the North Staffordshire Colliery Owners' Association realised that the exploration of the workings was going to be a long and anxious matter and would have to be done by men wearing breathing apparatus.

A Consultative Committee was formed with Mr. Henshaw as Chairman and on the 19th January, the organisation of rescue teams and the work being done in the Seven Feet were discussed. The exploration was completed on the 7th. February and all the bodies recovered from that seam. There remained 98 bodies in the Bullhurst Seam,

three of which were recovered shortly afterwards from the entrance to the Bullhurst Crut.

On the 5th February the Committee held another meeting when H.M. Inspectors and representatives of the company were present. It was thought that there was a possibility of a gob fire being the cause of the explosion and the plan of the Bullhurst workings was studied, particularly with regard to the near proximity of two old districts in which explosions followed by fire occurred three and twenty years before. From the evidence of the company's officials it appeared that no fracture or gob stink had been observed in the pillars or roads near these old districts and no heat in the new district. Following the meeting the work to re-open the Bullhurst Main Crut by clearing the fall as carried on.

On 23rd. February and inspection was made and gob stink was found over a fall in the Bullhurst Crut. At another meeting of the Committee, steps to prevent the circulation of air were proposed and it was as agreed to put on temporary stoppings and the smell to be closely watched. An inspection was made which again found gob stink after which it was agreed to build board stoppings and make them as tight as possible. By the 27th. March, three schemes to re-open the workings and recover the bodies were considered by the Committee, one from the representatives of the workmen, one from Mr. Saint and one from the North Staffordshire Colliery Firemen's, Shotlighters' and Overmen's Association.

The work was done in stages with close co-operation of all parties and the Inspectors of Mines by rescue brigades wearing apparatus. The work was started on the 18th. July, 1918 and four brigades were engaged for over 12 months. Thirty four stoppings were built in an atmosphere devoid of oxygen and the seam was opened step by step until the last body was recovered on 19th. August, 1919.

The men who died were-

Daniel Brayford aged 16 years, haulage.  
Charles Platt aged 35 years, ropeman.  
Thomas Sherratt aged 65 years, ostler.  
Samuel Rowley aged 62 years, shifter.  
Edwrad Downing aged 44 years, fireman.  
Alfred Beckett aged 35 years, shifter.  
Eli Lee aged 17 years, haulage.  
Harry Wareham aged 14 years, haulage.  
Joshua Amson aged 14 years, haulage.  
Thomas Cope aged 16 years, haulage.  
John Lee aged 16 years, haulage.  
Gearge Browning aged 59 years, ropeman.  
Vincent Rowley aged 20 years, engineman.  
Ralph Pointon aged 16 years, haulage.  
Elijah Holland jnr. aged 30 years, collier.  
John Richardson aged 50 years, shifter.  
Thomas Timmiss aged 50 years, shifter.  
S. Brockley aged 19 years, haulage.  
Arthur Pointon aged 24 years, roadman.  
Lionel Rowley aged 19 years, haulage.  
Fred Rhodes aged 15 years, haulage.  
Peter Benson aged 14 years, haulage.  
James Jones aged 16 years, haulage.  
Enos Daniels aged 38 years, pumpman.  
S. Richardson aged 56 years, hooker.  
Charles Hulse aged 15 years, haulage.  
Dan Leighton aged 39 years, collier.



Jabez Burgess aged 20 years, loder.  
George Burgess aged 42 years, collier.  
William H. Green aged 45 years, fireman.  
Henry Dean aged 32 years, collier.  
Joseph Mayer aged 16 years, haulage.  
Job Harrison aged 38 years, collier.  
John Harrison aged 28 years, collier.  
Jesse Dean aged 26 years, collier.  
Bernard Holland aged 23 years, cloader.  
William Pointon aged 15 years, haulage.  
Percy Hulse aged 23 years, loader.  
Charles Broad aged 32 years, collier.  
Joe Bateman aged 32 years, collier.  
Henry Wilshaw aged 21 years, loader.  
Arnold Byatt aged 17 years, haulage.  
Fred Woodvine aged 14 years, haulage.  
Fred Edgeley aged 16 years, haulage.  
William Hollier aged 42 years, collier.  
Wilmot Scrivens aged 19 years, haulage.  
Albert Roberts aged 21 years, loader.  
Henry Jones aged 36 years, collier.  
George Webb aged 35 years, loader.  
William Genders aged 28 years collier.  
William Davies aged 20 years, haulage.  
John Hulse aged 31 years, collier.  
John Rowley aged 31 years, collier.  
Thomas West aged 30 years, collier.  
Len Pointon aged 30 years, collier.  
Thoms Morgan aged 44 years, collier.  
John Austin aged 41 years, loader.  
George Rowley aged 18 years, haulage.  
Charles Leighton aged 45 years, fireman.  
Bernard Spode aged 14 years, haulage.  
William Kestervan aged 15 years, haulage.  
John R. Davies aged 18 years, haulage.  
Francis Beech aged 15 years, haulage.  
Thomas Challinor aged 15 years, haulage.  
James Wilcox aged 21 years, loader.  
Ben Jones aged 19 years, haulage.  
Reg Harrison aged 15 years, haulage.  
Arthur Ratcliffe aged 20 years, loader.  
William Ratcliffe aged 32 tears, collier.  
Bert Brockley aged 14 years, haulage.  
Fred Rowley aged 25 years, collier.  
David Burgess aged 44 years, collier.  
Ralph Dowling aged 26 years, loader.  
John Barlow aged 18 years, loader.  
John Dean aged 27 years, collier.  
F. Cartledge aged 32 years, collier.  
Ernest Harrison aged 20 years, loader.  
Leonard Taylor aged 31 years, collier.  
W. Richardson aged 47 years, collier.  
Arthur Birkin aged 14 years, haulage.

Ernest Jebb aged 20 years, loader.

Joseph Lear aged 26 years, loader.

John Madew aged 42 years, collier.

Hugh Doorboy, member of the Birchenwood Rescue Team.

Bernard Spode aged 14 years was recovered in August and identified by his Boys Brigade belt with the motto '*Press Forward*'. He was the grandson of Elija Holand, the fireman, who lost four sons in the explosion. At this date there were still ninety three bodies in the mine.

The formal inquest into the men's deaths was held in October, 1919 by Mr. H.W. Adams, H.M. Coroner. The delay between the accident and the holding of the inquest and the formal inquiry was due to the fact that the Bullhurst Seam gave off firedamp freely and was also liable to spontaneous combustion and the men employed in the inspection of the mine had to wearing breathing apparatus which made progress very slow. As a result of the inquest the jury returned the following verdict-

"1. We consider that the deceased persons met their deaths from the medical point of view as follows-

a) 144 from carbon monoxide poisoning.

b) 11 from violence and carbon monoxide poisoning.

2. The cause of death was an explosion of gas and coal dust in the Bullhurst and Banbury Seams of the Minnie Pit.

3. There is not sufficient evidence to show what caused the initial flames.

4. We consider that the pit had been carried on in accordance with the Coal Mines Act, 1911, and the General Regulations, so far as they have been issued, but were are of the opinion that, if the dust had been systematically removed, the explosion would not have been so extensive.

5. We do not consider that any particular person is to blame for the explosion.

6. As a result of the Inquiry we consider that further regulations should be issued at once for the treatment of coal dust, but we disagree with the miners' representatives that nothing whatever should be introduced which will injure the miners or the young life employed in the mine and that there is great scope for inquiry by the Government experts on this point, particularly, making coal dust itself inert.

7. The jury consider that any shot lighter should report in writing anything he considers unsafe in the mine.

8. It appears that the workmen have not taken advantage of Section 16 of the Coal Mines Act relative to the periodical inspection of mines by workmen and we consider that they should do so."

The inquiry into the disaster was conducted by Mr. W. Walker, C.B.E., H.M. Chief Inspector of Mines at the Town Hall, Stoke-on-Trent on December 3rd, 1919. Mr Walker said in the report-

"After carefully considering the facts revealed i the evidence of the various witnesses and by personal investigation, I have come to the conclusion that the explosion originated in or near the goaf at the top end of the No.4 district in the Bullhurst Seam and that the cause was an explosion of gas developing into an explosion of coal dust which traversed roads reached by the Banbury Dip Crut in the Bullhurst and Banbury Seven Feet Seams to which the force and the flames of the explosion were confined. The igniting cause of the explosion of gas in or near the goaf was, in my opinion, either a defective lamps or sparks produced when the bull-dog stone over the goaf fell of the two I think the former is the more probable cause."

James Thomas Machin, leader of the Rescue Brigade when Hugh Doorbyo collapsed and Frank Halfpenny were commended for their bravery.

### **STANRIGG and ARBUCKLE. Airdrie, Lanarkshire. 9th. July, 1918.**

The colliery was in the Parish of Monkland about four miles from Airdrie and was the property of Messrs. L. and A. McCracken who traded under the name of Messrs. McCracken Brothers. There were three shafts, the No.2 upcast, the downcast and the No.3 shaft through which materials and coal was wound but did not enter into the scheme of ventilation of the colliery. A blowing fan, driven by an electric motor, was placed close to the top of the downcast shaft which sent 14,100 cubic feet of air per minute to ventilate the mine.

The manager was Mr. George Johnstone who had managed the colliery since July, 1915. There were two firemen, William McCracken aged 24 years and Edward McCracken, aged 28 years both of whom were acting as firemen before the passing of the 1911 Act. The colliery was worked by a single shift with the people descending between 6.45 a.m. and 3.15 p.m. The firemen descended the No. 3 shaft at 6 a.m. and after making their statutory inspections, returned to the station at the top of the No.3 shaft and then the men there. After passing the shift into the mine, they returned below ground to their duties. It was their custom to meet at the surface about 10 a.m. to have their breakfast.

Three seams were worked at the colliery, the Humph, at 82 feet, the Splint at 117 feet, and the Virgin at 126 feet. At the time of the accident the Humph and Virgin Seams were being worked. The upper leaf of the latter was known locally as the 'Sour Milk'. The road from the No.3 shaft were in the Virgin Seam and two stone mines were driven from that Seam from the Humph coal section.

Five boreholes were put down in October, 1916 which showed that there was moss and mud and clay present at various depths. The seam had been worked up to the day of the accident without any moss or water being let into the workings. The method of working was originally by stoop and room, then longwall with coalcutting machines, but latter, this method was abandoned as being too costly and the stoop and room method was again adopted. There were several faults in the seam, and one of these, an upthrow of 1 foot inbye, was close to the longwall face when that method was stopped. This fault and the stopping of the longwall face had a very important bearing on the subsequent accident.

On the day of the accident the two firemen, as was their custom, came to the surface to have their breakfast between 10 and 10.30 and while they were eating, a bottoomer at the No.3 shaft, James Rafferty, came to the surface and told them that there was something wrong as the ventilating current '*was coming very strong*'.

They descended the No. 3 shaft at once and William McCracken, fireman in the Humph Seam was proceeding inbye when at about 90 yards from the shaft bottom, he was met with liquid moss moving along the haulage road in the Virgin Seam and pushing a hutch before it towards the shaft. Edward McCracken went to his section of the workings, the 'Sour Milk' and was able to get to the Wee Stone Mine leading to the machine section when he was met by the moss flowing towards him. He collected the men in that part of the workings and took them to the No.2 shaft, up which after steam had been raised in the winding engine there, they were drawn to the surface.

The inflow of moss, by filling up the two roads by which anyone working in the Humph Seam could have escaped, had been cut off and 19 men and boys were entombed and preventing rescue parties getting to them from the Virgin Seam. The 58 men and boys in other parts of the mine were rescued and got safely to the surface.

On the day of the accident Mr. H. Walker, the Divisional Inspector of Mines and Mr Wynne, the Senior Inspector were at the Sheriff Court in Kilmarnock and at 12.20 p.m. they received a telephone message from the Divisional Office at Edinburgh informing them of the accident. They arrived at the colliery between 4 and 4.30 when they were

briefed on the situation by the owners and the managers and learned what had been done.

These operations were the starting of a small shaft, about 5 feet square, at a point which was considered to be immediately above north-western edge of the workings in the Humph Seam and the cleaning out of a borehole which had been put down some time before. Work was also going on the redding of a road from the No.3 shaft through the old stop and room workings in the Humph Seam

There was great difficulty in clearing out the old borehole, and as the borer thought he could put down a new whole quicker and one was started. The attempt to sink the 5 feet square shaft was continued as were the underground operations.. It was found that to sink through the moss something like a boiler shell was required and steps were take to obtain one of suitable size. The first length, that was obtained with much difficulty, was on the ground at 10.30 p.m. and the second length arrived some time later. In the meantime the attempt to sink a new borehole had failed owing to the breakage of the linking tubes due to the movement of the moss. A second attempt failed from the same cause about midnight. The first attempt had got to about 44 feet and the second to 48 feet. At the sites of the boreholes the Humph Seam was 60 feet below the surface.

Before the arrival of the boiler shells, a survey was made and the position of a new sinking marked off. By 11 a.m. on the 10th . July, the boiler shell was 22 feet down and into the clay. The liquid material in it was cleared out during the afternoon but owing to the general movement in the body of the moss, it was impossible to keep the shell plumb and further sinking in it was abandoned.

One of the boreholes had reached the pavement of the Humph Seam and in it water was measured to a depth of sixteen and a half feet above the pavement of the seam. From this information it was apparent that the face at the highest level in the workings was under water, but in order to be sure, another borehole was started within the boiler shell in which sinking operations had been abandoned. This was not a success due to the lateral movement of the moss bending the lining tubes and another was then started 12 to 15 feet further to the east. The hole reached the pavement of the Humph Seam between 6 and 7 a.m. on Thursday, 11th. July and proved that the water at that point was 8 to 9 feet above the pavement. This was the nearest point of the workings in the Humph Seam in which the 19 men and boys were, and extinguished any hopes of them being found alive.

The redding of the road through the old stoop workings from No.3 shaft was continued by relays of men. The distance they had to go was 462 feet and all the time they were working there was a danger that the creeping moss would cut them off from the No.3 shaft. The work continued until the borehole proved the height of the water and the men were withdrawn. The moss continued to fill the pit and reached up the No. 3 shaft to within 34 feet of the top.

With all hope gone of rescuing anyone alive, the question was the recovery of the bodies. It was decided to sink a shaft on the site of the borehole to the Humph Seam. After considerable delay, the shaft was sunk and the roads in the Humph Seam to the top of the stone drift driven from the Virgin Seam were cleared of moss. Three barricades were the erected at points which isolated the area in which the inrush had taken place and after this was done the work of clearing the roads was carried out from the No.3 shaft.

Eight bodies were recovered in the roads that were cleared and it was expected that the remainder with the exception of the brakesman, whose working place was at the top of the mine leading from the Virgin to the Humph Seam, which was of the area that had been shut off by the barricades. One of these was removed and the roads immediately on the inbye side were explored as far as it could be done without running any undue risk. The face was reached in three places but no bodies were found.

The operation so the inbye side of the barricade found a break in the floor about 13 feet high and three feet wide which was 6 feet long. Further operation were connected with serious risk and the workers were withdrawn. The barricade was replaced and the roads between the workings between the and the No.2 shaft and Nos. 2 and 3 shafts was then cleared but no more bodies were recovered. That left eleven men and boys that were not recovered and were probably in the barricaded area. Further attempts to recover them were deemed too dangerous and this was a view shared by all concerned. Some thought that the men could not have survived more than two hours after the moss came in but Mr. Walker thought it likely that they did not survive half an hour.

Those whose bodies were recovered were  
William Marshall aged 31 years, miner,  
John Queen aged 66 years, miner,  
Leslie Gilchrist aged 15 years, drawer,  
George Templeton aged 36 years, miner,  
Neil Thompson Lindsay aged 16 years, drawer,  
James Munro Sneddon aged 14 years, drawer,  
Bernard Augustus McAdams aged 14 years, drawer and  
David Niven aged 17 years, drawer.

Those whose bodies were not recovered were  
Alexander Park aged 54 years, bencher,  
Robert Pollack snr. aged 49 years, miner,  
Robert Pollack jnr. aged 15 years, drawer,  
Alexander Gilchrist aged 31 years, miner,  
William Gilchrist aged 33 years. miner,  
Robert Campbell aged 28 years, miner,  
William Williamson aged 27 years, miner,  
William Brady aged 49 years, miner,  
Thomas Brady aged 18 years, drawer,  
John Sneddon aged 31 years, miner and  
William Campbell aged 48 years, miner.

The inquiry into the disaster was opened at the Sheriff Curt, County Buildings, Airdrie on the 18th. December by Mr. W. Walker, C.B.E., H.M. Acting Chief Inspector of Mines and presented to the Mines Department on 12th March, 1919.

It was pointed out that the delays in the rescue operations were caused by the fact that it was the Glasgow Fair Holidays. After a full inquiry the conclusion in the report stated that-

“There were no contraventions of the Coal Mines Act, 1911.

The manager in changing the system of working committed an error of judgement. In the conditions which existed, I am of the opinion a great risk of causing a sudden inrush of moss was run even if the blue clay had not thinned by the change from one system of working to another. Either of the two systems (longwall or stoop and room) throughout would have been less dangerous than to start with one and then afterwards change it.

In the circumstances which existed the safest method of working to adopt and adhere to was, the stoop and room with rooms of a maximum width of 8 feet and stoops left for the support of clay such a size that not more than 50 percent of coal was extracted.

The conditions vary so much as regards the thickness of the clay, depth of moss, etc. from mine to mine, that it is not possible to have Regulations dealing with the precautions necessary for safe working applicable to all circumstances, and I think,

therefore, for the prevention of similar accidents in future, a regulation should be established requiring that where coal or other mineral is being worked or roads driven under moss, quicksand, other liquid matter, (a) steps shall be taken by boring or otherwise to ascertain, as accurately as possible, the nature and thickness of the moss, quicksand, etc. and the working or workings. (b) Where the thickness of the strata between the moss quicksand etc., is proved to be less than 10 fathoms, or ten times the thickness of the seam being, or proposed to be, worked, whichever is the greater, all working to be stopped and notice given forthwith to the Inspector of Mines of the Division."

The question as to whether the mine would reopen was referred to a Committee with the Divisional Inspector of Mines as chairman.