ASTLEY GREEN, Tyldesley, Lancashire, 7th. June, 1939.

The colliery belong to the Manchester Collieries Ltd., and five men lost their lives in the Crombuke Mine, No.2. It was one of the worst mining disasters to have taken place in the last fifty years. There had been a gob fire in the mine at about 2 o'clock in the morning and Mr. J.H. Hewitt, the manager had been summoned to superintend the outbreak. There were rumours in the village that there was something wrong at the pit but the initial statement aid that the men had been withdrawn and there were no injuries. A man who worked din the affected working place said that the fire had been localised by tone dust and the men had been withdrawn as a precaution and he thought it would be safe for the morning shift. Later is was learned that the explosion occurred.

By 2 in the afternoon a chalked notice at the pit entrance, "No Afternoon Shift" was the first indication that something was seriously wrong. While fighting the fire it was reported that an explosion had taken place and an explosion had trapped the men about a mile and half from the pit bottom. Messages were sent to the Lancashire and Cheshire Mines Rescue Station at Boothstown and tow teams rushed to the pit.

Hundreds of tone of sand and bricks were sent down the shaft and a message sent to Tyldesley Ambulance Station of supplies of oxygen and carbon dioxide.

Gallant efforts were by the teams to get the trapped man out and they fought their way to where three men lay apparently dead. Almost immediately three more explosion occurred in rapid succession which drive the rescuers back. Throughout the afternoon the parties worked in relays and the anxious crown round the gate knew something serious had happened when Mr. D.C. Smith, agent for the colliery went down the pit and later the Inspector of Mines. Mr. Coatesworth and T.J. Brown, the miners' agent went down the pit.

The managing director, Mr.. J.T. Browne made the following statement:-

> "The Manchester Collieries Ltd., deeply regret to report that a series of slight explosions in the Crombuke Mines of the Astley pits, five men have lost their lives and others are injured though only one seriously. All the men have been got out of the pit. After consultation with HM. Inspector of Mines an d the miners' agent, it was decided, in order to avoid further loss of life to seal the district affected."

John Skuse told of the incidents which followed the first explosion:-

> "I was working in the `Ram's mine which is on a level higher than the Crombuke, when a firedamp came rushing to us shouting, 'Come on lads, there has been an explosion and w we have to get the fellows out'. I raced after him with other men and w e had to go a long way before we got to the scene of the disaster. When I got there it was very hot and there was smoke hanging about. I found Mr. Middleton on the verge of collapse, struggling to pull Frank Morris along with him. We carried Middleton and Morris away on stretchers and Mr. Middleton told us that Bill Smith was further along but we were advised not to go for him a s there was too much gas but three men went forward. They were George Morgan, William Hulme and Richard Sutton. Hulme was sin an exhausted condition when brought to the surface and sent home in the Ambulance. I think Mr. Middleton's effort was the bravest thing a man could do, He was s in no state to walk himself and he helped other."

Despite his injuries, Mr. Middleton had dragged Morris for nearly 200 yards and at one stage he stopped to release air form a pipe to revive him.

John Wilding one of the rescue men said he travelled 150 yards down the roadway to where William Smith was found with injuries to his head. They took Smith to the pit bottom. He went on to say:-

> "I was working 300 yards from the place where the explosion is supposed to have taken place but I never heard a report"

Those who lost their lives were:-
John H. Hewitt aged 36 years married, manager.
John Griffiths aged 45 years, married, underlooker.
Joseph Keegan aged 38 years, married, fireman.
Eli Smith aged 46 years, married, collier and
William Warhurst aged 36, married, collier.

Those who were injured:-
William Middleton aged 35, undermanager.
Lewis Jones, collier.
John Laughlan, underlooker.
Frank Morris and William Smith.

By the following Thursday the affected are was sealed and further inspections were planed when the colliery re-opened.

The Vicar of Astley arranged a simple memorial service at the pithead.

VALLEYFIELD. Culross, Fife. 28th. October, 1939.

The Valleyfield Colliery was one of a group of fourteen collieries which were owned by the Fife Coal Company. It was situated about five miles west of Dunfirmline at Newmills, in the Parish of Culross. There were two shafts at the colliery which were sunk about 1908. The output was about 850 tons per day. The general manager of the Fife Coal Company was Mr. C.C. Reid and the Company's operations were so extensive it was impossible for him to exercise a working control over the fourteen pits in the group which produced three and a half million tons of coal per annul. The system was to appoint agents with each supervising a group of collieries and these agents reported tot reid at frequent intervals. The agent responsible for the Valleyfield Colliery was Mr. K.H. McNeill, the manager was Mr. Robert Aitchison and both the agent and the manger were well qualified, Overmen were appointed by the managers to supervise the work during the shifts.

The colliery was well laid out and equipped with the latest plane of the best type electrical apparatus. the Company had a Safety and research Department and an appointed Safety Engineer, At each of the fourteen collieries there was safety Officer and some of the Collieries had safety Committee. The Company was also trying to educate it's officials and men in the object of the Regulations and their responsibilities under these Regulations. These voluntary efforts had led to a considerable decrease in the accident rate.

During the night shift on 28th. October 1939, work in the Culross District was proceeding in the No.2 Diamond Section at a longwall face which was about 730 feet in length. Three development headings which were named after the contractors whose men worked in them, McKeeman's, Cairn's and Dodd's were also being worked in the coal to eventually form another longwall face. Dodd's Stone Mine was off Mckeeman's level and this was standing at the time of the disaster. It had been worked by Dodd's men until 18th. October when the succeeded Cairn's and his men in the development of what became known as Dodd's Heading. At the time of the explosions there were also men in the Culross Five Feet Section.

The explosion originated in the Culross District of the mine in Dodd's Heading and spread extensively and violently to other parts of the mine. Thirty three men died instantly and two others were seriously injured. One of these George Toal, was able to

give evidence to the inquiry though seriously injured. A further twenty four en wee affected by the afterdamp.

The men who died were-
Those working in Dodds' Heading-
E. Link aged 24 years, oncost worker,
T. Kerr jnr. aged 27 years, fireman
A. Gauld aged 33 years,
D. Baillie aged 36 years,
P. Martin aged 42 years and
M. Murray aged 33 years, all brushers.

Those working in McKeeman's Heading-
R. Nicholson aged 32 years, brusher and
A. Doohan aged 39 years, brusher.

Those working in McKeemans's Level and Crosscut-
J. McFadzean aged 28 years, oncost worker,
D. Ewing aged 27 years, brusher and
M. Tinney aged 25 years, oncost worker.

Those working in Cairn's Heading-
W. Ramage agd 52 years, brusher,
J. Brown aged 21years, brusher,
R. Wright aged 48 years, brusher,
D. Cairns aged 35 years, oncost worker and
P. Gilliard aged 21 years, brusher.

Those working on No.2 Diamond Face-
H. Toal aged 29 years, machineman.
W. Devlin aged 30 years, machineman.
A. Anderson aged 43 years,brusher.
A. Lawrie aged 32 years, brusher.
R. McFarlane aged 39 years, repairer.
A. Christie aged 61 years, supervisor.
J. Spowart aged 44 years, brusher.
R. Lang aged 22 years, engineer.
J. McIntyre aged 21 years, electrician.
B. Keegan aged 52 years, brusher.
C. Morrison aged 51 years, fireman.
A. Paterson aged 32 years, brusher.
J. Irvine aged 38 years, packer.
D. Hogg aged 49 years, packer.
T. Clark aged 47 years, brusher.
T. Campbell Hutchinson aged 57 years, brusher.
and E. Glass aged 28 years, oncost worker.
T.Kerr snr. aged 58 years, oncost worker on the telephones who died in hospital and
A. Banks aged 65 years, oncost haulage worker who died in hospital.

The Inquiry into the causes and circumstances attending the explosion which occurred at Valleyfield Colliery, Culross, Fife on the 28th. October 1939 was conducted by R.P. Morison, K.C., Commissioner and Sir Henry Walker, C.B.E., LL.D. acting as technical assessor was held in the No.8 Court of the Parliament House, Edinburgh. Evidence was taken for fourteen days in January with all interested parties represented

and the investigation was adjourned on 27th. January. It was resumed on the 29th. February and concluded on the 4th. March. The report was presented to D.R. Grenfell, C.B.E., M.P., Secretary for Mines on the 2nd. August 1940.

The origin of the explosion was an ignition of gas by the firing of a shot in the face in Dodd's Heading. When the explosion occurred the place was 12 feet wide and 8 feet 6 inches high which was being drive to the rise in the coal. The method of bringing down the coal was to fire five or six shots in the bottom of the coal and then one or two shots in the top coal. Examination of the face after the disaster disclosed that the last shot in the top coal had caused the explosion. There were two unusual fractures in the coal seen after the shot but there was no evidence that these were visible before the shot was fired.

The presence of soft coal made it possible that the last shot was over charged and that it had consequently 'blown out' and the gas ignited and exploded. This theory was accepted by all the expert witnesses at the inquiry. Another possible source of ignition was the shot-firing battery which was used in the heading. the battery was a Schaffler's System Electrical Mines exploder B.D.K.25 and it was found in a refuge hole about 40 yards from the face. This was approved for work in stone but not for work in coal. There was no evidence that this had been used to fire the shots and the manager explained that the responsibility for the failure to return the battery to the surface lay with the fireman.

The question of whether the gas was liberated and ignited as the last shot was fired or an explosive mixture was present when the shot was fired which had been liberated from the firing of the shots in the bottom coal. The expert witnesses thought that the latter ws the case. At the place where the explosion originated the signs of violence were very slight. Stemmers were left standing up but the explosion increased in violence as it went across the heading and spread extensively and violently to other parts of the mine. The main force of the explosion travelled outbye from Dodd's Heading and reached the junction of the Heading and McKeeman's Level. It the divided into three. One blast went down the Diamond Dook, one down the No.2 Unit Loading Road, causing a heavy fall and down McKeeman's Level, the Compressor Road and into McKeeman's Heading. The force also travelled inbye into the Culross Five Foot Section where doors were blown inbye in the Top Road No.1. In the whole of the Diamond Section arches and girders were displaced and tubs overturned. The overcast across the Culross Five Foot Dook which was about 900 yards from the Dodd's Heading was disrupted and dust was raised at the downcast shaft more that 1,500 yards away.

The inquiry came to the following conclusions-

"1). That the initial cause of the explosion was an ignition of firedamp during the firing of a shot in the top coal.

2). That the spread of the explosion was caused by coal dust which had accumulated in certain roads.

3). That certain roads through which the explosion spread were insufficiently stone dusted.

4). That had the discovery of gas after the firing of almost every round os shots in the headings been reported, as it ought to have been in accordance with the Regulations, it is possible that steps might have been taken which would have prevented the explosion.

5). That a number of other breaches of the Regulations in relation to shot firing were alone connected with explosions. But in my view they suggest an absence of proper supervision over the work in the headings.

The Investigation has not in my opinion disclosed that it is necessary or that it is desirable that the existing regulations should be amended or supplemented. Suggestions were made by Mr. W.T. Miller, who appeared for the Federation of Colliery Deputies, that ventilation by means of auxiliary fans was undesirable, and

that stonedust should be suspended in shelves near the roofs of the roads. But the evidence led at the investigation was not sufficiently directed to these points to enable me to express a concluded view upon them."

MOSSFIELD. Longton, Staffordshire. 21st. March, 1940.

The colliery was the property of the Mossfield Colliery Company Limited as was situated on the outskirts of Longton at the south eastern end of the North Staffordshire Coalfield. There were two shafts which were both sunk to a depth of 440 yards which was about 20 yards below the Cockshead Seam in which the explosion occurred. The seam dipped to the south west about 1 in 3 and was recovered by a level crut, 60 yards long from the downcast shaft. Other seams both above and blow the Cockshead were worked from the shaft and the roads in the Seven Feet Banbury seam were used as part of the return airway from the Cockshead workings. The seam was comparatively thick and there was 7 to 8 feet of clean coal with a parting of 1Å to 2 feet from the roof and an intermittent band of pyrites nodules, 2 inches thick about 5 feet from the floor. The roof consisted of 2 feet of 'Hussle', a black and very friable carbonaceous shale and immediately above this there was 2 feet of dirt which was a soft coal measure shale followed by a layer of strong shale with ironstone bands. The seam gave off firedamp freely and safety lamps and only Permitted explosives were allowed in the workings. The seam produces a lot of dust and much stone dust was required to neutralise this.

This seam at the mine had a unenviable reputation and from it's earliest days the workings had been dogged by troubles from spontaneous combustion and on the 16th. October 1889, an explosion initiated by a gob fire caused the loss of 64 lives. There was little doubt that the explosion was carried by coal dust into the workings of the second seam, the Seven Feet Banbury and there was little doubt also that this explosion would have been far more serious if the roadways had not been treated with stonedust. The experience of the intervening half century was confirmed by Sir W.N. Atkinson's description of the seam-

> "On account of the liability to gob fired special methods of working were adopted and except for the accident of1889 had been substantially successful until the present unfortunate occurrence. such special methods involved, fundamentally, the avoidance, as far as possible, of leakage of air through the packs, the systematic withdrawl of roof supports and the prevention of the accumulation of bituminous matter in the wastes, backed up by working in separate panels with only one way of ingress and one of egress for the ventilation, thus affording for rapid isolation in an emergency."

The 15's longwall face was 90 yards in length and for all practical purposes was fully mechanised. the coal was cut at a height of 2 feet 6 inches fro the floor by compressed air driven percussive boring machines and delivered to the loading point in the level by a compressed air driven shaker conveyor. To the dip of the level there was short length of about 5 to 6 yards of face which was hand filled directly into tubs. On account of the 'hussel' and the 2 feet of dirt next to it, a thickness of 2 feet 6 inches of coal was left to form a safe roof in the longwall face. The strip pack were built up to this coal roof but the top coal fell into the wastes but as much of it as possible was recovered and sent out. Debris from this fallen roof provided the material for building the packs.

There was a patch of faulty ground which was encountered in the 15's Level. This fault was crossed and the face opened out beyond it but another fault was found 20 yards further on with another down throw. This ran in the direction of the dip of the seam so that the two faults met near the rise side of the face. The face was stopped while a search was made to recover the seam beyond this second fault. First, a level crut in line with 15's Level was driven in for 30 yards and, finding no coal, it was stopped at this point. Then a roadway was opened up on the line of the face alongside the inner fault and from it's junction with the return airway another crut was set out and strata wee

recognised as that which usually formed the floor and a slight extension of this crut to the left found the coal.

From this point a heading was driven 7 feet wide and supported by 7 feet steel arches until it reached a point which was known to be about the position of the first mentioned crut. A careful survey was carried out which showed that the floor of the seam in the heading was 18 feet vertically above the floor of the crut. The position of the seam was now accurately fixed and a third crut was started from 15's Level veering slightly to the left. It cut the seam 40 yards in and an extension of the line of the crut along the seam was met by a downbank heading from the side of which a new face was opened out.

The explosion 1 a.m. on Thursday 21st. March in the third hour of the night shift of Wednesday/Thursday, 20th./221st. March and at the time there were 12 persons, including the fireman, at work in and near 15's Level face. All of them were killed or severely injured by the explosion and only one, the fireman survived.

At the beginning of the day shift on the 15th. March, a contractor collier named, William Neil Washington, reached the 15's Level face at about 6.30 a.m. The face had been cut and the coal was ready for filling out. proceeding up the face from the Level and looking into each waste on the way, Washington reached the third waste. Against the pack on the rise side he noticed a peculiar smell and traced it along the pack side for a distance of about a yard. He described the smell as an oily one which he did not consider it unusual in the Cockshead working except that in this instance it was stronger than usual. Along the face, going uphill, he lost the smell in a short distance. He did not make an immediate report to anyone because he knew that the fireman was coming along very soon. He went to work opposite the No.3 waste.

The day fireman, Marshall Carson, arrived shortly afterwards and approached the face from the return airway at the rise side. He noticed a faint smell when he was about 10 yards down the face and about opposite the lower side of the waste next to the return airway. He followed the smell down to No. 3 waste where he met Washington who then mentioned the smell to him. The time was then about 7. 30 a.m. After he had examined the face and satisfied himself that there was nothing wrong with the waste, Carson thought the smell was coming from the pack. He completed his inspection of the face and came outbye along the 15's Level and reported the smell to the overman, John William Birks whom he met in the main haulage dip. Birks and Carson made their way to 15's face via Tam's Jig and the return airway.

Birks gave the following account of the events to the inquiry. The account was reported almost verbatim and the Inspector commented on his 'colloquial terms and expressions'-

> "I examined this face until I got to this third waste. Well, there was a bit of a smell. Of course, I got into this waste, and on the edge of this waste, the face edge of it, the hussel thickened due to this bit of an overlap, as Carson was saying. The hussel, just at the end of the waste would be 2 feet 6 inches and it made rather a big heap just at the top edge of the waste. Well, I could not perceive anything when I got over he top of it so I came back again. I went on the face in fresh air, and went topside of the waste again and came on it again, and I came to the conclusion that it was just the hussel smelling. There was nothing else to account for the smell. After going above and below and in the waste, I fixed it on this heap of hussel. I said to one of the chaps who was working on the face, 'Get all this loose coal out of here, clean it all out'. Then I thought I would come round after it had been cleaned out and have another look. I went away and came back about half past ten, and on going up the face at the first waste, I met the undermanager. I said to him, 'Have you been round the third waste Sam?"
>
> He said, 'Yes'.
>
> Well', I said, 'can you perceive anything different about it?'
>
> He said, 'It is much the same only a bit thicker.'

I said, ‘I thought the same as that.

‘But anyhow’, he said, ‘we will go together and have a look at it.’

So with that we went up and, of course, we went into the [third] waste as far as we could travel as long as it looked safe to travel we kept on travelling to be sure. When we got to the back end of the waste. I got down to smell this loose stuff that had fallen - the stuff that had fallen at the back end - smelling to see if I could smell anything. I could not smell anything but I got the air coming through. I dusted my trousers and I saw the dust was coming out. So I said, ‘Well, Sam, I have got wind coming through here.’

‘Why?’, has said. Of course I was a bit surprised you see being at the far end. I said, ‘I have got wind coming through’, and I knocked the dust and he could see it passing in. I said, ‘It looks to me as though we will have to stop this some way or other’.

So he said, ‘Have you got you tape?’

I said, ‘Yes’, and we measured it out from there to the face which was 44 yards. We then went out on the level and measured along the level to see if we could find whether it was leaking off the level. Well, we could not trace any air going through the packs on the level. This happened to be about 6 yards from the solid where we had started from, and we examined the packs and the level and we could not find any trace of air pulling through.”

From when Birks found the leakage of air through the fallen debris by Birks, Samuel Baker, the undermanager moved quickly. Baker gave instructions to Birks to get men to timber the waste in order to make it safe for building a stopping immediately in front of the debris. Baker then went outbye and met the manager Josiah Foster, at the pit bottom. Barker reported what he had found and what he had told Birks to do and Foster went to the spot. When he got there it was about 1 p.m. and the timbering was completed. Foster agreed that the best thing to do was to put up a stopping, and gave instructions for this to be done. He also gave instructions for a second stopping to be built across the waste some yards bearer the face. The second stopping was completed at 10 p.m. and a start was made on the barrier pack running parallel to the coal face throughout it’s length. Work on this pack went on uninterrupted throughout the weekend until it was completed on Tuesday, 19th. March.

While the packing operations were going on, in addition to the normal supervision by the fireman and their superior officials, a fireman and an overman were detailed specially to supervise the work during the afternoon and night shifts and workmen who knew the skills of pack building were transferred to the district from other parts of the pit. The smell gradually disappeared but not all agreed with this. The manager considered that there was slight trace when he reached the No.3 waste on the Friday evening between 8 and 9 p.m. and Carson thought there was slight smell on Saturday morning but Birks said there was no smell when he went round at 10 p, m. on Friday night when the stopping the No. 3 waste was almost completed.

George Thorley, fireman was one who was specially detailed for the supervision of the work on the afternoon shift and he did not detect a smell at any time during the shift but he admitted that he had no previous experience of a gob stink. Washington, the contractor, who first noticed the smell said it had disappeared by Saturday morning when the pack across No.4 waste was finished. Arthur Seaton, the only survivor of the disaster, who was the fireman on the night shift was interviewed as he lay injured in hospital. He said that at no time during the recovery of the face inside the fault was there any sign of heating. He heard about the smell in the No.3 waste when he came to work. The stoppings had been built across the waste and there was still a faint smell from the waste which he thought was definitely gob stink. There was no smell at the face at the beginning of his shift on Wednesday night, 20th. March. He considered that the barrier pack had effectively dealt with the trouble. Never at any time was the smell

detectable in the return airway and nobody working on the face felt any of the symptoms normally associated with carbon monoxide inhalation.

The face or barrier pack was completed at the end of the night shift of Tuesday 19th. March. On Wednesday 20th. March normal working proceeded throughout the day shift, afternoon shift and night shift until the explosion occurred about 1.15 a.m. on Thursday 21st. March. Seaton, the fireman described it.

> "At that time I had come down the face to fetch some Cardox shells from the tub in the level when I sensed something. There was a complete black out. I thought something had struck me and remembered nothing more until I regained my senses in hospital."

Of the four people in the 15's face who were injured by the explosions and found alive after, only the fireman, Smeaton survived and he was able to say little about the events. There was evidence that the explosion occurred further outbye. A roadman George Boulton was at the outbye end of the 15's level when he felt a peculiar sensation in his ears and noticed a cloud of whitish dust coming towards him from inbye. He said that he saw no flame or heard a noise. He telephoned the pit bottom where he spoke with Thomas Shenton, an overman on the night shift, who was in charge of the traffic at the bottom of the pit and on the main roads. Shenton said that there was momentary reversal of the air at the pit bottom and a cloud of dust. He went to the telephone and called Douglas Silcock, a haulage attended. Silcock was concerned by the dust and the air reversal but by that time it had become normal. Shenton told Silcock to stay where he was and he would come down. Boulton also spoke to Charles Clewlow, the fireman in the 'H' Level district which was a level on the opposite side of the main dip about 150 yards below 15's. Clewlow had completed his inspection at about 1.10 a.m. when he felt a rush of wind and saw a cloud of dust. He went to the face but and found the men were all right so he went outbye and spoke to Boulton on the telephone speaking from the 15's Level. Boulton asked him to, 'come up quick to 15's level'. Clewlow then phoned the manager who told him to withdraw the men and he sent a message for this to be done.

Shenton and Clewlow rapidly made their way to 15's level where they were joined by Boulton and all three went inbye. When they had gone about 50 yards they were joined by others whose willing aid enabled the dead to be quickly found and taken out of the pit.

Those who died were-
James Blundred aged 28 years, collier,
Arthur Butler aged 26 years, loader,
Colin Dodd aged 20 years, loader,
James Robinson aged 37 years, collier,
Leslie Leake aged 16 years, haulage hand,
Arthur Middleton aged 54 years, collier,
Richard Porter aged 27 years, collier,
Roland Porter aged 55 years, collier,
William Arthur Ratcliffe aged 33 years, haulage hand,
Charles Rushton aged 25 years, loader,
James Matthew Wood aged 59 years, collier and
Arthur Seaton aged 47 years, fireman was injured.

The inquiry into the causes and circumstances attending the explosion which occurred at Mossfield Colliery, Longton, Staffordshire on the 21st. March 1940, was conducted by F.H. Wynne, C.B.E., B.Sc., H.M. Chief Inspector of Mines. By arrangement with Major Gerald W. Huntbach, H.M. Deputy (and Acting) Coroner for the City of Stoke-on-Trent, the inquiry was held jointly with the inquest at the Town Hall,

Hanley on the 24th. and 25th. April 1940. All interested parties were represented and the verdict of the Coroner was as follows-

> "The eleven deceased men whose names were read out at the opening of the resumed inquest perished from injuries caused by an accidental explosion in the Cockshead seam at the Mossfield Colliery."

Immediately after the explosion, Clewlow, Shenton and Boulton found that there was a clear atmosphere in the level but there was smell of burning. Near to the haulier they found a smouldering bag and another was found further inbye lying on the wheels of an overturned tub of dirt. At the end of the level right against the face they found the special Cardox wagon askew. It was obvious even from a cursory examination that the explosion had been caused by spontaneous combustion in some inaccessible spot and the decision was take to isolate the district. Stoppings were constructed in the intake and the return airways and completed 12 hours after the explosion.

In the report, Mr. Wynne's comments-

> "The observed facts would suggest that a considerable volume of firedamp was ignited, and that it exploded with considerable violence which was however dissipated in displacing potions of the 8 feet thick barrier packs across the ends of Nos.1 and 2 wastes. This brings us to consider the reason for the accumulation of so large a volume of firedamp. It was, of course, due, firstly to the sealing off of the leakage of fresh air through the No.3 waste and secondly to the further obstruction of the circulation of air offered by the barrier pack. coincidentally, there would be a temperature rise within the now confined area tending to destroy the balance that existed between heat production by oxidation and heat dissipated mainly by conduction and so to produce more and more heating until active combustion started.
>
> Valuable information might have been obtained by taking air samples, firstly in the return airway as soon as the smell was noticed and later by means of one or more small bore pipes from the atmosphere inside the packed off goaf. Samples from the goaf would have served the dual purpose by affording information regarding 1) oxygen consumption due to incipient combustion and 2) oxygen reduction due to it's replacement by firedamp."

WILLIAM PIT. Whitehaven, Cumberland. 3rd. June, 1941.

The William Pit was one of three mines owned by the Cumberland Coal Company (Whitehaven) Limited. The mines was acquired by this Company in March 1937 and previous to that it had been idle for two years. The other pits were the Haigh and the Wellington Pits. They were all sunk close to the sea shore near Whitehaven and the coal that they worked was under the sea. The William Pit was a few hundred yards north of the L.M.S. Railway station and it had two shafts which dated from the early nineteenth century. The shafts were originally sunk to the Six Quarter Seam at 297 yards but after some time the lower part of the shaft was abandoned and winding was carried on from an inset 10 yards below the Main Band seam which was intersected at 208 yards.

The downcast was 15 feet in diameter and was the winding shaft. the upcast was 13 feet in diameter and was used solely for ventilation. There were three other means of egress to the surface through the Wellington and Haigh Pits and a day drift from the workings of the Haigh Pit. These were reached by a communication road from the William Pit workings. There were abandoned workings in the Main Band seam and work was in progress in the Bannock Band seam at the time of the explosion.

Three seams had been worked at the colliery. The Main Band had been extensively worked and the seam averaged 10 feet of clean coal. It was worked by pillar and bord and there had been much splitting and robbing of the pillars. Generally, the pillars were left at their original dimensions of an average of about 20 yards square. The disaster

concerned two patches of workings in the Bannock Band Seam. One to the south of the Lowca Junction which was known as the Delaval Bannock District and the newer Countess Bannock District which was opened in 1933.

In the Delaval Bannock District a few pillars were being worked out and but for the fact that roadways in the district served as return airways for the second and newer Bannock Band District, this district played no part in the disaster. The Countess Bannock Band District was opened by driving a drift 330 yards long, rising 1 in 8, from the main haulage road about 25 yards inbye of the Lowca Junction and vertically above the Main Band roadway. A second drift from a roadways was driven in the Main Band pillars to the north of the Main road to provide a return airway for this district. Latter a second return airway, the Countess Bannock New Back Drift, was driven from the Delaval Level near Lowca Junction to provide a separate spilt for the workings in the south side of the main level in the Countess Bannock District.

The main intake airway from the downcast shaft was the main haulage road to Lowca Junction. Originally it had an irregular gradient due to displacements of the seam and faults which it crossed. About 1908 a new road was set out with an even gradient from the downcast shaft at Lowca Junction and this permitted endless rope haulage in one reach between these two points. The new road was 4,000 yards long and was in the stone below the seam which minimalized the air leakage between the intake and the return airways. Haulage from the Countess Bannock District to the Lowca terminus of the haulage road was by a subsidiary endless rope driven by an electric motor installed immediately above the haulage road near the bottom of the incline.

At the time of the explosion all the intake air passed through the Lowca Junction. There was leakage through the doors n the Lowca and Delaval Levels and also into the stopping area of the Main Band pillars immediately under the Countess Bannock Drift. according to measurements taken in the drift on the 30th. May, 1941, 38,000 cubic feet of air were passing up the drift. Attempts to measure the quantity of air escaping to the return by leakage through the Main Band pillars about the Lowca Junction were abortive.

At the time of the accident 430 people were employed underground and 114 on the surface and the daily output was 650 tons on average. Supervision of the mine was in the hands of Mr. J. Williamson, the agent and there was general manager of all three mines, Mr. G. Farquhar, who had under him, two overmen on each of the day and afternoon shifts and one overman on the night shift.

For the normal working of the mine at the time of the explosion, there were 19 deputies working over the three shifts and in addition there were three more deputies, two on the day shift and one on the afternoon shift, whose duties were confined to inspections of and the supervision of people working at gob-fire stoppings. In December 1938, there was trouble from carbon monoxide in part of the return airway from Countess Bannock District which had come from old workings in the Main Band. It soon became evident that additional supervision was required to deal wit the trouble. At the time, Mr. A.B. Dawson was in charge of the surveying and planing department of the Whitehaven Collieries and he was specially detailed for these duties. He was a holder of a first Class Certificate under the Coal Mines Act, 1911 and at one period of his career he had been the manager of the William Pit for several years and he worked in collaboration with the agent and the manager with reference to gob-fires. He had under him two deputies on the day shift and one on the afternoon shift and a considerable number of workmen. These were rarely less than 20 and at times there were more than 100 when stoppings had to be built which interrupted the normal working of the pit. Mr. Dawson had a unique experience of the Main Band workings in both the William and other pits of the Colliery. He kept detailed notes and records on the course of events from December, 1938, right up to the day of the explosion which was presented as evidence at the inquiry.

Few of the pillars in the Main Band workings had been completely extracted but there were a few patches in the goaf. The seam was thick and with regard to the thickness of the coal and the method of working it was not surprising to find a history of trouble from spontaneous combustion but definite colliery records were sparse and confined to a few years before the disaster. There were official records of the occurrence of heatings or fires at several points prior to 1928 when the workings of the Main Band inbye of the Lowca Junction were abandoned. These occurred in the area to the north and west of the Lowca Junction. A heating was built off in No.8 North Section in 1911. There was a fire in No.5 Right Section in 1918 and another heating in No.3 North District in 1924. These heatings and fires were along way from the Lowca Junction but each one progressively crept nearer to the Junction.

From 1924 no further trouble was experienced until 7th. December 1938 when on that date two men working in the main return airway outbye of the 'Humbug Doors' showed symptoms of having been exposed to an atmosphere containing carbon monoxide. An analysis of the air showed that there was .0379 per cent of this poisonous gas. The Humbug Doors where the men were working was common to both the Delaval and Countess Districts. Spot samples taken in the return airways where they separated, showed that the carbon monoxide was confined to the Countess return but further sampling made it clear that somewhere in the pillared area to the north of the Countess Bannock Back Drift there was a seat or seats of active combustion.

The percentage of carbon monoxide in the main body of the air was never high but the roadway was the second means of egress from the District and it was essential that it should be maintained in a condition fit to be travelled by men in the case of an emergency and measures were put in hand to isolate the effected area by building a series of stoppings among the old bords flanking the return airway. At the same time attempts wee made to restrict the supply of fresh air and a second series of stoppings was erected in a rough semicircle called A1 to J1 among the pillars immediately below and around the Countess Bannock Drift. There were possible connections between the Countess District and the main return airway a considerable distance outbye, near the 'Humbug Doors' and nine further stoppings were either newly erected or repaired in this region.

At the time, the conditions for the erection of stoppings of any description were not favourable for, owing to falls of roof and fractures on the coal sides the average of the stoppings had to be 20 feet wide and 15 feet high. Most of them were constructed of broken roof stone set in mortar but some were faced with brickwork. The construction of the new stoppings and the repair of the old ones took along time and was not completed until March 1939. Throughout this period and afterwards air samples were taken on a systematic basis in the main return airway at a point about 15 yards outbye of the 'Humbug Doors'. The carbon monoxide content varied from day to day but the amount gradually grew less until the gas was barely detectable.

This state of affairs lasted until the middle of February 1940 and on the 11th. vapour was observed on the return side of the Lowca Level Doors and at the Little Main Regulator. Samples were taken and appreciable amounts of carbon monoxide was again detected. It was concluded that the vapour was coming from the area of pillars between Lowca Junction and the stoppings around the bottom of the Countess back Drift. It was stated that there was no smell of gob stink that could be detected at this stage.

A brick stopping was built in front of the Lowca Doors and the Little Main Regulator was bricked up. About a week afterwards, vapour was observed at stoppings 1A to the left of the Countess Bannock Back Drift and 4A, three pillars to the left of 1A. Several stoppings were reinforced by building new brickwork in front of them. The vapour was accompanied by an appreciable increase in the amount of carbon monoxide in the return air but this went away apparently as a result of the work that was done.

About the beginning of March there were further signs of combustion at stopping 1A and smoke was found coming from breaks on the left hand side. There was some leakage of smoke at another stopping, the furthest outbye in the Countess Return. Steps were taken to strengthen the stoppings by cutting into the side to find coal that was not fractured. Dense clouds of smoke came fro the breaks and smouldering coal found and very high temperatures recorded. It was evidence that there was active combustion near the stopping. Leakage at the stopping became less but the air found another outlet in the roof strata that formed the floor of the Countess Bannock Back Drift. A layer of concrete 6 to 8 inches thick was put down and repaired regularly as cracks appeared in it.

There was a reduction in the carbon monoxide escaping from the main return which seemed to indicate that an improvement had been brought about. Three months later fire was detected in front of one of the stoppings in the Lowca Junction intake barrier. A chock made of broken coal and stone with the lower part buried was found to be on fire. The fire outside the stopping was put out and cooled down by water but a hole a few inches square was found at the junction of the brickwork with the coal side and the coal could be seen to be glowing bright red. A wall was built and hole bored through the brickwork and in spite of constant application of water, the reduction of the temperature at one spot was followed by an increase at another.

In early September smoke appeared at the left hand side of the 'H1' stopping and cement was injected into the coal and the adjacent strata but about two weeks later a borehole indicated that the coal was still glowing. Water was again applied and the temperature began to fall. As the new wall was built to G1 stopping an airlock was made in the intake road, or 'Hole', as it was aptly called, on the right hand side of the Countess Bannock Drift. This was to reduce the leakage of fresh air into the stopping area. Another stopping called the New Front stopping across the old Main and roadway about 5 yards inbye of the airlock was commenced in February 1941 and the door closed on the 7th. March. This stopping was of 14 inch brickwork.

All went well for some time during the last week in May when the air temperature near the 'G1' stopping began to rise and moisture appeared in the roof above the stopping. There was also a break which extended an unknown distance outbye and laterally down the old roadway to the right of 'G1'. An attempt was made to plaster up the break but on the 21st. May a current of warm air was detected which indicated that there was an inlet for fresh air and that oxidation of the coal was going on. It was then decided to put in an additional stopping called the 'New Front' stopping, through the coal still remaining between it and the and the next old road, across this and into the coal of the pillar between 'H1' and 'J1'. During the following days the temperature rose and reached 104 degrees on the 30th. May.

The preparations for the extension of the New Form stopping were going on and on the 29th. May a start was made to remove about five feet of flue dust packing from the outbye side of the wall. This work was interrupted by the Whitsuntide holidays and nothing more was done for a further three days, 31st. May to the 2nd. June. There was examination except for the 2nd. June. The work then resumed on Tuesday morning 3rd, June. About 10 feet of the upper section of flue dust was still to be moved to each end of the brickwork and the face of the narrow cutting. Men were set to work and the fireman lent a hand from time to time.

Mr. Dawson arrived between 9 and 9.30 a.m. on the 3rd. June when the removal of the flue dust had been suspended while the passage was enlarged by taking the coal from the left hand side. Mr. Dawson went to the end of the cutting and cleared the flue dust up to the coal at the end of the cutting. The dust was warm but not hot and the temperature of the brickwork at this stage was said to have been normal. Later a connection was made to the water column and at about 12.20 p.m. water was applied to the exposed surface of the flue dust close to the roof of the face of the cutting. The dust soon became saturated and the excess water to where the old road had been crossed.

It soaked through the dust there and disappeared and not trace of it could be found. This occurrence was referred to at the inquiry.

Shortly after the hose pipe had been put into position at 12.20 p.m. the manager appeared and the general position was discussed, the other stoppings and surroundings inspected and at about 1.15 p.m. to 1.30 p.m. the party consisting of the manager, Mr. Farquhar, Mr. Dawson and the fireman, Mr. G. Savage withdrew after the workmen had already gone after their shift ended. The water was left running and the door in the 'New Front' stopping was left open and the doors to the air lock were both closed with the outer door plastered round its edges.

In due course three officials, the manager, Mr. Dawson and the fireman went out on foot. Work in the Countess Bannock District was going on as normal. Most of the day shift had gone outbye and the afternoon shift had gone to work. Due to absenteeism which was to be expected after a holiday, some work in the day shift had not been completed and a few hands had stayed on about an hour to catch up. They had completed their work about 2 p.m. and gathered at the Lowca Junction to wait for the train to take them to the pit. After some delay while repairs were carried out in the Countess Bannock haulage rope haulage was set in motion on the afternoon shift at 2.10 p.m.

At about 2.15 p.m. work in the Countess Bannock District was going on as normal. A number of men were near the Lowca Junction ready to ride outbye and some had already taken their places in the tubs while others were about to do so. The manager, Dawson and G. Savage were proceeding outbye on foot. These three had reached the Six Quarters Turn about half way to their destination when the explosion occurred. They felt a temporary reversal of the air current and they retraced their steps. At the Lowca Junction the men felt a violent blast from inbye. All were affected by carbon monoxide. Eight of them were found dead and four others fatally injured. Others were injured but survived and few near bye were little the worse suffering from shock. There was a lot of heat and dust was stirred up but no one observed any flame. The men in the haulage road at the to of the Countess Bannock Drift where also struck by a violent blast which came from outbye. Four out of the five men appeared to have been poisoned by carbon monoxide.

The manager's party realised that something was wrong and immediately went inbye. The fireman stopped at the second turn in the roadway with instructions to telephone the agent, Mr. Williamson. About 30 minutes later Farquhar and Dawson were approaching the Lowca Junction when they saw indications of violence. Wires were down and some props displaced. The haulage rope was still running in the Countess Bannock Drift and the manager cut off the power to the haulage while Dawson went towards the stopping area. He found the doors of the airlock had gone and there was a hole in the brick partition from which smoke was issuing. The smoke ahead stopped his progress.

Arrangements for the relief and evacuation of the injured was speedily put in hand and by 4 p.m. all who were not past help were either out of the pit or on their way out. Later the bodies were cleared and the work was finished about 9 p.m.

Those killed-
Sydney Barbour aged 21 years, junction hand,
Robert Baxter aged 55 years, coal filler,
John Penny Burney aged 21 years, haulage hand,
Johnathan Curwen aged 57 years, coal filler,
James George aged 18 years, haulage hand,
William Ernest Harker aged 20 years, engine boy,
Robert McCreavy aged 20 years, junction hand,
Charles James Martin aged 41 years, deputy,
Cornelius Moore aged 40 years, coal filler,

James O'Pray aged 38 years, sill hole cleaner,
William Perry aged 50 years, junction hand and
James Wells aged 27 years, haulage hand.

Those injured-
John Robert Baxter aged 29 years, coal filler,
William Benson aged 29 years, coal filler.
Thomas Dougherty aged 55 years, conveyor puller,
Joseph Fitzsimmons aged 21 years, engine driver,
Richard Donaldson Glaister aged 45 years, rope splicer,
William James Kerr aged 44 years, coal filler,
Thomas McCormick aged 45 years, haulage hand,
George Porterhouse aged 48 years, coal filler,
Joseph Rogan aged 18 years, pan engine boy,
Henry Ruddick aged 59 years, deputy and
Moses Stephens aged 17 years, haulage hand.

The inquiry into the causes and circumstances attending the explosion at the William Pit Whitehaven Collieries, Cumberland on the 3rd. June 1941 was held by F.H. Wynne, C.B.E., B.Sc., H.M. Chief Inspector of Mines in the Congregational Church Schoolroom, Whitehaven on Tuesday, Wednesday and Thursday 29th. to 31st. July inclusive when all interested parties were represented. The report was presented to David R. Grenfell Esq., C.B.E., J.P., M.P., Secretary for Mines on the 10th. May 1942.

Two features of the explosion were unusual. In the first place it was not associated with normal operations of coal production for although it affected men engaged in coal getting operations in another seam it occurred in connection with a large sealed off area which had been abandoned since 1928. There was no firedamp showing when the fires from spontaneous combustion were analysed there was no suspicion of an immanent explosion. In the second place there was little down but that the explosion was not one of firedamp but of inflammable gas produced by the application of water to a considerable mass of glowing coal.

Immediately after the disaster, Mr. Dawson and the manager approached the Lowca Junction and turned off the water which had been left running from a hose pipe at the New Front stopping and then returned to the junction to rejoin the manger. The separation doors at the Lowca Level were burning fiercely but they left those and went up the Countess Bannock Drift to look for men that they knew were up there. About half way in they met some men coming out with an injured man. They asked Dawson for reviving apparatus and he went to the airlock for the apparatus which he knew was there. He found both door blown out and the brattice cloth burning. He extinguished this and managed to get a few feet past the doors. The floor was littered with debris and he could not find the rescue apparatus.

Rescue and recovery were now well under way and the fire at the Lowca Level doors had been put out as well as a second fire which had developed behind the brick walling at the entrance to the Delaval Level. There as a mass or wrecked tubs at the bottom of the Countess Bannock Drift which was apparently due to runaways resulted for the fact that the haulage rope had continued to run for about half an hour after the explosion as there was no one left to stop it. The rails had been displaced upwards but there were no indications as to the direction of the blast and it was concluded that the explosion had occurred in the area inside the airlock. Joseph Fitzsimmons was the engine driver at the Countess Bannock haulage engine saw sparks in the brow 20 to 15 yards inbye and along the brow but he felt no blast.

When all the bodies had been recovered and the injured evacuated, all the workmen and officials left the mine at 10 p.m. At about 2.30 a.m. the following day the Managing Director arrived from Glasgow with two mining advisors. There was short discussion and

Mr. Williamson and some of his mining experts and three Inspectors went down the mine to the Lowca Junction. They thought it futile to try to fight the fire and returned to the surface to make preparations for sealing it off. This was done successfully by the erection of dams in the man intake and return airways about 1,400 yards from the fire area and about one third of the way out from the Lowca Junction.

At the inquiry evidence was given that Water Gas could be produced by water being poured on red hot coal and Professor Granville Poole said that probably 700 cubic feet of gas would be required to form an explosive mixture in the open space between the stoppings and the air lock. On the 15th. December 1929 in the Louisa Old Pit of the Holmside and South Moor Collieries Limited, in County Durham a fire was discovered at a disused air crossing in a main intake and haulage road in the Low Main Seam. On breaking through the air crossing it was discovered that the fire had a very firm hold in the overlying strata which comprised the Maudlin seam. A water supply was available for short time it appeared to be having the desired effect. Later the ground was lost but the water supply was continued and two days afterwards turned to the heart of the fire and there was an explosion which blew out stoppings 55 yards away and opened a door 400 yards from the site of the fire. Lights were put out and men blown over but no one was hurt. Firedamp was ruled out and it was thought at the time that the gas was a chemical product of the action between water and the fiercely burning coal.

The Inspector concluded the report by saying-

> "As regards deep seated fires arising from other causes care in the application of water is clearly called for where there is a possibility of the production of 'water gas'. Within the limits of this report it is impossible to discuss or attempt to define the conditions which may give rise to the risk of water gas explosion and the precautions to be taken. It is, however, important that an attempt to do so should be made and to this end I recommend further investigation and perhaps research."

CRIGGLESTON. Wakefield, Yorkshire. 29th. July, 1941.

The colliery was the property of Messrs. Benzol & By-Products Limited and was about three and a half miles south-west of Wakefield. The Agent and the Manager was Mr. F.B. Howitt. The seams that were worked at the colliery were the Top and Bottom Haigh Moor and the explosion occurred in the No.1 West District of the Top Haigh Moor seam which was 256 yards deep. the Bottom Haigh Moor seam was about 11 yards below had not been worked anywhere near the explosion area. The No.1 West District was opened out by taking a narrow bord face forward from which the end faces were developed to the right and left. Coal was first produced from these two faces on the 29th. April 1941 and at the time of the explosion these faces were 100 and 110 yards long respectively. The seam was almost flat, 3 feet thick with a blue blind roof in which there were bands of ironstone. It was undercut in a 4 inch band of dirt. Over the seam was a 4 inch dirt band which usually came down with the coal. The district was fully mechanised and electricity was used for coal cutting, drilling, face conveyors, gate conveyors, haulage, a loader and signalling. Direct current at 500 volts was used for haulage and alternating current at 400 volts for the rest of the electrical plant.

Coal was loaded on the day shift and on the afternoon shift the face conveyors were dismantled, the seam undercut to a depth of 5 feet 6 inches, shotholes were bored, 7 feet to 9 feet apart in the coal and as required in the ripping gate lips, the ripping shots fired and the packs built. On the night shift shots were fired in the coal, the face conveyors were re-assembled and the gate conveyors were moved forward. There were two deputies in the No.2 West District on the day shift, one deputy and one shot firer on the afternoon shift and one deputy and two shot firers on the night shift.

The quantity of air passing in the district was last measured before the explosion on the 30th. June 1941 was 10,600 cubic feet per minute of which 6,450 cubic feet reached the South Conveyor face. It was well known that the quantity of air circulating in

a district varied in 24 hours, especially in mechanised faces with thin seams and so the percentage of firedamp varied. These fluctuations resulted in the different kinds of work that were carried out during the cycle and were independent of leakages at donors due to deficiencies or of their being left open. Just before the explosion 7,129 cubic feet were measured at the entrance to the district of which 3,958 cubic feet were measured at the South Conveyor face although in the meantime a brick wall with a door inset had been built to prevent direct leakages between the intake and return and a door erected in the West main gate.

The explosion occurred at 7.20 p.m. on Tuesday, 29th. July 1941 in the sixth hour of the afternoon shift and it was confined to the one district. There were 25 people in the district at the time including 4 machine men and a timberer form the South Side coal cutting machine who were in the West Main Gate on the way out. the two outer of these men and the timberer for the coal cutting machine on the North face, who had reached the return airway were the only survivors., Twenty one men were found dead and one died in hospital within a few hours in the district. A deputy 280 yards away in another district heard a terrific bump and he went quickly to the No.1 West District and gave the alarm, to the surface by telephone. He helped the survivors and was able to reach the point where Bruce Beaumont was found but because of the firedamp he could not get to Charles Megson who he heard breathing. Megson died in hospital.

Four machinemen on the North Side had completed their work and were on their way out. They were found a few yards from their machine. The four rippers in the North Loader gate had completed the gate side packs and had only to erect another steel arch to finish their shift. The deputy and the shotfirer were with them. The four rippers in the South Timber gate had almost finished their gate side packs and the five rippers in the South Loader gate, were erecting a girder at the gate end. These men were found in a heap under the girder and it was significance that they met their deaths where they were working while other men in the district working a few yards away seemed to have had warning on the immanent disaster as they were found away from their working places, overcome by afterdamp. From the position of one man, it appeared that he had a warning, went out and them turned back.

The West Yorkshire Rescue Station Brigade were summoned from Wakefield and arrived at the colliery 15 minutes after the call. They went underground immediately and started an exploration of the affected area. They travelled the South side and then came back to the entrance of the North Loader gate. All the ventilating sheets and the door in the north Loader gate had been blown down and steps were taken to restore the ventilation which was short circuiting directly into the return. Sheets were erected about midnight at the North Loader gate between the intake and return and the exploration of the North face was able to be made without breathing apparatus by way of the North Timber gate. Two percent firedamp was found in the general body of the air and later on the South Side, a layer of firedamp was found near the roof along almost the whole length of the Loader and timber gates. There were only two small falls and no evidence of any great violence although the timber supports had been blown out. Coal dust played no part in the disaster. Arrangements were made for noting the position of the bodies which were then sent to the surface.

The men who died were-
A.E. Broadhead, 45 ripper.
Bruce Beaumont, 25 machine man.
William Mitchell, 29 shotfirer.
Lloyd Fox, 24 ripper.
Bernard Fox, 32 ripper.
William Handley, ripper.
James Arthur (Joe) Fox, 39 ripper.
William Hartley, 30 deputy.

Jim Hancock, 38 machine man.
Basil Wood, 53 machine man.
Arthur Piper, 31 machine man.
Alf Oatland, machine man.
John William Mollart, 47 ripper.
Robert Wison White, 40 ripper.
Harry Wright, 36 ripper.
William Priestley, 40 ripper.
George William Riley, 29 ripper.
George Norman Nussey, 49 ripper.
William Charlesworth, 38 ripper.
Ezra Lambert, 34 ripper.
Sam Tunnicliffe, 45 machine man and
George Megson, 27 machine man who died in hospital.

The injured-
Clar Kennett, timber man,
Ernest Broadhead, machine man and
Albert Fawcett, timberman.

The inquiry into the causes and circumstances attending the explosion which occurred at Criggleston Colliery, Yorkshire on the 29th. July 1941, was conducted by H.J. Humphrys, D.S.O., O.B.E., M.C., H.M. Divisional Inspector of Mines. The inquiry was conducted alongside the inquest which was held by Mr. C.J. Haworth, one of H.M. Coroners for the West Riding of Yorkshire who sat without a jury. All interested parties were represented and the court found that-

> "The men died as the result of extensive burns or injuries and carbon monoxide poisoning following an explosion of firedamp and that they met their deaths by misadventure."

The report was presented to Mr. D.R. Grenfell, Esq., C.B.E., J.P., M.P. Secretary for Mines on the 3rd, November 1841. The proceedings occupied seven days and 21 witnesses were called to identify the victims and evidence was taken from 27 witnesses about the events of the disaster.

Three workmen how survived the explosion gave evidence. One could remember nothing about the events, another knew of nothing unusual during the shift and the third was working at the coal cutter on the South Face. He said that there was little firedamp at the face ripping lip of the South Loader gate which he mentioned to a deputy. he also stated that the machineman in charge carried a flame safety lamp which was hung up on the Loader gate for the whole of the shift.

The question as to the presence of firedamp was examined and directed to see if there was any truth in the rumours that there was gas in the there was gas present in the district before the explosion but it was not established that gas had been found except on two occasions and in small quantities. There was evidence from the deputies that there saw a feeder of gas a few feet from the face and the point of issue moved forwards as the face advanced. A belt breaker on the South Face was in the district two hours before the explosion and he smelt firedamp in the South Timber Gate 9 or 10 yards from the ripping edge but he did not report this to anyone and the day shift deputy found none and a half percent in the South Side at 6.25 a.m. he fixed a hurdle sheet and the gas cleared but he did not record this the book which was a breach of No.7 of the Coal Mines Regulations, 1938. There were no automatic gas detectors issued on the shift and on the day of the explosion nine flame were issued in the whole pit.

The ventilation of the district was regarded as insufficient by H.M. Inspectors as there were leakages through the sheets. The opinion was expressed by several witnesses

that firedamp accumulated in the cavities formed above the roof level during of t e settlement of the beds above the seam and Dr. D.W. Phillips of the Safety in Mines Research Board explained how the gas could be forced through breaks in the roof into the South Loader and the South Timber gate sand along the fault sides.

Mr. Humphrys summed up the evidence and said-

"In my opinion the firedamp was ignited in a break by a ripping shot fired in the South Loader gate two and a half hours prior to the explosion and it continued to burn unseen until contact was made by the flame with an explosive mixture."

Mr. Humphrys made the following recommendations-

"1). That the statutory regulations as to the supply of flame lamps or detectors should be rigidly complied with everywhere, particularly where the workings were electrified and intensively worked.

2). That even men, deputies or other, should carry out the requirements as to reporting impurities in the air.

3). Leakages should be tightened up, and additional doors provided where necessary.

4). The system of packing should receive every consideration, especially in view of Dr. Phillip's evidence.

5). That every explosion however small - even if no one is hurt - should be treated as matter of major importance.

6). Every precaution should be taken by management and men to see that all regulations are enforced."

BULLCROFT MAIN Yorkshire 19th. October 1941

There had been a series of four small explosions in a face that wa subject to spontaneous combustion. A rescue team went in and there was an explosion on the return airway. One man was rescued alive but died later and two were killed in the explosion. The other three were buried under fall and not recovered. The distrct was sealed.

Those killed:-
A Baldwin 37 Rescueman. Rescued but died later
l Crane 39 Rescueman. Killed in explosion,
William Gyte 47 Rescuman. Killed in the explosion,
A orme 55 Rescueman. Not recovered.
l Samson 42 Deputy Not recovered and
B Baxton 47 rescueman. Not recovered.

BLAENCLYDACH. Blaenclydach, Glamorganshire. 25th. December, 1941.

In the morning when the shift was being lowered down the pit down a road which dipped nine inches to the yard by an electric haulage engine, the tubs got out of control and gathered speed down the dip.

Most of the men either jumped off before it was brought to a standstill but five men were killed and over 70 injured, twenty seven of whom were kept in Hospital.

SNEYD. Hanley, Staffordshire. 1st. January, 1942.

The Sneyd colliery was the property of the Sneyd Colliery Company Limited. The explosion occurred at about 7.50 a.m. on Thursday, 1st. January 1942. Fifty five persons were killed immediately and two others died in hospital from injuries received. At the time of the explosion one of those where two was very close to the bottom of the

No. 4 shaft and the other in the Cockshead Level near the Hardmine intake. No one in the Banbury seam beyond this point was found alive.

Normal work was being done at the time of the disaster and coal was being won on the 22's face and the 21's face was being prepared for similar work during the afternoon shift. These two faces were worked on the morning and afternoon shifts alternately week and week about. The coal from the 21's face was hauled by main and tail electrically driven haulage gear placed in 21's level about 40 yards inbye of the bottom of 22's jig. The coal from the 22's face was hauled along 22's level by a compressed air driven endless rope haulage engine to the top of the 22's jig and from there jigged down to the 21's level. From the outbye end of the 21's level all the coal was jigged down the Banbury Crut Jig and from the foot of the jig hauled by a chain tail and gate electric haulage gear places near the bottom of the No.4 shaft. The haulage gear in 21's level was the only electrically driven machinery in the Banbury Seam.

The Banbury Crut Jig was a drift about 200 yards long which rose 1 in 3Å from the Cockshead Seam to the Banbury Seam. It was driven in late 1937 and the first ninety yards went through strong bond and the remainder through shale which was supported by steel arches 12 feet wide at the foot and 8Å feet to the crown of the arches. The coal from the Banbury Sea, about 1,700 tons per week went down the jig and was sent outbye to be wound at the No.4 shaft. Stone and other rubbish was sent this was as well. The haulage was self-acting with loaded tubs going down the incline and pulling empty ones up always on the same side. The jig wheel was placed horizontally about 12 yards o the inbye side at the top and the hauling rope passed two and a half times round it. The wheel was fitted with a brake ring around which an iron brake and contained wood blocks lined with Ferodo linings. Six coal tubs or five tubs of stone formed a full set and there were six tubs in an empty set. The gauge of the rails was two feet and a half inch with two feet four inches between the full and empty roads.

On the right hand side looking inbye there was a 6 inch diameter pipe to take compressed air to the haulage, coal cutting and conveyor machinery in the Banbury Seam. This pipe was at a slightly higher level than the outside rail, with it's nearest surface about eight or nine inches from the head of the rail. At about 92 yards from the bottom of the crut there was a gland round this pipe with a cock fitted in the top. The gland covered a half inch square hole. Between the wheels of a tub moving on the full road and the lugs of the gland nearest to it there was a clearance of three inches. On the right hand side of the crut there were canvas slings which carried electrical cables which carried 3,000 volts which fed the 50 h.p. motor which drive the main and tail gear operating the haulage on 21's level. Normally these canvas slings were 6 feet apart with the cables suspended four feet from the floor. The height of a tub standing on the rails was 3 feet 2Å inches. Near the top of the crut there were two 'Warwicks' 41 feet apart but connected by a wire rope in such a manner that when one was up the other was down. A set of six tubs with couplings stretched, measured 34Å feet.

The accident happened as a tub runaway down the jig and came off the rails. As this happened the explosion occurred.

The men who died were-
A. Mountford. Died in hospital from injuries received.
A.C. Harrison. Died from extensive injuries.
R. Newton. Died from injuries and burns.
A. Mallin. Died from injuries and burns.
J. Ashworth. Died from injuries.
William Docksley. Died from injuries, burns and carbon monoxide poisoning.
R. Bennett. Died from injuries and burns.
T. Rushton. Died from injuries.
H. Baskerville. Died from injuries, burns and carbon monoxide poisoning.
J.C. Growcott. Died from injuries.

A. James. Died from injuries and burns.
H. Cartwright. Died from injuries and burns.
S. Mountford. Died from injuries and burns.
F. Harrison. Died from injuries and burns.
D. Briggs. Died from injuries, burns and carbon monoxide poisoning.
J.H. Wright. Died from injuries.
G.T. Bennett. Died from burns and carbon monoxide poisoning.
J. Sherratt. Died from injuries, burns and carbon monoxide poisoning.
L. Bromley. Died from injuries and burns.
T. Lyons. Died from injuries, burns and carbon monoxide poisoning.
J.B. Bennett. Died from injuries and burns.
Thomas Cross. Died from injuries.
H. Gibson. Died from burns and carbon monoxide poisoning.
S. Moore. Died from injuries and burns.
L. Meadowcroft. Died from injuries and burns.
E. Stonier. Died from injuries.
W.T. Cashmore. Died from burns and carbon monoxide poisoning.
W. Beckett. Died from injuries.
H. Bourne. Died from injuries.
G. Podmore. Died from injuries.
T. Moulton. Fireman. Died from injuries and burns.
J.W. Jones. Died from injuries and burns.
J. Roberts. Died from injuries and burns.
A. Harrower. Died from injuries.
A. Deakin. Died from injuries.
N. Marsh. Died from burns and carbon monoxide poisoning.
L. Hamlett. Died from injuries, burns and carbon monoxide poisoning.
B. Davies. Died from burns and carbon monoxide poisoning.
B. Oakes. Died from injuries.
E.H. Gater. Died from injuries.
G. Manley. Died from burns and carbon monoxide poisoning.
J. Thomas. Died from injuries and burns.
J.T. Dono. Died from injuries and burns.
M. Sutton. Died from injuries and burns.
W.J. Sheldon. Died from injuries and burns.
M.H. Butler. Died from injuries and burns.
J. Mostyn. Died from injuries and burns.
J. Barber. Died from injuries and burns.
J. Bullock. Died from injuries and burns.
E. West. Died from injuries.
A. Higginbottom. Died from injuries and burns.
John Dale. Died from injuries and burns.
R. Yeomans. Died from injuries and burns.
William Hancock. Died from injuries, burns and carbon monoxide poisoning.
W.M. Noxon. Died from burns and carbon monoxide poisoning.
J.W. Bowker. Died from injuries, burns and carbon monoxide poisoning.
H. Kelly Died from injuries and burns.

The Inquiry into the causes and circumstances attending the explosion at the Sneyd Colliery, Staffordshire on the 1st. January 1942, was held by Sir Henry Walker, C.B.E., LL.D., in the Town Hall, Hanley on the 13th. April and lasted for four days, taking evidence from thirty five witnesses. All interested parties were represented and the report was presented to Major The Right Honourable G. Lloyd George, M.P., Minister of Fuel and Power on 2nd, November 1942.

The conditions in the crut after the explosion were described at the inquiry. Near the bottom many tubs were overturned but some were on the rails. There were three tubs just above the bottom and on the outbye side of theses a stone which measured 6 feet long by three feet wide by three feet thick was found standing on one end on the floor and the other against the roof from which it had fallen. It blocked the empty road but not the full road.

Travelling up the jig a stone was found on the floor and then a rope cap on the empty side. On the right side there was a damaged air pipe flange and then a hole in the roof from which the stone found down the jig had fallen. On the right side of the full road there was a tub coupling chain and further up in the empty road, one end of the jig rope with it's cap and coupler. About five yards further inbye on the right side of the road there was the electric cable which was damaged. The gland that was fixed to the compressed air pipe was found to damaged a little further along the crut and in the full road at the other end of the jig rope was found without it's cap. The two Warwicks were found in a normal condition and on the outbye side of them past the brow of the jig and lying on the empty road was the jig wheel which had been moved 8 feet to the left of it's normal position.

From the evidence of the damage in the Banbury Crut Jig, deductions were drawn about the explosion. Mr. Harry Cook, the undermanager stated that after the explosion he found no signs of any coal cutting or shotfiring having taken place on that morning. There was no unusual smell or sign of spontaneous combustion or if the ignition of firedamp but he found evidence of a runaway set of full tubs which had careered down the main jig and had damaged the compressed air pipe in which there was a pressure of 80 lbs. per square inch and the electrical cable was found to have been damaged.

It was established that the tubs were empty when they ran away since no coal or dirt was found lying anywhere on the jig. When asked to say which end of the hauling rope found in the jig had been attached to the full load and Mr. Cook replied-

> "The rope in the jig with the coupler and tackle attached would be the one normally attached to the full loads and the one that was broken would be the one that should be attached to the empties."

The rope cap that was found on the empty side of the road and a six feet length of the rope was examined by Mr. Alexander Esdale McClelland of the Safety in Mines Research Board. He said that a force of 9Å tons was required to pull off the cap from the rope and he said that sparks could have come from the rope when it broke.

It was generally agreed that the explosion originated in the Banbury Jig and was one of coal dust alone but there was no agreement either to the origin of the coal dust or as to the source of ignition except that the runaway set of tubs was the original cause. In the opinion of Mr. John Hebblethwaite, the manager the cold dust had come from the runaway tubs on the jig. He said-

> "After thoroughly investigating and considering all possible causes of the explosion, I have some to the conclusion that six tubs were turned in at the top of the Banbury Crut Jig without any empty wagons being attached to the other rope. From some unknown cause the loads at the top of the jig ran away and as these six loads careered down the jig, the oncoming rope possible getting behind one of the wheels. When the impact occurred at the pass-by it would be responsible for pulling the jig wheel out at the same time breaking the rope. If the tubs were not already derailed this would derail them. A pair of glands covering a half inch square hole in the compressed air main was knocked down the pipes a matter of 6Å inches. The escape of compressed air at 18 lbs. per square inch pressure would increase the amount of turbulence already set up by the runaway tubs. Immediately following this, the tubs got rucked up and damaged the power cable, the performed cloud of dust produced by rucking of these tubs due to the force that had been thrown out into the jig would travel back up the jig, being assisted in doing so by the ventilation which is travelling at 200 feet per minute and when it

had almost gone, the finer particles, which were still in a agitated state due to the turbulence of the compressed air pipe, were, I feel sure, ignited by one of the following causes- frictional sparks from the tubs crossing the compressed air main and steel arches at the time when they were rucking up and also from sparks produced from the wheels and the breaking rope electrostatic sparks from the discharged compressed air spontaneous electrification of the dust cloud, I feel sure, played some part in making this dust cloud more easily ignited than in normal circumstances. The fourth possibility is that the cable, and I have gone into this very fully with people who know a lot more about cables than I do myself, was concerned but I have to come to the conclusion that the cable was not responsible."

Mr. Edgar Hamilton Frazer, H.M. Divisional Inspector of Mines thought that when the tubs became derailed considerable sparking would occur and that the dust exploded was raise from the floor by the empty rope flying up the jig but Professor Cotton was sceptical that the explosion was caused by friction sparks. After hearing all the evidence, Sir Henry Walker came to the following conclusions-

"1). That the up-going rope got over the inside wheel of the first tub of the set coming down at the time of a runaway

2). The marks between the strands of the sample of rope examined by Mr. Clelland were made by the rope rubbing against the front right-hand corner of the first tub coming down and that the two small flakes of mild steel he found embedded in the rope came from the bottom of this tub.

3). That the capel of the up-going rope was caught against the sole of this tub and so pulled off, the jig-wheel being pulled down and the set derailed at the same time.

4). That 3) occurred when the first tub on the down coming set was about ten feet above the cock in the air main.

5). That, thereafter, the derailed tub or tubs displaced the cock and then damaged the electric cable.

And I think-

a). The dust which was ignited was dust from the jig and not from the runaway tubs

b). That such dust had been ignited before either the hole in the air main had been exposed or the electric cable damaged.

c). That the ignition of such dust was due to heat generated by friction between the up-going rope and the underside of the first down-coming tub of the runaway set."

The Inspector went on to say

"Even though I do not connect the compressed air main or the electric cable with the origin of this explosion, I think, if such plant has perforce to be laid in such places, it should either be protected by a strong fender against passing tubs or buried, and, in the case of cables, suitably protected to prevent the possibility of damage from picks or other tools.

In the present case, the cable had been removed from the jig. Some better means of preventing runaways is also required and, if possible, they should be automatic.

The 'Warwicks' at the top of the Banbury Jig seemed to be too near together and were operated more as a matter of routine than a safeguard.

The conditions which resulted in the up-going rope running against the wheels of the down-going set should be remedied and should include the replacement of the horizontal jig-wheel by one set vertically."

After the disaster the method of working were looked at by the management of the colliery and it was considered to spray the coal at the loading and transfer points.

BICKERSHAW, Plank Lane. Leigh, Lancashire. 7th January 1942.

Major Hart was the managing director of the Bickershaw Collieries, Ltd., which consisted of five pits. Household and industrial coal were produced from the various seams Fireclay and shale was also worked. Six men were killed and four injured, three detained in hospital, as the result of an explosion at the No 4 pit, Plank Lane Colliery Leigh, shortly before midnight on Monday. The cause of the explosion was thought to have been a 'blowout' of gas near where the men were working. A survivor told how suspicions that all was not well arose amongst a party of men, and of his subsequent struggle to a place where the air was fresher.

The following official statement was issued by the Colliery Co.:-

> 'The directors of Bickershaw Collieries, Ltd. greatly regret the unfortunate loss of several lives through an explosion. The deepest sympathy is extended to the relatives of those who have lost their lives.'

The accident which occurred in the Rise Unit, east side of No. 4 pit, just as the night shift men were taking over and quickly spread through the district. It was stated that it was probably due to an explosion of coaldust or: what is called a blowout of gas where the men were working. Only 90 men were down the pit at the time and were going to their places in small groups. These were quickly brought to the surface and members of the Lancashire Mines Rescue Station at Boothstown were summoned and recovered the bodies. The managing director of the colliery, Major E Hart, M.C., and the general manager, Mr. JH French both hurried to the pit when informed of the accident, and descended the mine.

A survivor, named Neville, interviewed by a the local paper, said that Monday was the first time he had been to work for a fortnight after sustaining a sprained back. He told how he, Bailey, Houghton, Kennedy, and two other men named Hagen and Eatock, were seated in the main haulage way, about 180 yards from the pit bottom, waiting for the haulage to start to enable them to take tubs to the workings. One of the men remarked about the atmosphere, and said, 'Jimmy, there's summat funny.' He replied that it was only dust, and might have been caused by a tall of dirt or something like that. They remained talking for about five minutes, when Hagen said, 'It's summat worse than dust,' and so they all went to where the air was fresher. Neville said he stayed behind for a few minutes. 'I began to feel alarmed,' he said, 'and had a dry choking sensation in my throat. I groped round trying to find one of the cans containing tea, but I couldn't. It was very dark, and I said to myself, 'Jimmy, my lad you'd better get out yourself.' I found the haulage rope and began to grope my way along it to the pit bottom. I must have gone about 80 yards before I collapsed. I remember nothing more until I came to in the ambulance room at the top.'

Neville said he did not hear the sound of an explosion. He did not know that any of the men were in hospital, and when it was revealed to him that Kennedy and Houghton were detained in the infirmary he was surprised. and said, 'They were two of my mates. I am sorry to hear that'.

The victims were:-
Thomas W. Monaghan aged 40 night manager, Sherwood House, Crankwood Road. Abram,
John Dykes age 38, safety officer, 115, Plank Lane, Leigh,
Ernest Huyton age 30 driller, 3 North Ave. off Crankwood Road. Abram,
Albert Brown aged 41 driller, 138, Plank Lane, Leigh,
John Bali aged 61, dataller, 15 Ellesmere Street, Hindley, and
James Durkin aged 55, dataller, 38, Byrom Streets, Poolstock. Wigan.

The injured:-

Thomas Rafferty aged 47, 17 Charles Street, Tyldesley,
Thomas Kennedy aged 21, 52, Hulme Road, off Wigan Road, Leigh.
William Houghton aged 22, 16, Closebrook Road, Pemberton, Wigan,
James Neville aged 49, 34, Victoria Terrace, Bickershaw. Allowed to go home after treatment.

Dykes left a widow and three children and Huyton a widow. Monday night was the first time he had been to work for three days. It was his birthday. Both men were members of the Colliery Home Guard.

Mr. DR Grenfell. M.P., Secretary for Mines, sent the following telegram to the manager:-

> 'Deeply regret to hear the sad news of the loss of life and injuries caused at Bickershaw. Please convey my sympathy to the relatives of the deceased men and to the men who were injured as a result of the explosion.'

This was the second pit explosion within a week, the first in which fifty seven men lost their lives being at Sneyd Colliery, Burslem Staffordshire on New Year's Day. In April, 1934, four men and a boy lost their lives through an explosion caused by shotfiring at No.3 pit of the Bickershaw Collieries. Two years earlier nineteen men lost their lives through a shaft accident at the same pit when on October 10th. 1932, a cage hurtled to the bottom of the pit and the men were drowned.

At the inquest into the disaster, Peter Shaw , coal cutter, 5 John Street, Higher Ince, said he went down No.4 Drift about 11 p.m. on January 5th and was on his way to the coalface. He was near the Rise Unit when he heard a dull thud followed by clouds of dust. He had not felt any difficulty in breathing until the dust came. They got out to No.4 brow when they felt it was safer and the air was clearer. Someone remarked about there being men in the level. He could see the lights of the lamps and on going to investigate came across one of the men. He went back for assistance and some men were brought out, several being unconscious. One of them was dead. The men were found lying within a few yards of each other and seemed to have been following one another. They saw smoke was somewhere in front of them. When they decided return they had covered a distance of 270 yards from where the last body was found. He did not know he cause of his lamp going out or why the one he found was out. The rush of wind or the presence of gas would do it. In his opinion the rush of wind along the level would put out the lamp he found, but he admitted that his own lamp went out without any wind. He found no sign of fire.

In answer to Mr. Blackledge, Shaw said he had been on this coal face for three years and he had never come across was sufficient to cause alarm. Further questioned he said he believed a "stopping was blown out and then they found they could hardly breath. Shaw told the Coroner that recently there had been a little gas at the top end of the face, but it was hardly worth taking notice of. The last time he was down he did not notice gas. He said he could smell it when he got on to his machine. He had never reported it. There was so little it didn't matter.

Edwin Hunter 5, Whelly Wigan, coal cutter, said he was about 20 yards from the Rise Brow when he felt a gush of wind. Clouds of dust came and he shouted to his mate, James Durkin, but got no reply and turned and went back to the bottom of the jig. There he met Peter Shaw and two other men and guided them to No.4 brow were they were safe and in fresh air. With Catterall and Benson he returned to the coal face to see if he could give any assistance because he knew there were some men at the top of the jig. At the top of the delivery they found that there had been a fall of dirt and they were unable to get any further. He had never known the indicator show the presence of gas, neither had he smelled any.

Frank Rigby, a member of the permanent corps stationed at the Mines Rescue Station at Boothstown, 9, Orchard Avenue, Boothstown, said he was in charge of a team of rescue workers who descended the No.4 pit about 12.40 a.m. on January 6th. They went along the west level and made tests for gas, Things were rather difficult and he could not get a definite show owing to the smoke. The light of his lamp went out. They reached No.4 brow, From the time they reached the pit bottom they had been wearing the oxygen apparatus. They located the first body 100 yards from the belt brow lying face downward on the belt. The second body was 40 yards further on, in the same position as the first. The third and fourth bodies were located shortly afterwards face downwards in the travelling road. The fifth body was about 12 to 15 yards along the belt level. After examining the stopping, which was intact, the team returned to its base. He saw three lamps. two electric and one oil. The latter was not lighted but undamaged. The next day he took a rescue team down to try and ascertain where the smoke was coming from. After going along the belt level, past where the last body was found. They found the bottom of the slant full of water vapour. They turned up the higher side slant and had gone about 60 or 70 yards, when they found a fall of roof which was father difficult to get over and he heat was so intense they decided to return. It was evident that the source of the smoke was somewhere in front of them, When they decided to return they had covered a distance of 270 yards from where the last body was found. He did not know the cause of his lamp going out or why the one he found was out. The rush of wind or the presence of gas would do it. In his opinion the rush of wind along the level would put the lamp he found out, but he admitted that his own lamp went out without any wind. He found no sign of fire.

One of the men who was injured, Thomas Rafferty aged 47, colliery dataller, of 17, Charles Street, Tyldesley, told how he joined party of shot lighters and two haulage hands, Kennedy and Houghton and assisted to move some tubs of timber. They were waiting to go along the level when a cloud of dust surrounded them. He turned his back to it and put his scarf round his mouth. It affected his breathing. The others went back to the pit bottom and he made his way out but after he had gone about 50 yards he collapsed. On recovering he found himself in hospital. He had never felt any difficulty in breathing or anything wrong with the atmosphere.

Herbert Holland aged 32, colliery fireman, of 345, Warrington Road, Abram, said he finished his duty at 11p.m. on January 5th. He examined the pit on several occasions, including the district known as the Rise Unit. The last examination finished at 10p.m. He tested the district for gas with a flame lamp, but found no gas on the face, only on the top of No.7 brow. He estimated it at one per cent, and it was about two feet from the roof. The air was clear at the bottom of the brow. From the top of No.7 brow it was in the general body of the air to the bottom. It could only be found at the top of the brow and he did not think it was any detriment to working. He thought the ventilation was sound. The condition of the Rise Unit was better on that day than the day before. It had not been good at one time, a week previously. On that afternoon they withdrew the men from the district because they found some indications of heating all round the top of No.7 brow. On that occasion he went up the higher side slant but found no signs of heating there. He found gas at the same point as the heating. Apart from that occasion he was quite satisfied with the condition of the mine. The heating indicated to him that there might be combustion in the old workings which began at the top of the No.7 Brow. There was a stopping at each end of the old workings.

After the findings of the week previous, the stopping at the No.7 brow end was reinforced and the other stopping was extended. He examined the work as it progressed and was pleased with it, thinking it to be a big improvement. He had found gas on previous occasions and he had been reporting it in writing for about two months but he had never found more than one per cent. The only thing to suggest was better ventilation or the removal of the cause of the gas. He did not think that the gas he had found was coming from the face but that it was bleeding from the stopping at the top of

No.7 brow and the work that was going on was to try and prevent it coming through the stopping on the top level was to prevent the air going round the old workings. The stopping on No.7 brow was 25 yards thick and was built of dirt, stone dust and two brick walls, each a yard in thickness. The other stopping was built of stone dust and sand in bags. The other fireman, William Cooney, was in charge of the work of building the stoppings and he received instructions from the under manager.

In answer to Mr. Fraser, he said it was not usual to seal up old workings. This one was sealed off because there had been some indications of heating. He would not call it a fire. There had been outbursts of smoke or gas at times. It could be seen, and was like vapour and had a sulphur smell. He did not think that a gob fire had broken out but that it was outburst of gas due to it accumulating behind the stopping.

Mr. Fraser asked, "Suppose, after investigation, the stopping was found intact, where would you say the fumes which killed these men came from?"

"I should say they came from the old workings and that the stopping had been blown down by an explosion inside the sealed area. He thought that oxidisation of the coal caused heating which developed into a live fire and that the gas, which had collected behind the stoppings ultimately became alight and blew the stopping down and the gas escaped into the air ways in which the men were travelling and so overcame them."

Mr. Blackledge asked, "If I were to put it to you that there had been outbursts of gas as far back as July what would you say?"

"I should say that you were mistaken. They had been canaries at the top of the brow to give warning in case of an outbreak of gas and although I have not seen any of the birds in distress, I have heard of them being so previous to the explosion. My conclusion from that was that carbon-monoxide was present and I warned the men under my charge."

George Catterall aged 41, night overman, of 17, Bag Lane, Atherton, said he commenced at 10p.m. in the No.4 pit. He gave instructions to the night firemen. He met Mr. Monaghan and his party on their way to reinforce the stopping at top of No.7 brow. About 11.30p.m. he was in No.4 brow arranging for some coal cutting when he heard a dull thud. Volumes of dust were followed by smoke. He sent a message for the Miners' Rescue Brigade but in the meantime organised a rescue team of his own. They went down the intake to the rise unit but they were forced to come back the way they went. Before doing this they safely directed seven men to No.4 brow. Others they directed to the East Level in No.3 pit. It was a blockage which forced them to turn back. There were seventeen men going to their work. Of these, six men lost their lives. Dykes had a cage of canaries, and since the explosion these had not been discovered.

In answer to Mr. Fraser, Catterall said his theory about the cause of the explosion was on the same lines as that given by Holland.

Dr. G. A. C. Lynch, pathologist of Wigan Infirmary, stated that he performed a post mortem examination on John Bailey and Ernest Huyton. He took a I quantity of blood from their lungs, and a spectroscopic examination showed it to contain concentrated carbon monoxide to the extent of 58 per cent of the specimen. In the case of Huyton it was 82 per cent. specimen. James Durkin, he found, sustained a fractured skull and from an external examination he thought that three others died from the same cause. The body of Monaghan was not seen by Dr. Lynch, the Coroner stating he had permitted it to be taken to Scotland. Returning to the head injury sustained by Durkin, Dr. Lynch agreed that a sudden burst or blast, which might have blown him down, could have caused the injury.

In order to release men so that they could get back to work at the colliery, the Coroner, at the resumed inquest on Thursday and read a number of statements made at the previous hearing, so that the men could sign them.

At the resumed hearing Mr. D. Coatesworth, H.M. Chief Inspector of Mines deputised for Mr. Frazer the Divisional Inspector. Two of the injured James Neville aged 49, Victoria Terrace, Bickershaw and William Houghton aged 22, 16 Closebrook Road,

Pemberton, Wigan, were not present as the former was being in a convalescent home and the latter too ill to attend.

First witness was William Benson aged 42, fireman. 38a, Westleigh Lane, Leigh. who said he arrived at the pit bottom at 10.40p.m. On his way to see the Rise district, he heard a dull thud and saw clouds of dust. Then there was a slight smell of smoke. He turned back at once and caused all his men to be sent to the surface. He and others tried to reach the deceased men by the intake. A fall of roof blocked their way. They showed this to an official and then went to No.4 brow. None of the men had time to reach their work when this happened.

Benson was questioned about the stopping. His instructions were to pack it up with fine dirt and build a stone wall. They finished with sand and stone dust and built a new wall. Men from both the night and day shift worked on it, and they did it according to instructions. He inspected the work twice every night as the job proceeded. Benson described one stopping as dry stone walling, whilst the other at No.7 Brow included brick built walls.

At the resumed hearing, William Cooney aged 34, fireman, 274, Nel Pan Lane, Leigh, said on December 29th. they discovered some heating and they placed sand bags and pillars to prevent the heating going further. In his opinion they arrested the trouble. He had never found gas on the face. It was perfect and clear as a crystal. He had not received any complaints about gas, only about it being too cold, a sign of good ventilation. In his opinion the explosion took place between the stoppings and was caused through gas becoming ignited. Everything that could be done to prevent the explosion was done.

Herbert Booker aged 41, manager of No.4 pit, of 482 Crankwood Road, Abram, said on December 29th about 5.30p.m. he was notified that there was some indication of heating at the stopping. He found a slight heating of the strata just over the top of the stopping. He did not see any sign of smoke or flame but there was a pungent, uncommon smell being given off. It did not smell like gob fire. As a precaution he gave instructions for the men to be withdrawn and arranged for tests for firedamp and sent for the safety officer. It was also decided to reinforce the stopping by putting a sandbag wall in front of the original wall. After putting the work in progress he arranged for H.M. Inspector of Mines to be notified. The latter arrived about 8.30 p.m. and he agreed with what was being done and stayed the whole of the night and assisted in the work which was completed by 6a.m. next day. Conditions were much improved and he was satisfied that what they had done had reduced the smell and the heat. It was afterwards decided to put a 3 foot thick brick and mortar wall in front of the sandbags. That showed a marked improvement. Anything that was being given off would be driven back into the old workings. The sandbag stopping was continued along the belt level. Everything they did was improving the condition. During the progress of the work they had the advice of Professor DT Jones. who was engaged as an expert advisor by the Company and he could not offer any better suggestion. He took some samples of the air and Booker viewed the result of the examination of the samples as satisfactory. Mr. Coatesworth. H.M. Inspector of Mines, visited the place on December 3lst. and satisfied himself that conditions were safe. He was also satisfied that the improvement was maintained.

During the following week the place was continually under observation for any further signs of heating and birds were taken on every shift. Normal coal-getting was proceeded with and was approved of he understood, by H.M. Inspector of Mines. He, along with other officials, visited the place once a day, and on each occasion a thorough examination was made. On the night of January 5th he received a phone message to go to the colliery and learned that there was something wrong in the Rise Unit district. He went underground and found noxious gases coming out from the direction of the west level. He found Rafferty lying. unconscious and sent for the rescue party. He proceeded to the Rise Unit lower side face and found everything normal until he reached the coal face when he saw that one or two props were disarranged and a large

fall prevented further, progress. Later he learned that five men had been found dead in various places in the brow. It was later reported that the stopping at the top of.No.7 brow was intact, with no signs of fame, smoke or violence. Coming from the top of the higher side slant was a vapour. After the bodies had been recovered, screens were erected to cut of as much ventilation as possible from that district and all men were withdrawn. The stopping at the top of the old workings was put in to prevent air going into the workings and the stopping at the other end was to prevent any gases from the old workings entering the air circuit. The brick walls were put in the stopping at the No.7 brow because if gas did accumulate it would try and come out that way. Both the stoppings would serve equally well as a means of preventing air or gas coming through. He did not put the brick walls in because he had any misgivings but merely as an extra precautionary measure. From information at present available it was difficult to come to a conclusion as to what actually happened, later the whole of the Rise Unit was sealed off.

Completing the inquest on six men who lost their lives, James Henry French, agent and General Manager, said that the initial trouble was discovered on December 29th. He visited the pit and spent the entire night there. Mr DM Coatesworth, H.M. Inspector of Mines also visited the scene. Birds were taken down the pit, temperature tests were taken and senior officials of the company were always on the spot when the sealing operations were in progress. He received personal reports from them all. The quickest thing they could do was to erect a stone dust barrier and finish with a brick wall.

The area was now being permanently sealed up. This was being done after consultation with H.M. Inspector of Mines. It was generally accepted practise in mining,, that it was one of the most hazardous tasks to open an area which had been heating and re-admit oxygen. They deemed it unwise to take the risk, having in mind all the circumstances. Asked for his opinion as to what caused the accident he replied, "I think there was an ignition of fire damp in the sealed-off area, probably by spontaneous combustion. I cannot subscribe to the view that the stoppings were blown and this is supported by the fact that flame was not propagated through any part of the workings."

The reason given by Mr. French why the area was to be sealed off long before the accident happened was that the management did not consider the district an economical proposition, coupled with the fact that it was a district liable to spontaneous combustion. They also had to cut out the resistance to the ventilating circuit.

At the previous hearing several witnesses had been cross-examined with regard to the difference between the two toppings erected to seal the area up, inasmuch that one included a brick wall. Giving an explanation, Mr. French revealed that had they built a brick wall at one side it would have been on unsafe ground, and it would have given them a feeling of false security. "The ground and the roof were both active," he said. "Where a good, well-built pack is erected the movement and the weighting would have consolidated this whereas the movement would have cracked and crushed a wall. This would have let air into he area and our job was to prevent this."

The Coroner observed to the Jury that it was one of those cases where, despite all they could reasonably have done in the way of inquiry, they could not get to the bottom of the affair. He did not think they could take it much further than Mr. French's views on the position. He did not want to indicate to the jury that the time spent had been useless. They might, under the circumstances, feel they would like to return an open verdict as to the cause of the explosion, or they might feel that whatever happened was in the nature of an accident. In that case their verdict would be one of misadventure. The jury, after a brief consultation, decided upon a verdict of 'Death from misadventure', adding that they were prepared to accept Mr. French's views. The Coroner paid tribute to the men who bravely did what they could to prevent further loss of life.

BARNSLEY MAIN. Barnsley, Yorkshire. 16th. and 17th. February, 1942.

The Colliery was the property of the Barrow Barnsley Main Collieries Limited. Professor Douglas Hay was the Managing Director of the Colliery Company with Mr. J.E. Longden as Agent. The manager of the Barnsley Main Colliery was Mr. A. Benford with an Assistant Manager and three undermanagers one of whom, Mr. E. Pilkington acted for the Fenton seam. Mr. J. Harrott was the assistant manager for the seam. There were two shafts which were 400 yards apart. The No.2 downcast was 15 feet in diameter and 512 yards deep and from it the coal from the Swallow Wood, Haigh Moor and Lidgett seams, lying at 344, 358 and 393 yards respectively was raised. The No.4 upcast shaft was 16 feet in diameter and was sunk to 542 yards. from this shaft the Fenton and Parkgate seams at 524 and 542 yards respectively were raised. Only the Fenton seam was affected by the explosions.

The Fenton seam was 4 feet 4 inches thick with a dark bind roof and strong spavin floor. Fifteen inches from the floor there was a black shaley band 4 inches thick in which the cutting was done. The main intake and return to the workings passed through a 36 feet upthrow fault through which they were drifted in stone. The intake drift was 45 yards long rising 1 in 6 and the return 30 yards long at a gradient of 1 in 3. At the time of the explosion two faces were being worked. They were known as ‘A’ and ‘B’. The ‘B’ face, in which the explosion occurred, was 140 yards long, 95 yards on the left side of the level or loader gate and 45 yards on the right, and dipped from left to right at about 1 in 20.

The coal was undercut 4 feet 6 inches by a B.J.D. chain machine and filled on to conveyors, on the left side a jigger and on the right a belt which delivered to a gate-end loader in the main loader gate. This was about to be moved to a new loader gate which turned off to the left of it. Coal cutting was done on both the afternoon and night shifts, ripping and packing on the afternoon shift, turning over conveyors on night shift and filling on the day shift. Shots were fired in both the coal and in the rippings. Three hours before the first explosion, four shots were fired in ‘B’ district. Two in the right tail gate and two on the face in the left hand corner. All these shots were fired without incident. On each of the three shifts there was a deputy in charge of ‘B’ face supervised by an overman who also had charge of the ‘A’ face.

The ventilation of the mine was produced by a Keith Blackman fan which circulated 175,000 cubic feet of air per minute at a water gauge of 4.8 inches. The last statutory monthly measurements were measured on 26th. January and showed that 27,2600 cubic feet per minute entered the North East District comprising the ‘A’ and ‘B’ faces. There was not record of the quantity that passed down each face as was required by the regulations. there was a book which recorded weekly measurements that were taken n the intake and return airways but these were taken 10 yards not 100 yards from the face. During the period of six months before the explosion firedamp had been reported by the deputies on 10 occasions. All the reports related to feeders on the left hand tail gate and were reported as ‘being diluted as give off’. Electricity was used at the face at 550 volt A.C. for coal cutting and conveying and compressed air which was supplied by a main which ran up the left tail gate was used for drilling shotholes and also to drive the jigger conveyor.

There were two explosions. The first occurred at about 7.30 p.m. on 16th. February and two persons were burned, one of whom subsequently died and the second explosion which was far greater occurred at 12.40 p.m. on 17th. February which caused the deaths of 12 persons and injury to 28 others.

The events that lead up to the first explosions started on the afternoon of Monday 16th. February when cutting was to be done on the ‘B’ face. On a previous shift, the machine had cut up the face to about 20 yards from the rise end and the front part of the cut coal had been stripped leaving a track wide enough to take the coal cutter through before the conveyor pans were moved forward. It was intended to flit the machine to the top end of the face, jib in there and then cut the 20 yards down hill and

the take the whole machine down the to the lower end ready for cutting the whole length of the face uphill again.

Walter Lodge was the coalcutter driver and he and his assistant had gone to the face to commence work at about 6.20 p.m. The trailing cable used on the periods shift had been damaged and sent out of the pit and another cable had been sent for which Lodge saw in a tub in the north East plane as he travelled inbye. There was a spare cable in the district but it was too short to reach from the loader gate, in which the switch gear was situated, to the top of the face. The switch panel was moved into the new loader gate or cross gate to solve this problem. As the new cable was on it's way, arrangements were made by the overman, Horace Rawson, to transport this form the plane and since the main and tail haulage along the level were not in use on that shift, the cable was carried by about ten or more men up the face. Every care seems to have been taken to avoid damage to the cable and there was no reason to suppose that it suffered any damage on it's way down the pit.

The cable, which was 120 yards long, arrived at the new loader gate and was carried up to the machine. Forty yards of it were left coiled up in the gate. the pommels were examined by Samuel Dawson, an electrician, who also examined 45 yards of the cable next to the machine by passing it through is hands as it was taken up the face. He found nothing wrong with it or the pommels. The pommel was inserted i the switch panel and William B. Rushforth, assistant electrician, stood there ready to switch on. Lodge had previously been up to this machine and made his usual examination for gas in the general body of air about 10 yards on each side of it with the flame safety lamp he carried. He found no gas.

The other pommel was fixed to the machine and Lodge shouted for the machine to go down the face to have the power put on. As soon as Rushforth switched on, and before Lodge had time to put in the machine switch, there was a flash from the trailing cable, and Rushforth which was still hold of the switch handle, immediately heard shouts of 'Switch off again" but the switch had tripped automatically. Witnesses agreed that the flash occurred at a point about 20 yards below the coalcutter and Dawson and the deputy later found there a hole in the new cable which was half to three quarters of an inch in diameter and appeared to extend down to one of the cores. Mr. Rowell , the safety engineer, also saw the hole when he examined the cable some hours afterwards.

The flash from the cable ignited firedamp and Frederick Wood and Ephraim Wilson were burned. Wood died some days later. Prior to switching off the current wood had been freeing the coalcutter jib. He then went up the face and was thought to have been somewhere opposite the top waste when he was caught by the flame. His clothes were set on fire and he ran out of the tail gate to the level where he was overtaken by M. Walsh and C. Bailey, having discarded his pants which were still burning and had to be extinguished. He refused first aid treatment and they put a coat over him and a lad gave him his pants after which he was taken to the pit bottom and fro there to the Ambulance room on the surface where he was treated and sent to hospital. Ephraim Wilson was working at the top left corner of the face and ran out down the tail gate. He was burned on his shoulders, arms, hands and head. He was taken to hospital and was unable to give evidence at the inquiry as he was too ill.

Roof breaks appeared regularly after each cut. The afternoon shift overman stated that as result of a heavy weighting over the weekend there was an open break about 40 yards long, along the face and roof on the gob side but the afternoon shift deputy and others said they knew nothing of this weight and the roof appeared normal. It seemed that the two breaks nearest the face had opened more than normal and when seen later by the manager and the safety engineer they had widened to several inches during to the settlement of the strata. The Inspector commented-

> "It is desirable, especially in gassy seams, that open breaks at the face should be avoided as far as is practicable by careful attention to roof control."

Lodge and Dawson were at the machine when the flash occurred and Lodge said that the flash hit the roof and then died out leaving a fire in the roof and gas was on fire at the break. The flame which was 2 feet from the roof and 4 feet 6 inches wide billowed slowly up the face to the machine, went back to where it originated, returned and went up the tail gate. Both men rushed to the waste opposite the machine and got behind the pack where they remained until flame passed. They then went out to the loader gate. The overman Rawson was at the ripping edge in the new loader gate and fro where he stood he could see up the face. He noticed the flash and said, 'as the flame went into the break in the roof it flashed up and down both ways in the breaks to within 10 yards of me and across into the gob straight over the pans and along the face.'

After the explosion Rawson withdrew all the men from the Fenton seam and also gave instructions for their withdrawl from the Parkgate seam. He then found hat three fires had been started. A small one on the face and two others in the gob, one in the second waste from the tail gate and another in the third waste. The deputy and two overmen were sent to deal with these while Rawson went to the telephone to report what had occurred.

The fire at the face was of small coal and was quickly dealt with by applying stonedust. Those in the wastes were 4 or 5 yards in from the face. deputy Lunn's first impression was that heaps of small coal or gummings had got on fire but on thinking about the matter he changed his mind and at the inquiry thought that it was gas burning. These fires were extinguished by about six bags of stonedust. The overman was of the same opinion at first, that it was the coal that was one fire but later thought it could be gas that was burning.

After the fires had been dealt with, smoke was discovered in the left tail gate coming from a break over the gate side pack from the first waste and about 10 yards back from the face. When he went into the waste, Lunn saw a 'very fierce blue flame' beyond a big fall which stopped him seeing if it came from the floor or the roof. He thought it was gas burning and the flame seemed to fill the whole of the opening over an old fall which had come down on the 27th. January when the roof broke down and closed the face. Fire extinguishers were applied through the opening and appeared to have extinguished the flame but there was still a great deal of heat. This was about 1 to 9.30 p.m.

Rowell and McNeill, the manager of the Barrow Colliery, reached the 'B' face about 9.40 p.m. They found smoke coming from the right hand side between the hurdle sheet and the ripping lip and there was a layer of smoke and steam and 4 per cent of gas 6 inches deep against the roof which extended back for about 8 yards from the ripping lip to about half a yards short of the hurdle sheet. In the first waste the undermanager and others were working throwing back the debris, and as it was warm, mixing stonedust with it to prevent it getting on fire. The Agent and manager arrived at about 9.50 p.m. and found these conditions. In the waste there was little smoke hanging near the roof and some heating in the region of the old fall near the gate sidepack. To improve the ventilation in the tail gate the sheets in the loader gate were tightened up, a second hurdle sheet was also erected in the tail gate about 2 yards from the ripping lip. This cleared the smoke and gas. Later a sheet was erected in the main plane leading to 'A' face to force more air to the 'B' district.

In the meantime a scouring about 3 feet square was started through the gate side pack towards the old fall and when this had gone about 2Å yards, broken roof was encountered and two pieces of red hot timber got out. Working the waste was proceeding when Mr. Baker a Junior Inspector arrived about 10.45 p.m.. Gummings and dirt were being cleared fro the floor and timber erected to secure the roof in the waste. Baker examined a yard or two into the waste and could find no firedamp and as there was no visible fire he concluded the heated material would be soon got out and he returned to the surface to report to his Senior Inspector. Before he left he asked Mr. Longden to let him know the position by telephone when he came out of the pit. An

examination of the whole face by the manager showed normal conditions everywhere except in the first waste.

John Hayes, a ripper and colliery rescue brigade man reached the district as a member of the second rescue brigade just after 11 p.m. and went to work in the waste to relieve Mr. Pilkington with whom he then took two short spells shovelling the material out and throwing it back to Lunn and others behind him. A way was the cleared through the middle of the old fall and this work went on for half an hour or more. Leaning over the fall at the centre where Hayes was working the manager was able to put his lamp up and see into the gob for about 6 or 7 yards but saw no fire or flame. At the left side there was a normal gob temperature and no smoke but on the top of the fall where Hayes was, the manager 'got the temperature, and 2 yards from the right hand pack the temperature got you whether you were standing up of kneeling'. In the gate he notice thick smoke puffing out through the break over the pack and found 3 per cent gas at the ripping lip coming from a small separation about 9 inches from the roof. About this time a brattice sheet was put up across the face into the waste to cool the place for Hayes and others who were working at the fall.

At about 11.35 to 11.40 p.m. Hayes was slightly burned on the left arm and right ear. He had noticed a cavity just over the fall and a red glow which he said, 'seemed to be shadowed in the cavity from a fire in the waste there was smoke going up into this cavity and then coming out travelling along the roof over my head as I was shovelling. While I was shovelling all at once I head a rumble and then there was a flame which came out and burnt me.'

Mr. Longden was in the gate at this time and heard a noise like a fall of dirt in the waste. He and Mr. McNeill examined the waste where they found 4 per cent firedamp just beyond the end of the brattice sheet about half way between the roof and the floor. A brattice sheet was hung from the roof and went to the floor to direct as much air as possible into the waste to clear this gas. The heat in the waste had been increasing and was becoming almost unbearable. Longden thought that this was case by gas burning in the hole and a flame had been wafted out by a fall in the waste beyond the fall. It seemed unsafe to continue work and he withdrew all the twenty men.

A conference was held at the bottom of the tail gate by the colliery officials and Mr. George Martin, President of the local branch of the Yorkshire Miners Association was present and it was unanimously decided to seal off the district. Longdon explained that the position had become critical and the decision had to be taken quickly with no time to consult anyone else. At the inquiry Longdon agreed that the Divisional Inspector could have been informed but it did not occur to him at the time.

The face selected for the stoppings was at the drifts about 600 yards from 'B' face and a start was made at about 12.30 a.m. on the 17th. February. there was no evidence of the work being held up at any time through lack of material and progress was maintained under the supervision of the agent, manager and undermanager evidence was taken that the intake stopping was 25 feet long and the return stopping 24 feet. The manager described the construction of the intake stopping thus-

> "The intake drift was supported by arched girders. After the rails and cable had been removed and the compressed air pipes broken, the first two feet was built of stone packers intermixed with bags of stone dust forming the inbye facing. Two long girders were the placed at an angle across the road between two sets of arches and spragged by two short girders. Some old rails and pipes were inserted as sprags."

The return stopping was built similarly except that no girders or rails were pit in a support but at the centre of the stopping there was an existing door frame built into the brickwork and this served as reinforcement. Near the top of each stopping a passage was left for air and at about 11.40 a.m. the plugging or sealing was commenced and continued simultaneously by means of sand bags. The manager estimated that 30 yards would be required to complete the plugging, and half an hour before the plugging

started, 130 sand bags were filled. The sand was transported in tubs along the main plane to a point near the intake stopping where the bags were filled. During the building of the stoppings regular tests were made in the return air for firedamp and a reading of 1.38 per cent was found just before the plugging was completed. There appeared to be no decrease in the flow after the plugging had been completed and it was not until 5 to 10 minutes before the explosion that the circulation of the air through the stopping seemed to stop.

At 12.40 p.m., twelve and a half hours after the erection of the stoppings had begun and half an hour after starting to plug, 4 yards of the plugging had been completed when the major explosion occurred which blew out the stoppings. Two fillers, who were working near the intake stopping, were partially buried by sand but survived. One said that the bags in front of the stopping, 'stated to move as if somebody was shoving them and then came with a rush'. The movement stared at the top and not at the plug hole and he saw a blue flame come over the stopping and pass over his head. The other man said that the saw no flame. Mr. Longton, who was standing about 15 yards from the stopping, talking to Martin and Tom Brown, who were local officials, said, 'there was a thump, and I seemed to be projected forward.' He was later found unconscious 80 yards further outbye.

At or near the return stopping there were 18 men including two Inspectors, Houston and Baker and Mr. Rowell. M.r Baker was taking a final air sample when the explosion occurred and said he heard rumbles like three or four peals of thunder in quick succession, followed buy a rush of air and dust. Mr. Rowell's impression was of a dull heavy thud followed by four more distinct thuds in the space of a second, then the stopping plug blew. Afterwards dense clouds of fumes came through the hole and lasted for some minutes.

All the men at the return stopping escaped injury but the deputy who was in the plug hole and two others suffered from shock. After they had all assembled in the South East return in practically fresh air and it was decided that Mr. Barker should accompany them to the shaft bottom and then report to the surface. true to the high conditions of mining men for coolness and courage in the face of danger, the others elected to stay and help the men at the other stopping.

Two of the rescue men went through first wearing breathing apparatus to the intake side to look at the position. The first door was closed, the second had previously been removed from it's hinges and the third was found open. Between the second and third doors they found an injured boy whom they carried back and reported that a lot of men were lying helpless in the intake, some apparently dead.

The men who died were-
Arthur Brown aged 35 years, filer who died from asphyxia.
William Burns aged 31 years, filer who died from a fractured skull.
John Thomas Cocking aged 38 years, collier who died from concussion and blast.
John Albert Harrott aged 39 years, assistant manager who died form asphyxia and bruising to the chest.
William Hinchcliffe aged 45 years, filler who died from shock and a fractured ankle.
William Larkin aged 55 years, overman who died from a fractured skull.
Verdi Lowe aged 54 years, filler who died from concussion and blast.
Robert Henry Luck aged 51 years, overman who died from carbon monoxide poisoning.
George Martin aged 54 years, repairer who died from carbon monoxide poisoning.
Ernest Pilkington aged 37 years undermanager who died from a fractured skull and carbon monoxide poisoning.
William Rushforth aged 31 years, filler who died from carbon monoxide poisoning.
Charles Wright aged 41 years, filler, who died from concussion and carbon monoxide poisoning.
Frederick Wood aged 34 years, filler who died from toxaemia following extensive burns.

The inquiry into the causes and circumstances attending the explosion which occurred at Barnsley Main Colliery, Barnsley, Yorkshire on the 16th. and 17th. February 1942, was conducted by J.R. Felton, O.B.E., H.M. Deputy Chief Inspector of Mines. The inquiry and the inquest were held jointly by arrangement with Mr. Sanderson H.B. Gill, H.M. Deputy (and Acting) Coroner at the Town Hall, Barnsley on the 25th March to 10th. April. The report was presented to Major The Right Honourable G. Lloyd George, M.P., Minister of Fuel and Power on the 11th. August 1842.

The verdict of the Coroner was as follows-

> "Frederick Wood died from toxaemia due to burns sustained from an ignition of gas caused by the fusing of an electric trailing cable attached to a coal cutter. the other twelve men died from the causes stated in the medical evidence following an explosion in the Barnsley Main Colliery whilst they were working as members of a rescue party sealing off a district in the mine which had got on fire, the deaths being by misadventure in each case."

After all the victims had been removed, Mr. Houston and Mr. Rothwell went through the doors without breathing apparatus. They found the top of the intake stopping had been blown off and they saw seven dead. All those alive were examined, the last of these men was Mr. Longden.

It was clear that the first explosion was one of firedamp ignited by a flash from a coalcutter trailing cable. Since this cable had just reached the face after being repaired at the Company's Barrow Colliery and sent to the Barnsley Main Colliery great attention was directed on to it. Professor Statham gave evidence and Mr. Felton agreed "that the matter of design, construction and use of trailing cables is one that is requiring further investigation, and suggest that as soon as circumstances permit a Committee should be set up for this purpose, on which cable makers, electrical experts and managers should be represented"

As to the presence of firedamp and the ventilation of the face it was evident that the lengthening of the face and its change in direction brought about anew set of conditions, and the method of ventilating the face ought to have been adjusted to meet them. As to whether the normal method of ventilation a fast end was by means of slits and an air passage along the rib side, there was some difference of opinion but it was agreed that from the point at which the pack was reduced it was built to the solid rib. On the 10th. February on inspection was made of the district by Mr. E. Netherwood, Inspector of the Yorkshire Mines Safety Board, and Mr. G Martin and they reported as follows-

> "Ventilation generally good. Feeders of gas were found in the left hand corner of 'B' face and also at the ripping on the left hand tailgate and of the new loader gate."

All the evidence pointed to the major explosion having originated in the top waste and it was not possible to say definitely what was burning in the gob behind the fall. It was small coal and or timber that was smouldering then the erection of the brattice sheet across the entrance might have had the effect of fanning the fire. Whatever flame or heating there was beyond the fall it seemed to the Inquiry that there was reasonable chance of it being extinguished by the application of water. The Inquiry commented-

> "A supply of water through pipelines and hose extensions posses the obvious advantage over the alternative method of supply, and should be adopted wherever practicable, particular in mechanised areas."

At the colliery, barrels of water and a manual pump were taken to the 'B' face but the water was not used, fire extinguishers being preferred.

Attention at the inquiry then turned to the major explosion which was an explosion of firedamp and whether coal dust played a part could not be determined but the evidence pointed to the fact that it did not. The accumulation of gas was ultimately ignited either by the flame from gas which had continued to burn at the break and then was forced down or by burning material in the waste. The Inspector was unable to say which.

The place chosen for the stoppings to be built was regarded by the inquiry as the most suitable but the large number of men that were used to erect the stoppings came under criticism from the miner's representatives and it was thought that this had led to a greater death toll. The Inquiry commented-

> "While such work is in progress and particularly in the later stages when the air is being cut off, it is most important that the number of men exposed to risk should be reduced to a minimum compatible with the demands of efficiency and speed."

At the time there were 62 men with in 30 yards from the stoppings but only 12, including four officials, on the intake side who lost their lives. With this proceedings at the Inquiry terminated and the report was presented to Parliament.

LEPTON Huddersfield, Yorkshire. 4th. June 1940

Dorman Long and Co. Ltd.
Those who died were:-
J Turner 46 Collier
C Cartwright 36 Collier
L Rich 30 Collier Died 5th June
JJ Hughes 36 Collier Died 5th June.
A England 22 Haulage hand Died 5th June.
J Stevens 49 Collier Died 5th June.
N Overton 30 Haulage hand Died 5 th June.
T Coleman 42 Collier Died 5th June.
JW Daykin 40 Collier Died 6th June.
JH Foster 36 Collier Died 18th June.
E Rich (injured) 56 haulage ahnd.
A Baistop (injured) 25 Collier.
TH Walker (injured) 31 Haulage hand.
R Milward (injured) 16 Haulage hand.

An explosion of firedamp occurred at the intake end of a fully manned longwall face 360yds in length. Eleven colliers were working in the first 35yds of the face and three haulage hands were injured. Two were killed outright and eight others have died since. it has not been possible to examine the face since the explosion owing to the frequent number of explosions but it is possible that the firedamp was ignited by spontaneous heating in a divided airway at the intake end of the face. The district was subsequently sealed by substantial stoppings.

MURTON. Murton, Durham. 26th. June, 1942.

The Murton colliery was very extensive and had been mined for about one hundred years prior to the explosion. It was in the heart of the Durham coalfield seven miles north east of Durham City and six miles south of Sunderland. It had three winding shafts, the East, Middle and West shafts. It was owned by the South Hetton Coal Company Limited with Mr. G. Raw as agent and Mr. W.O. Blenkinsopp as manger, Mr. J. Grogan as undermanager in charge of the Main Coal Landing from which the Main Coal and Five Quarter seams and the Polka area of the Low Main seam were wound. There were two undermangers in charge of the upper and lower landings. The mine employed nearly 2,000 persons underground and 452 were at work at the time of the explosion with 270 in the Main Coal Landing. The mine was worked throughout by safety lamps.

The explosion occurred in the back-over Flat district of the Five Quarter seam which was reached by stone drift driven through a large drop fault from the Main Coal, which lay 26 fathoms below and 204 fathoms deep at the shafts. The seam was 4 feet 9 inches thick in this Flat and was interposed by two thin bands of dirt with a laminated

sandstone roof containing thin beds of shale. The coal was a fairly hard stem coal and had to be won by the use of explosives.

The Back-over Flat was a working area that was being driven back towards the shafts from the 1st. East Main Plane for the purpose of providing a main return airway for anew development in the seam to the south and a new return airway to cut out a long and tortuous return which was serving the Five Quarter seam and also to provide a travelling way for the men so that they did not have to travel on a main engine plane where high speed main and tail haulage was in operation. The final stage of this development had been reached at the time of the explosion. The companion stone drift rising 1 in 6 southwards was being made and the winnings, Fore, Middle and Back Drifts rising o the full gradient of the seam 1 in 23 had reached the point where the drivage to the shafts would be made.

The Flat had its own ventilation split and the most remote working was three and a half miles from the shaft and since it was near a small district, the ventilation was heavily regulated. The last measured quantity of air passing from the first working place was 5,670 cubic feet per minute. The seam in the Flat was cut by arc wall machines operated by compressed air with a jib length of six feet. The working places were normally 16 feet wide and the ‘cut’ was made in the coal 21 inches from the floor level.

Shot holes were bored by compressed air machines to a depth of 5 feet, three being placed systematically in the top coal and three in the bottom coal. The usual charge was 7 ounces of explosive in the centre and 6 ounces in the side holes. The explosive used was Minex and an approved type H.T. single shot exploder was provided for coal shots and a multi-shot exploder for firing volleys of shots in the stone drift. Sand and clay mixture was provided for stemming and home-ground shale dust for use on the roadways and for shot firing.

Gray-Sussman electric hand lamps, with a proportion of schedule B oil lamps as gas detectors, were in use in this flat or district and the deputies were provided with Edison Model J cap lamps and Wolf re-lighter oil lamps.

In common with the practice in County Durham, four coal shifts were worked daily with a deputy in charge of each shift in each flat. In the Back-over Flat the deputies fired all the shots in the flat, including the stone drift. They had ample time to do this work and attend to any necessary bratticing and generally carry out their statutory duties in a proper manner.

The explosion 8 p.m. on Friday 26th.June 1942, during the fifth hour of the Third Shift and it was confined to the face area of the Back-over Flat. there were 15 persons inbye at the time and all were killed except a putter, G.K. Smith who was at the inbye end of the landing and the landing lad, S. Abbott. Smith had a very lucky escape as he arrived at the landing just as the explosion occurred. He heard Abbott calling from the outer end of the landing and Smith with great presence of mind, carried the badly burned and cut lad out to safety, although when was himself suffering from the effects of shock, he was able to inform the manager of what had occurred and enabled him to be quickly on the scene and to take prompt action in rescue and recovery operations and to make the necessary arrangements for medical and ambulance services to go to the mine. Smith was later awarded a certificate and £15 from the Trustees of the Carnegie Hero Fund. The third injured person was T.R. Daglish who was employed at the outer end of the district and was found to be suffering from the effects of shock.

The thirteen victims were at work just before the explosion. Two stonemen and a stone putter were in the stone drift and a putter at the bottom caunch of the Middle Drift, two fillers and the deputy in the Back Drift, two cuttermen in the No.1 Wall and two fillers in the No.2 Wall.

There were clear indications that the force of the explosion emanated from the Back Drift. One wave swept along the No.1 stenton and died out towards the face of the Middle and Fore Drifts. Another swept straight down the return airway where the explosion appeared to have gathered force from coal dust in the old dead-end walls and

stentons outbye. The force was sufficient to blow out the nine inch brick stoppings in the Nos. 5 and 6 Old Stentons before dying out. The flame had evidently travelled along these stentons to the Middle Drift and severely burned the landing boy Abbott. There was no evidence of force and little indication of burning on the Middle Drift but the door of the off-takes cabin on the main engine plane 1,100 yards outbye were blown open.

The explosion seemed to have started as a firedamp explosion in the Back drift and developed into one of coal dust which was eventually stopped by the stone dust on the inbye roads. Carbon monoxide poisoning was the main cause of death of all the victims apart from the filler G. Emery and three other men found under falls of roof on No.1 stenton and at the turn of the No.2 Wall. Both the deputy's hands were burned and several of the victims wee found away from their places of work, indicating that they had some warning of the disaster before they were overcome by the afterdamp. It was also evident that the two fillers, Lashley and Garrett had returned beforehand from the Back Drift to the No.1 Stenton.

The Hougton-le-Spring rescue team arrived at the colliery at 11 minutes after receiving the call and they were quickly followed by the teams from Elswick and Crook Central Stations. These teams did excellent work in attending the injured men and others affected by the rescue work. The ventilation was quickly restored and 10 of the bodies recovered by 11 p.m.. The bodies of the three other men were under the falls and these were eventually recovered about 4 a.m. the following day. Abbott was sent to hospital and recovered from extensive burns and shock and C.K. Smith was also a survivor.

The men who died were:-
T. Davison,
W. Walton,
F. Andrews,
W. Cook,
E.B. Elliott,
W. White,
G. Jeffries,
J. Terry,
G. Emery, a filler,
J. Garrett, a filler,
A. Lashley, a filler,
F. Grimes,
W. Scott,
T. Daglish, brakeman and Worth, a deputy.

The inquest was held by Mr. T.V. Deveny, H.M. Coroner for the area who sat with a jury of seven men and occupied two days. The jury came to the following conclusion-

> "That the men met their deaths by an explosion of firedamp and the firedamp exploded because of the simultaneous firing of shots by the deputy."

It was generally agreed that the explosion occurred in the Back drift and that is was brought about by the firing of shots at the coal face. When Smith left this place a few minutes before the disaster the face was cut and the gummings clear ready for shotfiring. The six shothole had been bored during the previous shift. Smith had reached the landing and after a short conversation with Abbott was sitting down when he heard a thud and then felt a rush of air from inbye followed by smoke and dust. He though a compressed air pipe had burst until he heard Abbott crying for help.

When it was possible to examine the Back Drift at 12 midnight, the body of Worth, the deputy was found 12 yards from the face and on the left side opposite him was a multi-shot exploder with the firing cable leads still attached. The coal face had been shot down and pieces of detonator wire were lying about that confirmed the first

impression that shots had been fired simultaneously by this deputy from the position in which he was found.

There was, at the time, a two percent firedamp content in the air where the deputy lay which rapidly increased towards the face. The side brattice had been completely burnt away and the place was not being ventilated but 36 hours after it was possible to proceed only seven yards up the drift because of the gas. Deputy J. Dent had been in charge of the shift because of the absence of the First Shift deputy and had had trouble with gas in the Drift during this shift and he had allowed the the fillers to work there for time and the arc-wall cuttermen had afterwards cut and bored the face. Towards the end of the second shift he found another fouled place and applied the 'hogger' which was the flexible compressed air pipe from the arc-wall machine, to remove the gas but the place quickly fouled again and about 4 p.m. He fenced off the place and handed over to the Third Shift deputy J, Worth and told him to be very careful in the place. Worth's gas detector safety lamp was found under a fall in the No.1 stenton and it could only be concluded that he had decided to fire all six shots together without first examining for gas.

The inquiry came to the following conclusions-

> "It seemed clear that the ingiting source was an incendive spark created by the exploder while the shots were actually being fired by Deputy Worth in an atmosphere containing an inflammable mixture of firedamp in the air. The burning of the timber some distance from the face of the Back Drift suggests that a rich mixture was ignited in the neighbourhood of the exploder, rather than at the face itself and the faulty connection of one of the cable leads with one of the terminals of the exploder would be sufficient to bring about at the exploder a spark of sufficient incendivity, apart from the sparking inside the exploder."

Mr. Yates went on to recommended that work on the development of a multi-shot exploder should be pressed as a matter of urgency and the taking of an unapproved exploder in any part of a mine where safety lamps were required should be discontinued at once. There were also recommendations about coal dust n mines. Dr. F.V. Tideswell of the Safety in Mines Research Board made an examination of the affected area and reported as follows-

> "The initial gas explosion would push out a cloud of coal-rich dust from the Back Drift and ignite it. The blast would also raise clouds of coal-rich dust in the walls and stentons. These clouds would assist the propagation of the explosion along the Back Drift in two ways (1) by being sucked into the dust cloud a head of the main flame by the series of pressure pulses commonly present in dust explosions (2) by igniting within the wall or stenton and providing and additional impulse behind the main flame. There was no evidence that the flame of the explosion had extended part way into each wall and stenton.
>
> The propagation of flame was checked about 250 yards from the face by increasing dilution of the cloud with incombustible dust from the roadway, assisted by the release of pressure behind the flame provided by some of the open workings and the bursting of the stenton stoppings. Only minor projections of flame or of hot products of combustion seem to have reached the middle road and no propagation of the explosion occurred on this road, presumably because of its high content of stone dust.
>
> No signs were seen that the stone dust everywhere had failed to rise and play its part in checking the explosion."

It seemed evident that steps should be taken to deal with danger from coal dust in disused roadways and the Inspector recommended that all dry and dusty roadways should be sealed off or two or more multi-shelf dust barriers be constricted and the position reviewed at such intervals as may be necessary to maintain the dust in an effective condition.