

MANVERS MAIN. Wath-on-Dearne, Yorkshire. 4th. March, 1945.

The colliery was the property of the Manvers Main Collieries, Limited and there were four shafts at the colliery but in connection with the accident only Nos. 1 and 4 shafts need be considered. These served the Haigh Moor and Meltonfield seams which they intersected at 347 yards and 122 yards respectively. The No.1 shaft was the downcast and was 13 feet in diameter and the No.4 shaft was the upcast, 16 feet in diameter. Mr. G.C. Payne was the agent of this and the Barnborough Main Colliery which belonged to the Company. Mr. E.J. Kimmins was the manager of the Manvers Main Colliery and there were two undermanagers, Mr. A. Wild was in charge of the No.1 pit in which the Haigh Moor and the Meltonfield seam were worked. The district in which the explosion occurred was last visited by the manger on 1st February and by the undermanger on 17th. February 1945.

The explosion occurred in the Meltonfield seam which was three feet nine inches thick, clean coal with a shale roof and a fireclay floor. It had been extensively worked in the district, usually by the longwall advancing system and in comparison to other seams in the district was not considered gassy but there had been explosions in the seam at other collieries.

Some years before the management decided to try intensive mining to increase production by installing power loading on the pillar and stall system in the colliery in the Meltonfield seam and the necessary machinery was made available by the Ministry of Fuel and Power. The system was abandoned because of difficulties with the span of the roof which was over 13 feet wide and was replaced by a retreating longwall system. The faces at first were 60 yards in length but as experience was gained, they were lengthened to 120 yards. After being retreated for 55 yards, water from the Oaks rock above came through the roof and the faces stopped. A pillar of coal 35 yards across was left, after which another longwall face, 120 yards long was opened out beyond and retreated as before. Ordinary longwall machinery was used on these faces.

The North-West district was being headed at the time of the disaster with a view to opening out a retreating longwall faces on this system and it was in this area that the explosion occurred. The report comments-

“The longwall retreating method has been practised to a limited extent in this country for many years and there was nothing new in the system adopted in this case except that American shortwall machines and Joy loaders were used in the headings.”

The opening out of the North-West district was done by driving two parallel roads, 13 feet wide and the height of the seam which were known as the top (inkake) level and the bottom (return) level, with connections or slits at intervals of approximately 36 yards centres or 32 yards between the slits. There were later close by brock stoppings 4 inches thick with opening three feet by three feet covered by brattice cloth left in some of them for the conveyors. From what was seen after the explosion Mr. Joseph Hall, of the National Union of Mineworkers, questioned whether the stoppings in the 5th and 7th. slits were ever there. From two levels three pairs of headings were driven to the dip. These were called 1's and 2's, 3's and 4's, and 6's and 7's and these were about 13 feet wide with a view to form panels for the extraction by longwall. The 1's and 2's had been standing for some weeks before the explosion. The faces of the 6's and 7's headings were undercut to a depth of seven feet by shortwall machines, holes drilled by Siemens-Schuckert drilling machine, and the coal then blasted and loaded by 12BU Joy loaders on to B.J.D., Type H.C. scraper chain conveyors installed in the headings and in the section connecting slit from the face. The chain conveyor in 7's heading delivered on to a Meco gate belt conveyor which was at the top level and ran through the length of this level to the trunk gate conveyor gate 60 yards beyond the bottom of and running parallel to the North Plane. This conveyor delivered to the

loading point at 5th North from which the tubs were despatched to the North Plane and there lashed to an endless rope haulage. No ripping was done in the levels or headings which were supported by steel girders set on wooden props.

For ventilation and inspection purposes the North-West development area formed part of the North district, the lamp station for which was at 5's junction on the north Plane. The ventilation was produced by a fan situated at No.4 shaft which circulated 320,000 cubic feet of air per minute at a water gauge of 2.4 inches. The total quantity of air circulating in the north district of the Meltonfield seam as last recorded by Mr. Fretwell on 28th. February, was 34,368 cubic feet per minute when, the measurement was taken on the North Plane. To ventilate the headings in the North district there were three auxiliary fans. One in 4's heading which was driven by compressed air and the others were driven by electricity. The fan for the '6s and 7's headings was a Meco EF4 driven by a 5 h.p. motor and was at the junction of 7's heading with the top (intake) level. The air was carried through canvas tubing, 16 inches in diameter, to the faces of the headings as required. When there was cutting and blasting in the 6's heading the tubing was removed from the 7's heading face and transferred by way of the last cross slit to the face of that heading. At the time of the explosion the tubing was in the 7's heading, suspended near the roof and according to the evidence of witnesses who saw it the previous shift, within eight or ten yards of the face.

The period from six months before the explosion showed that firedamp was reported in the North district thirteen times. On most of these occasions, the auxiliary fan was out of order or the tubing was partially closed by a fall of roof. When these conditions were remedied, the gas quickly cleared. Only five of these reports were of gas in the North-West area and on one of these occasions the men were withdrawn. This was on 1st. February 1945, when the deputy, Dobson, found gas at 8 to 8.30 a.m. and three percent firedamp was present in the 'North-West top heading, due to a breakdown of the electric fan'. The statutory reports of . At 12.30 to 1 p.m. on the same day a further examination was made and Dobson reported, 'New fan installed, place clear and fence removed'. The manager who was in the district on that day stated that this had occurred when the top level had advanced beyond the 11th. slit and just short of the 12th., the lower level had reached the 11th. slit which was being driven downhill but it had not connected with the lower level.

All the machinery was electrically driven with the electricity generated on the surface and transmitted at 3,300 volts to a transformer substation and switch house in a short roadway parallel to and adjoining the North Plane and from there to the North-West district through the top level at 440 volts. The sub-station had two Reyrolle, Type F, oil circuit breakers, each fitted with earth leakage protection. One of the circuit breakers controlled all the apparatus in 6's and 7's headings and the other for 3's and 4's headings with the cable for this being taken along the lower level. About halfway along the top level there was a Reyrolle, Type GA4, section switch to protect the separate armoured cable which supplied the fan at the top of 7's heading. The main cable was carried through the busbar chamber of this switch to two banks of three gate-end circuit breakers which were at the top level between the 11th. and 12th. slits. They were connected by four feet of pliable armoured cable. The first bank of Reyrolle, Type GA1 switches supplied three conveyors. The second had Type GA1 switches with one controlling a flexible cable to the coal cutter in 6's heading and the other, with a similar cable, went to the Joy loader in 7's heading. A type GA2 switch unit controlled a flexible cable to the drilling machine.

The cable to the Joy loader had four cores and a bare centre earth conductor. The three insulated power cores were each surrounded by a copper screen, all in electrical contact with the bare earth conductor. The fourth core was used as the pilot and was unscreened. The Reyrolle GA1 switch was covered by the Buxton F.L.P. Certificate and consisted of a three-pole isolator, three automatic overload trips and a core

balance earth leakage protection device. Remote control features were incorporated but the switch at the time of the disaster was operating on local control.

In 1936, a safety Department was set up by the Company which had grown and at the time of the disaster consisted of a Senior Inspector with two full-time Junior Inspectors, one at Manvers Main Colliery and the other at Barnborough Colliery, in addition there were three assistants at the former colliery, two at the latter and five other members of staff. It was evident that the Company had shown an active interest in safety and had gone to considerable expense and trouble to ensure a high standard.

No one was left alive in the explosion area so no light could be thrown on what had happened. The position on the previous shifts, Saturday 3rd. March and in particular what happened on the afternoon shift of that day did provide some answers.

It had been arranged that during the weekend, modifications were to be made in the method of conveying the coal in the 6's and 7's headings and the day overman, Harold Mann, in consultation with the deputies, planned the work to be done. The chain conveyor in 7's heading, running from the face to the main belt conveyor in the top level, was becoming too long, and it was proposed to shorten it to deliver on to the chain conveyor in the second cross slit. The direction of this running was to be reversed and to install a belt conveyor in 6's heading from the first cross slit to the top level fed by the chain conveyor from the face of 6's heading and that in the second cross slit. To do this the driving gearheads had to be moved along with other parts of the machinery into the headings and to move them inbye, required the erection of the belt conveyor in 6's heading. In the bottom level no rails were laid, but there was a trolley or bogie with pneumatic tyres, one of which had been missing for some days and it was suggested that this might be used to transport material but there was no evidence that this had to be done. The only other solution was to move the pans which weighed two to three hundred weights by hand. After the explosion the trolley was found opposite the 7th. slit damaged and lying on its side with one wheel off.

On the Saturday, the day shift deputy, Frank Dobson, went down at 5.40 a.m. and came up about 1 p.m. He made two inspections on the North-West side, the second between 11.30 a.m. and 12.30 p.m. and he found that all was in order and failed to detect any firedamp in the headings. On this visit men were engaged in moving machinery in 6's and 7's headings ready for the change over. Coal cutting was done in 7's heading twice during the shift and once in the 6's heading. The coal cutter in 7's heading was left about two yards from the face and that in 6's heading on the low side of the second slit from the face. Both these machines were found in these positions after the explosion.

The Saturday afternoon shift deputy, Laurence Wroe, went down the pit at 12.10 p.m. and came up at about 8 p.m. He had forty three men in the North district, eighteen of whom were working in the North-West. Six of these men were moving pans along the return road and by the end of the shift he had got a number of men just beyond the chain conveyor in the 6th. slit and others were on the outbye side. Four men were moving the chain conveyor gearhead down the 7's heading from the top level by means of the Joy loader. Wroe's first inspection in the North-West was made about 12.30 p.m. and he found all in good order. The second inspection was about 6 p.m. by which time all the men had left and in consequence of this he did not consider it necessary to inspect the face of the headings and he found no firedamp elsewhere. The auxiliary fan was not running at the time as it had been stopped by Crossley on his way put to the shaft when he switched off all current to the district.

Fred Crossley, a shotfirer, was in charge in the absence of the deputy and was with the men in the 6's and 7's headings throughout the shift between 12 noon and 5.30 p.m. when he went up the pit. During the afternoon shift the gearhead was being brought down the 7's heading but something significant happened at the Joy loader. John Wilson, a Joy loader operator who had about eighteen months experience was operating the machine when in his own words, 'the cable got trapped in between the

Joy loader and the gearhead of the chain conveyor, on top of the Joy loader'. There was slack cable in front of the loader and the cable got fast on a pommel screw. This was followed by a flash and the cutting off of the current. Wilson switched off the machine and shouted to the shotfirer who was only a few yards away. After the loader had been pulled forward by sylvesters a sufficient distance to free the cable and it was found, when it was examined, that the cable was punctured through one of the cores. Crossley saw that the rubber was punctured but he did not notice the exposed core.

The flash occurred about 4.30 p.m. and after the cable had been examined, the men went out leaving the Joy loader with its nose just opposite the second cross slit from the face and the cable still connected. It was found in this position after the disaster. The cable was not removed from the gate end switch and Wilson did not withdraw the pommel at the gate end switch because he did not think it was necessary. Wilson went out intending to neutralise the loader gate end switch but he found that this had already been done. He did not notice if the flag of the Joy rider switch had dropped which would indicate that the earth leakage had tripped but he took this for granted. It was assumed by Crossley and Wilson that the gate end switch and also the switch to the transformer had tripped. They knew that the supply could be restored only by an electrician authorised to do so and with the proper tools.

Shortly before this incident, Crossley proceeded up the heading to the top level where he found the fan had stopped which suggested to him that the current had tripped outbye. He looked at the gate end switch controlling the Joy loader and though the red flag had dropped, but he could not be sure. He put the isolating switch into neutral and saw that all the other five switches were in neutral. He made his way outbye at once to the transformer station at 7th. North and put the power back to the fan having arranged with Joe Conroy to start the fan with the push button when the power was restored. To do this Crossley used his battery key which he had been told would do the job even though there were no electricians in the district that afternoon. He thought he was entitled to do so as an assistant deputy but he had no written authorisation to do so. By his actions the electrical system was made live to the switch panels between the 11th. and 12th. slits.

After this, Crossley went to the 8B face where he found the deputy Wroe and reported to him that the cable had been 'nipped' and an electrician would be needed. At the inquiry, Wroe did not remember being informed that there had been a flash on the cable but on coming out, Wroe left word with the onsetter that an electrician was to be informed next morning. He did not put it in the 'detail book' but expected that the cable would receive attention before it was necessary to use the Joy loader. The 'detail book' was a foolscap book that was kept in a 'box hole' about 30 yards from the pit bottom and the deputies entered particulars of what had been done on their shifts and anything of importance of which he thought the oncoming deputy should be made aware.

Mr. Shawcross put in a form of report sheet headed "Isolation of Face Machinery Report" and gave directions as follows-

"This sheet is to be completed whenever face machinery is left unattended as at weekends or holidays or play days. It must be filled in by the deputies in charge of the last working shifts."

The report was as follows-

"I have personally seen that the compressed air hoses or electric trailing cables are completely disconnected from ALL gate conveyors, face conveyors, coal-cutters, rotary boring machines and all other face machinery."

This had to be signed and dated by the deputies and countersigned by the manager and undermanager. Deputy Wroe had signed such a report for his Saturday afternoon shift even though the Joy loader trailing cable had not been completely disconnected at the gate end box.

Harry Ayscough was the deputy on duty on the night shift of Saturday 3rd. March. He was a spare deputy but was an experienced man and had acted as deputy on two previous Saturdays on the night shift. At the inquiry he gave a full and detailed statement of the events leading up to the explosion. Instead of going down the pit at 10 p.m. to make his pre-shift inspection he descended the No.4 shaft at midnight accompanied by a shift of nine workmen, four of whom were to cut the 8B North face, four to move conveyor pans in the bottom level of the North-West and one, Charles Edward Leeman, to attend to the pumps of which there were three, two driven by compressed air in the headings of the dip of the North Plane and one, electrically driven at the side of the North Plane outbye of the transformer station. The former delivered into a standage near the latter from which the main pump delivered the water to the shaft bottom.

The electric power was off, but as it was required for cutting on 8B face and for driving the two auxiliary fans, the deputy switched it on as he went in. The men at work on the 8B face carried electric lamps and had no safety lamp or other detector with them as they ought to have had. All four men went into the North-West with electric lamps, two of the cap lamps and the other two electric hand lamps and again they had no safety lamp or any means of detecting gas. Leeman carried both an electric lamp and a safety lamp but this was found at the main pumphouse in the North Plane after the explosion.

The deputy proceeded down the North Plane taking with him the four men who were to work in the North-West and left them at the bottom while he went in and examined the workings. He returned and the men followed him down the plane and the four who were to work at 8B face proceeded to the bottom of 8's loader belt where they waited for him. They then followed him in while he inspected the place of work. The inquiry pointed out that in doing this the requirements of Section 63 of the Coal Mines Act, 1911 and the General Regulation 50 were not observed.

Ayscough said he expected the pumpman to go into the first pumphouse down the plane, look at the sump there and then go to the second pumphouse and inspect the sump and if this was full, to start pumping, or if it was not, to go down to his air pump. After leaving the bottom of the north Plane Ayscough went to the North-West by the top level as far as the 12th slit, then down the 7's heading in the middle cross slit and out along the bottom level to the 1st. slit and back to where the four men were waiting for him. he did not go into the face of the headings as he did not think this necessary since no one was to work there on that shift.

He tested for gas against fan as he went in since that was the highest point and he thought that gas was most likely to be there. He found none and started the fan by putting in the isolation switch and then pressing the start button. The fan was started after having been stopped for seven hours without an inspection of the district having been made. He made further tests for gas in 7's heading by the first cross slit and at the junction of 6's heading with the bottom level and found no gas.

At about 12.30 a.m he started his inspection of the North-West and he estimated that from leaving the men at the bottom of the North Plane until rejoining them would take about 15 minutes and no more than twenty. From the distance that he had to travel, it was evident that his examination must have been very hurried and there was doubt that he did in fact test for gas except at the fan. On returning to the four men at the North Plane, he sent them to their work and did not see them or Leeman alive again. After inspecting the workings on the other side of the plane and finding everything was in order, he admitted the men and then he went to the pit bottom where he saw Ernest Briggs, the onsetter. He left the pit bottom about 2.35 a.m. to make his second inspection and went inbye by the return as far as the belt conveyor, then through the separation doors at 6th. North on to the North Plane and down to the Plane bottom. As soon as he saw the main belt there he realised that something was wrong because the belt was covered with a thin film of dust. There was haze in the

intake and dust was showing in the beam of his lamp. His first impression was that there had been a heavy fall. The time was about 3 a.m.

He went along the North-West top level to the 5th. slit and went down into the bottom level to get to the men but on reaching with two yards of the 4's heading, the air was thick with dust and he could just see that there had been a fall on the chain conveyor. He adjusted his lamp to make a test for gas but breathing had become very difficult and he did not stay. He retreated by the 5th. slit to the, where he apparently switched off the current to the fan and went along and to five yards beyond the slit where he found 1Å to 2 percent firedamp and three yards further up he found 4 per cent..

He now knew what he needed assistance and started to come out but stumbled and fell and after crawling for about twenty yards he lost consciousness for some time. When he came to he found his lamp at his side, still burning and travelled outbye to the plane bottom where he was forced to sit down and rest. After some consideration he decided to go to 8B face and get those men out. He found the men still at work and shouted to Ben Winder to go at once to the telephone to inform the manager and undermanger that something serious had happened and to get a rescue team.

He told the other three men to go out by the return and asked them to assist him put. On reaching the 7th. North he instructed the men to switch off the power at the transformers. When they got to the main plane he sent Jack Winder up to the pumphouse to see if Leeman was there. Winder could not find Leeman and Ayscough concluded that he was also missing but he had no idea where he was. Ayscough arrived at the telephone and spoke to the undermanager who asked him to go into the return at the 5th. North and test the ventilation there. He did so but could find no firedamp but there was strong smell in the return. After reporting to Mr. Wild what he had found, he enquired the time and was told it was 5 a.m. He then decided to go in again along the top level, taking Jack Winder with him. They go to within two yards of the 6th. slit where he found that the dust had cleared a lot, and he saw that the junction had fallen in at the gearhead. Testing for gas he found 4 percent and considered it too dangerous to make further attempts to go on. They returned to the pit bottom where Briggs was instructed to cut off all the power in the pit. The inquiry was very aware of Ayscough's brave conduct.

Ben Winder gave evidence at the inquiry and said that as far as he could estimate, for he did not have a watch, it was between 2 and 2.30 a.m. when he was working on the B4 face that "there was strong gust of wind along the face which lifted the dust and blew bits of coal about." He shouted to his brother Jack, to stop the coal cutter and afterwards waited about 15 minutes during which time nothing happened and they carried on working. At about 3.45 a.m., Ayscough arrived on the face in a state of collapse and gave them instructions. Winder said that on his way up the plane he found that the two inbye pumps had been started and they were delivering water into the standage there.

Harold Mann, the day overman, received the message from the undermanager at 5.15 a.m. which told him to go to the pit at once as there had been an accident. He got down the pit about 6.15 a.m. and contacted Mr. Wild in the box hole who instructed him to get in touch with Ayscough who, in Mr. Wild's opinion, was not fit to remain in the pit. At the 5th. North, Wild and Ayscough met and with Ayscough were F. Maltby, J. Hallam and Jack Winder from the 8B face. He waited there until the first rescue team, arrived. Tom Holmes, a member of the safety department was the captain and held a 2nd. Class Certificate of Competence. They had descended at 6.25 a.m. and they proceeded, taking Maltby with them.

Holmes, after getting all the information he could from Ayscough, went inbye with his team, coupling their apparatus at the bottom of the plane and got to the 6th. slit on the top level where there was a fall completely blocking their progress. He tested for gas and found 4 per cent. He then went down the 5th. slit to the return where he again

found 4 per cent gas, along the level and got as far as the 8th. slit where another fall completely blocked any progress. A short distance outbye of this fall there was a small fan with a girder across the roadway and one or two other girders dislodged. Just inbye of the 4's heading in the bottom level the four jackets of the missing men were lying and their snacks and water bottles untouched in the pockets. Just inbye of the 7th. slit, a trolley was seen, turned on it's side with one wheel off. In Holmes's opinion this had been done by the explosion.

Opposite the bottom of the 7th. slit and reaching the top level they saw all the supports dislodged and heard heavy falls of roof taking place inbye. in the bottom level just beyond the 6th. slit, Holmes's safety lamps was extinguished and he concluded that there was an explosive mixture present there. The 7th. slit was badly damaged and there was a fall of roof in it. Owing to the falls that were taking place and the levels being obstructed, he decided to retire with his team and on arrival at the fresh air base he reported to the undermanger and the captain of the following team.

An unsuccessful search was made for Leeman along the bottom level to the 1st. slit and at the compressed air pump outbye of the slit. This was found to be running and was stopped. Leslie Phillips, a shotfirer, was the leader of the third rescue team which had stood by from 4.10 p.m. and went in at 8.05 p.m. They started to work at the fall in the bottom level of the 8th. slit. An aperture had been made by the other team but it was not large enough for men to pass with breathing apparatus. After about an hour this team managed to get through and at 8.55 they found the body of Raymond Kelsey and those of J.W. Ollitt, J. E. Kelsey and B.J. Conroy all within eight yards of the face between the 10th. and 11th. slits in the bottom level. The first three were facing outbye and Conroy inbye, all face downwards. Only Conroy showed injury by violence and all were covered with a thick layer of coal dust. The team continued but found a heavy fall at the junction and retired.

Alan Wild, the undermanger was informed of the accident about 4 a.m. and after giving instructions to Ben Winder and Ayscough. He rang the agent, Mr. Payne because the manager was away from home. Payne told the Divisional Inspector and Mr. Joseph Hall to arrange for the Rescue Teams. Wild arrived at the colliery about 4.45 a.m. and Payne was already there. They descended about 5.30 a.m. and remained at the pit bottom and at about 9.15 a.m., Tom Holmes came out with his team and reported the state of affairs in the workings. After bringing his report to the agent, Holmes went into the workings as far as the fall at the 6th. slit and found that all the stoppings outbye had been disturbed. At the 5th. slit, half the brickwork on the left side had been knocked out but the right side remained intact and some of the bricks had been blown into the lower level. He then returned to the 5th. North telephone and reported to the agent. He asked him to send four men and a supply of brattice to temporarily repair the stoppings. This work started about 11 a.m. and was soon completed.

Later Major Humphrys, Mr. Miller, Mr. Hall, Mr. Jones and Mr. Palmer got passed the fall, Holmes saw that the stopping in the 7th. slit had been completely blown out and a few of it's bricks were on the lower level. Rescue teams continued working in relays at the fall on the top level and to secure the entrance to the workings. A fresh air base was established at the 7th. slit and the compressed air auxiliary fan was moved to the 4's heading, carried air to the fall. It was necessary for the men wearing breathing apparatus to work in the bottom level to secure the roadway and make it safe to travel.

Mr. Kimmins, the manager, had to get from Uttoxeter and arrived at the colliery about 6. p.m. and at once went underground to the North-West where he met Payne, Humphrys, Hall and others. The rescue men tried to get into the top level up the slits inbye of the 8th. but were stopped by heavy falls of roof. Major Humphrys was relieved at 10 p.m. by Mr. Houston, H.,M. Senior Inspector of Mines and was present as the recovery work progressed. By the 8th. March it was possible for persons without

apparatus to get into the headings with rescue men standing by and to the fan on the top level. On the following day the Inspectors, colliery officials and representatives of the men made a careful inspection of the workings.

Girders had been stripped out of parts of both headings, stoppings blown in in the 9th. 10th. and 11th. slits from return to intake. The stoppings in the cross slit opposite the low level was blown in the direction of the 7's to 6's headings, part of the conveyor drive head in 6's heading was blown 25 feet outbye and the fan blown into the top level and completely turned round. the blades were broken off and blown out of the casing and the fan tubing extensively damaged and shredded.

In the top level the conveyor drive head at the top of the 11th. slit had been blown outbye and the switch panels and main cable damaged. The roof had fallen into a great height from this point to just outbye of the 7th. slit and at other places had fallen to a height of two feet or more. The gearhead of the chain conveyor in the 6th. slit had been moved bodily outbye for four and half feet. There was little evidence of coking.

The search for the body of Charles Leeman continued until the 16th. March. While part of fall was being cleared from the inbye end of the top level, he was found lying under the top level belt of the conveyor which had been dislodged from the conveyor frame, along side the gate-end switches near the 11th slit. He lay face downwards, head outbye, wearing his coat with his electric lamp about a yards from his feet.

The men who lost their lives were-

Raymond Kelsey,
John Ollett,
John Kelsey,
Bertram John Conroy and
Charles Edward Leeman.

The Report of the Causes and circumstances attending the explosion which occurred on the 4th. March 1945 at the Manvers Main Colliery, Wath-on-Deerne, South Yorkshire, was conducted by Mr. J.R. Felton, O.B.E., H.M. Chief Inspector of Mines and reported to The Right Honourable Emanuel Shinwell, M.P., Minister of Fuel and Power on the 20th. August 1945.

By arrangement with H.M. Coroner for the City of Sheffield and the Rotherham District of Yorkshire,, Mr. Alan P. Lockwood, M.C.. the inquiry was held jointly with the inquest into the deaths of the men at the Town Hall Wath-on-Deerne. Proceedings stated on the 23rd. May and finished on the 30th., May 1945. The coroner summed up and returned the following verdict of the deaths of the men-

"In each case I find a verdict of misadventure. the cause of death in the case of Raymond Kelsey was asphyxia due to carbon monoxide poisoning and shock of burns. John Ollett, the same. John Kelsey, the same. Bertram John Conroy, a depressed fracture of the skull. Charles Edward Leeman, shock of burns and multiple crushing, fractures of an injuries to the cranium, thorax and chest.

In each case the other findings will be in terms that the deceased died on the 4th March, 1945, in the underground workings of the Meltonfield seam of the Manvers Main Collieries, Ltd., at Wath-on Deerne in the West Riding of Yorkshire fro the causes already stated and that the deceased was involved in the early hours of the morning in an explosion of gas, firedamp, in the said underground workings. In my opinion the evidence is not sufficient to determine conclusively all the circumstances of the explosion, but points to the following sequence of events: a) A cable damaged on a previous shift, such damage exposing the core, followed by an earth leakage and a flash, and the cable being left attached to the switch-box b) the failure of an automatic switch in the said box to trip out on such earth leakage c) an emission and accumulation of gas, namely, firedamp, from a cause not ascertained d) a failure of the ventilation from a cause not ascertained,

but possibly due to obstruction by a fall e) the inadvertent switching on of the power of the cable.”

All interested parties were represented at the inquiry and evidence was heard from twenty two witnesses. There was common agreement on the following points, 1) the explosion was one of firedamp and coal dust played little or no part, 2) it originated in 7's heading in the vicinity of the Joy Loader and 3) the igniting medium was an electric flash or spark from a short circuit in the trailing cable feeding the Joy loader. Opinions differed as to how the conditions for the explosion occurred.

Professor Statham supported the theory the manager was that there was fall at the bottom level of the 8th. slit before the disaster which interrupted the ventilation and that at the same time, there was an abnormal and local emission of gas. This fall was extensive and it was difficult to see how the men would not try to get out when not occurred. Sir Hartley Shawcross, K.C., who was representing the Company, examined Holmes about the fall and it was possible that the fall had occurred after the explosion.

The question of the emission and the accumulation of the gas was looked into and it was said by the management that a short time before the disaster the ventilation was adequate and that no firedamp was detectable on the face in 6's and 7's heading but Mr. Houston thought that the emission of gas had persisted for some time. This could be explained by reference to old workings in the Barnsley and Parkgate seam which were 162 and 433 yards below the Meltonfield seam. A plane was produced by Mr. Kimmins which showed that the Barnsley seam had been worked in 1890 and left a pillar of solid coal which was again worked in 1932-37. There had been workings in the Parkgate seam in the same area. A opening out had been driven in 1911 and the coal on one side was worked and that on the other side left to for a rib. It was suggested that breaks along this rib would pass through the strata up to the Meltonfield seam. It was agreed that this was possible. Five days after the explosion firedamp was issuing from the two headings into the return. There was evidence of some small breaks in the roof but none in the floor. The inquiry came to the conclusion that it seemed reasonably clear that at some time prior to the explosion there was some additional issue of gas into the headings and it may have come from the seams below.

The ventilation of the headings was examined and the inquiry stated-

“I desire to urge the importance of managers giving more careful study to the monthly records of air measurements as shewn in the air measurements book, with a view to excessive leakages being tracked down and corrective measures being applied to ensure the adequacy of the ventilation at all parts of the workings.”

The source of ignition was thought to have been due to an electrical fault. The inquiry drew attention to the use of auxiliary fans and recommended that-

“At collieries where auxiliary fans are used the managers should draw up a simple code of rules for the instruction of officials and workmen dealing with these matters, including the periodic measurement of the quantity of air passing in the roadway at which the fan takes its supply and the quantity delivered at the safe and the person made responsible for taking and recording such measurements should be properly instructed as to the significance of the readings.”

HARRINGTON No.10 PIT. Lowca, Cumberland. 9th. December, 1946.

The Lowca Colliery was described as a 'big industrial sentinel on its 500 foot hill overlooking the Solway Firth and was first sunk in 1908. At the time of the accident, it belonged to the United Steel Companies Limited. The shafts were known as the No.10 downcast, which was 20 feet in diameter, and the No.9 upcast, which was 16 feet in diameter. The pit bottom was in the Six Quarters Seam at a depth of 648 feet and the Main Band Seam at the shaft lay at a depth of 350 feet. The Colliery employed 770

people of which 530 worked underground and 240 of which 30 were women were employed at the surface. 196 were engaged at the coalface and 335 on the haulage and as oncost workers. The average number employed on a day shift was 250 but on the day of the explosion, there were 208 at work of whom 53 were in the Main Band Seam. It was known as a wet pit but it had been free from serious accidents. The Main Band Seam was 350 feet below sea level and four districts were being worked at the time of the disaster. The explosion occurred in the No.2 District where there were five headings worked at the time.

Mr. J.A. Nimmo was the General Mining Manager of the Company's Cumberland collieries, Mr. J.T. Hughes the Agent and Mr. Frank Graham the manager of the Harrington Colliery. At the date of the disaster, Mr. McCracken was the undermanager. The regular undermanager had been ill and McCracken had been transferred from a similar position in the No. 5 pit three months before.

The No.2 district of the Main Band seam was supervised by two overmen, day and afternoon and by one deputy on each shift. The seam was overlain by a thick sandstone roof and was 12 feet thick coal with thin dirt partings. but the roof coal, 2½ feet thick was not worked. The floor was of fireclay and then a thick hard shale. Four units or districts were being worked and they were entered from the Main Band Engine Plane which started at the Lickbank Junction off the North Plane haulage about one and a half miles from the shaft and ran west for about a mile. At this point mechanised mining was started in 1943 to try to increase output. Four parallel levels were started numbered 1 to 4, from the Main Band engine plane as development roads and advanced by Joy Loaders and a M&C Arc Shearer. Later, a trunk belt conveyor was installed in the No. 3 level and chain conveyors. Auxiliary fans were then introduced to ventilate the levels.

From these levels, the No.2 district, in which the explosion occurred, was opened out by five headings started in November 1944. The district was mined by the pillar and stall method with headings being driven into the coal 8 to 16 meters apart and interconnected by thirlings or side passages, about 25 meters apart. The resulting pillars supported the roof and by this method about one third of the coal in a district would be mined. The pillars were the 'robbed' when the passages were widened. Shuttle cars were introduced but they were withdrawn and the section abandoned a short time before the explosion and supports were being withdrawn from it.

The area of the No.2 district was very wet with water raining from the roof in the headings and it was decided to advance the Nos. 2 and 3 headings which rose about 1 in 18, rapidly to the boundary which was fixed by a limiting minimum cover of 240 feet so as to drain the water from the area, Duckbill loader and Goodman shortwall coal cutters and Victor drills for simultaneous shotfiring were installed. The height of the headings was reduced to 6 to 7 feet at a point about half way between Nos. 5 and 6 left thirls and continued at that height. The rate of advance was about 40 yards a month. The No.1 heading was stopped at the No.4 left thirl and No.5 struck a fault and was discontinued. The intention was to drive back from No.5 right thirl to make a connection.No. 3 heading was the haulage and intake road in which a belt conveyor fed by a scraper chain conveyor was installed in No. 5 left thirl between Nos 2 and 3 headings and a similar conveyor in No. 5 right thirl. At the date of the explosion Nos. 2 and 3 were in advance by about 40 yards of the last thirl, No.7 and these workings were about three miles from the shaft.

When the thirls were no longer in use they were sealed off by corrugated sheeting covered by brattice cloth. The undermanager stated that there was shortage of both bricks and bricklayers and that was reason why brick stoppings were not built. He considered the sheet metal both safe and effective.

The ventilation was produced by a Capell double inlet fan which was electrically driven. It was situated in the No.9 shaft and had a capacity of 2000,000 cubic feet per minute at 8 inches water gauge. On the north side of the pit the North Plane haulage

road in the Six quarter Seam was the main intake. At the Lickbank junction which was about one and a half miles from the shaft, the air split. A current to the Main Band Seam went west by the Main Band Engine Plane and from this separate splits were taken to the Nos 3 and 4 and then to the Nos. 2 units. the remainder went further inbye to ventilate the No.1 unit. The total quantity of air entering the North Plane was measured on the 7th. November 1946 was 61,870 cubic feet per minute and the quantity entering the Main Band was 41,750 cubic feet. No measurements of the quantities entering the separate slits in the Main Band were recorded in the Statutory Air Measurement Book but readings taken for the No.2 district recorded in a note book showed 17,017, 16,744 and 17, 876 cubic feet per minute for September, October and November respectively.

There were three auxiliary fans in use in the No.2 until, all of the driven by electricity. No.1 fan was fixed in the No. 2 road was an Aerex type made by Walker Brothers and was 19 inches in diameter, driven by six half inch belts but only four were in use at the time. It had a total capacity of 8, 750 cubic feet per minute and adjustable louvres were fitted at the intake end for regulation. This fan had about 300 feet of 24 inch diameter Meco canvas tubing attached to it for ventilation part of the old shuttle car section of the workings which had been recently abandoned and were being drawn off. No. 2 fan was in the No.3 road and was Aeroto screw type made by Davidson and Company. This was driven by a direct motor at 2,900 r.p.m. and had a capacity of 5,000 cubic feet per minute with 540 feet of tubing, 24 inches in diameter. This was used to ventilate the No.4 heading and the No.5 thirl extension. No.3 fan also in the No.3 road was a duplicate of the No.1 and was used to ventilate Nos. 2 and 3 headings. All the auxiliary fans were kept running when the men were at work. Normally Nos. 2 and 3 ran constantly from Sunday midnight until about midday on the following Saturday. They were restarted on Sunday morning at about 6.45 and run for another five or six hours when the maintenance engineers were on duty. After that they were stopped and restarted by the night shift deputy before making his pre-shift inspection for the Monday morning shift. No measurements were taken of the air circulated by these fans.

The Main Band seam was regarded as a gassey one and during the six months up to the explosion the statutory reports showed that firedamp had been detected in the No.2 district on several occasions and the reports were found to be incomplete. No inspection on behalf of the workmen had been carried out in the district during this period.

The are was supplied with electricity from a 100 kva Transwitch Unit 3,300/550 volt which was in a sub-station on the low side of the No.3 Level. The main cable passed through busbars of a number of switches before dividing into several sub-circuits. No2 switch at the foot of the No.3 heading controlled the main trunk belt conveyor in that heading and was operated by nearby switch. Nos. 6 and 7 switches were near the No.3 left thirl and controlled a Mono pump in No.3 heading and No.1 fan. The main and tail gate haulage in No.2 heading was supplied by a cable off from the main cable just on the inbye side of No.7 switch. No.10 switch controlled the coalcutter and drilling machine in No 5 right and No.2 fan. No.11 switch controlled the two scraper chain conveyors feeding on to the No.3 heading belt conveyor, one in No.5 right and the other in No.6 left and the two duckbills in Nos. 2 and 3 headings. From No.11 switch, a pilot cable ran down the No.3 heading back to a push-button switch at the transfer point on No.3 level which enabled the starting and stopping of the branch conveyors to be controlled, in relation the the main conveyor from this point. The whole of the electrical apparatus in the district was certified to be flameproof with the exception of the two shortwall cutters, two duckbills and the scraper chain conveyor in No.5 right which were of American design and manufacture.

A certified bell and approved dry battery were used on the bare wire signalling system. The bare wires extended inbye as far as the return wheel at No.5 left and

outbye to the bottom of the No.2 supply road. A similar battery signalling system was installed in the No. 3 heading, the bare wires extending from the transfer point at the outbye end of the heading to about 20 yards inbye of the No.4 right beyond which up to No.6 left there was a pull wire by which the signals could be transmitted outbye.

The morning shift descended at 5.30 a.m.. There were thirteen men, including Thomas Millar deputy, John McMullan, stoneworker and an overman, William Hoodless. the most important task was to clear the firedamp as soon as possible so that coal could be produced. Hannah had reported that the No.4 heading and the No 5 thirling extension of number one heading, clear for work. On this information, two brothers John and Thomas Bird were sent to remove timbers and Thomas Addison, John Hill and Daniel Lague were sent to start work in the No.4. The rest of the shift were to assist in restoring the ventilation with William Hoodless directing the operations.

All the men who entered the No.2 district that morning were killed and there was no evidence to say what they were doing on that fateful morning so the inquiry looked at the situation on the preceding shift and considered the situation at the end of that shift as detailed by the shift deputy. From this and the evidence of the position of the bodies and injuries, deductions were made about the situation.

Coal getting operations ceased in the District with the end of the day shift on Saturday 7th. December about noon and the fans were stopped and all electrical power cut at 10.30 p.m. On that day John Lewis Tubman, a shotfirer and spare fireman went down the one with the pumpman, William Urwin who was left at the No.6 pump on the main plane. After calling at the No.3 district and starting a pump there and an auxiliary fan, Tubman went to the No.2 district where he travelled up the main conveyor road called the No.3 heading, until he reached the first auxiliary fan used for ventilating the No.4 heading and back to the No.1 fan which he started after making an examination. He then retraced his steps to No.3 heading and went inbye to the No.3 fan where he found the air clear and started the fan. This fan was between Nos.4 and 5 left thirls. He went a little beyond No.5 thirl and found all in order. It was then about 2.25 a.m. About 15 minutes after Tubman started the fans, he made an inspection at the face of both No.2 and No.3 headings and found no indication of firedamp. There was canvas screen brattice immediately over No.3 fan extending across the whole width of the road but with a small opening covered by a loose sheet through which the belt conveyor passed and according to Tubman, 'good air' was circulating. A canvas screen was also placed in No.5 right thirl over the top of the scraper chain conveyor about three yards from No.3 heading beyond which a T-piece was place in the ventilating tubes from the No.2 fan with extensions into the face of No.4 heading and the fast end of the No.5 thirl. Tubman came out of the district about 2.35 a.m., leaving the three fans running and after visiting other parts of the mine to see that the pumps were working, he reached the shaft and went up about 5.35 a.m. He had gone in on this shift to get the pumps and fans started because it was intended to move No.3 fan forward on Sunday morning.

The deputy, John Proud Fisher, went down at 6 a.m. on Sunday morning with four men, including two maintenance engineers, to move the No.3 fan. He saw Tubman at the pit head baths and he told him how he had left things in the district. Fisher and his men went to the old shuttle car charging station where they left some of their clothing. All three fans were running but on his way inbye to make an inspection, he stopped first the No.1 fan and then the No.2 at about 7 a.m. The men followed him inbye to No.3 fan. The Inspector commented that this was 'a procedure not strictly in accordance with the requirements of Section 64 of the Coal Mines Act, 1911.' He then inspected the the face of Nos. 2 and 3 headings, tested for gas and found none. He opened the door flap which was about four feet square in the brattice screen over the conveyor belt to allow air to pass through to the face while the fan was stopped and

returned to the No.3 fan. Fisher disconnected the air tubes from the fan and left them suspended from the roof.

The fan was then pulled inbye for about 50 yards by means of a shortwall coal cutter the rope from which was lengthened by two short pieces to reach the fan. Glaister, one of the maintenance engineers, stopped the fan at the switch panel and then removed the plug from the fan socket. The fan as standing on the floor in it's new position and the trailing cable was dragged up to it and connected to the fan by Thomas Brown, the other maintenance engineer, the fan was restarted by a switch which had been installed at the switch panel by Glaister. The air tubes had been broken at a joint and re-attached to the fan which started without any trouble.

About the time that the fan had been got to its new position, Robert McCracken, who had been operating a coal cutter and was the man nearest the face remarked, 'I think its getting dirty up there' meaning there was gas at the face. There was a flame safety lamp about 10 yards on the inbye side of the No.7 thirling which the deputy said he had hung up about five minutes before and had not noticed any indication of firedamp though he knew, 'it was possible inbye that thirl to get dirty" He did not bother about McCracken's remark as the fan was ready to be re-started. This was about 11 a.m and the fan had been stopped for over three hours. After starting the fan, the brattice screen across the No. 3 heading which had been removed to leave the road open, Fisher and his men came out to the charging station to have their bait. About half an hour later, he returned to Nos. 2 and 3 headings and made a careful examination of the faces without finding any firedamp. At the time the headings were being ventilated by an air tube in each and the fan as running normally. There was no fall or any movement of the roof to suggest the possibility of a fall at the junction of the No.2 heading and the No.7 thirling. After stopping the fan, he came outbye at about 11.55 a.m.. While the fan was running the louvres were fully open so it would pass the full quantity of air and it was left in this state. Nos.1 and 2 fans which had run for part of the shift were stopped after the men had taken their bait and were not re-started.

It was originally intended to move the switch gear controlling the No.3 fan but owing to the difficulty in hauling it due to the reduced height of the roadway, it was decided to leave the switch gear in the old position and the length of the spare training cable was enough for this to be done. No careful examination was made of the cable after it had pulled by Glaister and Brown who said they saw it was not damaged and was in good condition. General Regulation 131 (c) required that the electrician should be responsible for the fulfilment of certain duties and test all new apparatus of apparatus that had been re- erected in a new position. A piece of wire was found sticking out between the plug and socket attachment to the fan motor which was fitted incorrectly. Glaister, took the plug out of the fan before it was moved and Brown, who replaced it later both denied knowledge of having seen such a wire and claimed to have made careful examination of the apparatus. Unless this wire was put in in the morning of the explosion which seemed very unlikely, it must have been there when the fan was re-started but it apparently escaped the notice of the two maintenance engineers. Before leaving the district after the fan had been moved up, Glaister put the isolator switch at the No.11 panel into neutral so cutting off all current to the duckbills and scraper conveyors. It was the practice to have the switch close during the week. The switch was opened by the day shift deputy at the end of the shift on Saturday and left until Monday morning unless the maintenance engineers required the current.

On the Sunday afternoon, Robert O'Neill, a shotfirer, went down to attend to some pumps in other parts of the mine but between 2.30 and 3.30 p.m., he had occasion to go into the No.2 district to look for some grease near the scraper conveyor in No.5 right thirl. He did not examine the place nor, apart from getting the grease, interfere with anything. Alan Hannah, the night shift deputy, who had been in the position for only two months but had previously worked in the No.2 district, went down at 11 p.m. on Sunday with James Bateman, a pumpman. Hannah's duty was to see that the

districts in the Main Band Seam were in good order for the Monday morning shift to enter. They went together as far as the first pump which was known as the 'back end' in the main haulage road where Bateman was left to look after the pump and Hannah continued inbye to the No.2 district which he entered by the No.2 supply road at about 12.15 a.m. He arrived at the No.1 fan and examined the place for gas, found none and went into the No.3 heading and started the fan. He returned to No.1 fan and found it running and returned to No.3 heading. He reached and started the No.2 fan, the air being clear and continued up the No.3 heading and at the junction of the No.5 left thirl he walked into what he called 'an accumulation of gas'. When he was asked what he did then Hannah said-

"When I came across the accumulation of gas I was surprised and I think shocked to find such an accumulation. To shift it properly would have meant that I would have to move more men, and where I was going to get them from I did not know. In fact there was no way of getting men for assistance at that time. I decided I would do my best to shift this accumulation and that I would open the door in No.5 left and this I did. This door was about 6 feet high and 4 feet wide and was opened by fastening up the sheet which hung down like a curtain. I then came to the belt road, No.3, leaving the position as it was and entering No.1 district, carried out examinations and left that district clear."

After about an hour and a quarter, he returned to No.2 district and went to No.5 left thirl which he found clear. This proved to him that the intake and the return from No.5 left was clear of any obstruction and he thought the air was travelling up to the No.7 thirl which was the last one. He then decided to take the tubes from the No.2 fan out of No.5 right and put them straight up the No.3 heading. To do this he stopped the No.2 fan and re-started it after fixing two lengths of tube about 34 yards long up the No.3 heading. After moving the tubes from the No.5 right thirl up the straight he opened the door of the canvas screen in that thirl to ventilate the No.4 heading. The velocity of the air from the tubes was good and there was a good draft through the door in No.5 left and the air seemed to be going beyond No.5 left and being drawn back through the door. He tested the air at the outbye end of the tubing in No.3 heading by beating dust from his clothes and by breathing into the air to see if any re-circulation was taking place but there was none. He was satisfied that the gas was not coming back on him and that the ventilation was taking its natural course. He returned to Bateman at the pump to have his bait and left the No.2 fan running. He reached Bateman at 3.05 a.m.

Bateman was an old and experienced pitman and Hannah discussed the position with him. After having their bait they returned to the No.3 district, each with a flame safety lamp and a cap lamp. They went to No.5 left thirl and found that the gas had receded further up the No.3 heading. going through No.5 thirl, Hannah went as far as No.2 heading where in making a test for gas the light was extinguished which showed that the No.2 heading was also fouled. To find out what the position was higher up, Hannah ran up the No.6 left thirl with just a cap lamp and opened the screen which opened in two halves. The first was connected to the prop on which the door was made by means of a five foot boring drill and the other side was jammed with a sleeper. On his way back he closed the screen in No.5 left thirl after this he made a fence at the junction of this thirl with the No.2 heading. He did not test for gas in the No. 2 heading. When he was going up the No.6 thirl, Hannah passed the No.3 fan in its new position but there was no brattice sheet across the heading or any other obstruction there. When he left the No.3 heading there was gas down to about 20 yards inbye on No.5 left thirl but the impression he gained was that the air was passing inbye beyond that point.

The door through the screen in No.5 right thirl still remained open and left so. Tests for firedamp in the No.4 heading and the extension of No.5 right thirl were made before and after removing the tubing from this thirl but none was found. As nothing more could be done in the No.3 heading Hannah went outbye, through the No.3 left thirl into

the No.1 heading, up this heading, leaving Bateman just inbye No.1 fan and followed the course of the air tubes from the No.1 fan to the near end of the tube where he made an examination and found about one per cent of gas. He took little notice of this as it was not uncommon to find gas there and he thought some gas would be coming from the No.2 heading. Although he did not then know that there were men at work there, he knew timber was being drawn in this section, that men would be at work at this place. It was here that the Bird brothers were found after the disaster.

It was about 4.30 a.m. when he made this examination. He then went outbye by No.2 level to No.4 district to make his pre-shift examination, leaving Bateman at the No.6 pump and from there he went to the Lickbank junction where he reported the accumulation of gas in the No.2 district in the report book and that he had fenced off the area. He then went to the shaft where he met Hoodless, the overman, in the undermanger's cabin and told him of the position. The undermanger then came in and he too was informed of the position.

The morning shift on Monday, 9th. December descended at 5.30 a.m. It included thirteen men and the deputy, Miller, who were at work in the No.2 district and John McMullen who was normally a stone worker but on that day he was sent to work at the transfer point at the entrance to the No. 2 district where the belt conveyor in No.3 heading was delivering its coal on to the main trunk belt. They were accompanied by the overman, William Hoodless. The task which faced these men was to get the accumulation of firedamp cleared as quickly as possible so that normal coal getting operations could continue on Nos. 2 and 3 headings. Since the night shift deputy had reported the No.4 heading and No.5 right thirling extension fit for work it was considered that these could start at once and the positions of the bodies indicated that they had either started or were about to start work, two others were employed in with drawing supports in the old shuttle car workings and this is where they were found.

Most of the others were presumably assisting in restoring the ventilation with the overman directing the operations. The plan of action was to advance the air tubes from No.2 fan until No.3 fan was clear of gas and then to run No.3. Evidence was given by Glaister of seeing two bales of canvas being taken inbye and being told by John Fox, one of the deceased, that he and his mate Pflaumer were going to erect a canvas screen on the inky side of the fan which had been moved on Sunday. The canvas bales would be taken up No.2 heading to the return wheel. It was suggested that this would have been done by the haulage engine in that road and carried forward by hand.

J.W. Glaister went into the No.2 district on Monday to look for some tools he had left at the old charging station. He arrived about 7 a.m and left about 7.45 a.m. to go to the No.1 district where he was working. When he left, R.H. Brown, the maintenance engineer in charge of that shift was still in the charging station. Glaister said that the main belt in No.3 heading had not been started as he did not hear it when he was at the charging station, nor was it running when he passed the transfer point and spoke to McMullen on the way to No.1 district. John McMullen whose job it was to control the running of the no. 2 district belts and who although seriously injured by the explosion was able to evidence at the Inquiry said that the main belt was running from about 7 a.m. almost continuously, though very little coal was being delivered by it at the transfer point, mostly in small intercurrent patches of a few shovel fulls as though of cleaning up. He was actually cleaning the spillage, of which there was more than usual at the transfer point and was probably not paying very great attention to the belt delivery.

Some minutes before the explosion occurred, the deputy, Miller, came outbye to the transfer point. He asked McMullen what had been wrong with the belt to which McMullen replied that the trunk belt on the main road had been standing. The belt had been re-started and was running. Miller then retraced his steps inbye along No.3 heading and only had proceeded about 15 yards when as McMullen said. 'I knew no

more'. McMullen was later found unconscious. He had been burned on the left side of the face, right hand and left thigh and was badly shocked.

Glaister was working at the conveyor in the No.1 district about 600 yards from McMullen when the blast happened. He said it was like a heavy fall of stone and the blast which accompanied it flung him over the conveyor and threw stone dust from the side into the air. It was followed by smaller explosion, perhaps seconds after the first. Along with his mate with whom he was working he came out to the transfer point on the No.1 district with the main trunk belt and tried to telephone but could not do so as the lines had been damaged. On the No.2 level he found the deputy who was going in to bring his men out but the men were already on their way outbye. Together they travelled out by No.2 level for some distance and then through a thirl to the No.3 level and reached the transfer point of No.2 district where they found the conveyer structure piled up in the road way and other damage. It was not until later the McMullen was found there. From this point Glaister telephoned to the undermanger at the surface giving the alarm.

Thomas Barton who was the deputy in the No. 4 district said the explosion sounded like a big dull thud or the closing of a big door and the auxiliary fan in his district stopped. He heard only one bump. He went inbye, met some haulage boys coming out and then some men from the No.3 unit. He found the air at the No.2 district transfer point thick with dust and smoke. He was going to the No.1 district when he met some men coming out and turned back with them. On the instructions of the undermanager he went to examine some of the airways but collapsed and was sent outbye.

Rescue operations were set in motion and everything possible was done to get into the affected area to give aid to the men there. It was soon evident that the explosion had travelled outbye to the transfer point on No.3 road with considerable force. The air crossing which was a considerable structure, had been demolished, doors and other ventilation arrangements destroyed and there were numerous heavy falls. All this made the work of rescue very difficult and because of the wet condition, unpleasant but no effort was spared by officials or workmen from this and other collieries to reach the entombed men.

By 9.45 a.m. on the morning of the disaster the first trained rescue team had arrived from the Brigham Rescue Station, under the direction of the Superintendent, Mr. Charlton and other brigades followed from other collieries a total of twelve brigades in all took part in the rescue operations.

Few of the men outside the No.2 district were treated by the men of the rescue brigades but by the time they could be reached all the men in the affected district were dead. By Tuesday night all the bodies had been located except that of Miller and he was found under a heavy fall.

The explosions was sudden and devastating. Thomas Miller, the deputy, came to talk to John McMullen who was at the junction of the No.3 heading and No.3 level, cleaning the spillage from a conveyor belt. McMullan's last memory before he lost consciousness was that Miller had left him and was just starting to return down the No.3 heading. Miller's body was found about 10 meters from that junction.

The explosion was felt or heard in other districts in the mine and men from these district soon raised the alarm and rescue efforts were started at once. By 9.45 the first trained rescue team arrived soon to be joined by brigades from other collieries. The explosion had travelled with great force out-by which meant that men in other districts were affected by afterdamp. Unfortunately the men in the No.2 district were past help and in most cases died instantaneously.

The first official statement was made about 11 hours after the accident and stated-
"As a result of what appears to have been an ignition of firedamp in the No.2 District of the Main Band Seam, Harrington No.10 Colliery, Lowca at 8.30 a.m. today, 15 men are missing. Rescue operations are in progress. The cause of the

accident had not yet been ascertained. Rescue parties have been hampered by falls.”

The seat of the explosion was about three and three quarter miles from the pit shaft, well out under the Solway Firth where the Main Band Seam was about sixteen feet thick and was regarded as one of the richest in Britain.

Teams of volunteers were quickly formed from the miners in the No.10 and others were quickly summoned from St. Helens, Solway, William and Haig Pits under the command of Mr. J. Charlton who was the superintendent at the Mines Rescue Station at Brigham. Among the first to go down the pit were Mr. F. Graham the mine manager, Mr. T.J. Hughes, the general manager of the United Steel Company's Cumberland collieries and Mr. T. Stephenson, Secretary of the Cumberland Miner's Association. There were reports of the conditions underground immediately after the explosion were told to the press. There were more than two hundred men in the pit at the time, many in remote workings who were unaware that there was anything wrong until they were ordered to return to the surface.

One of the men working near the scene was Joseph Little of Main Street, Parton. He was completely deafened and clouds of stone dust rushed past him. He tried to get to the scene but the fan had stopped and both men were driven back by the gas. Little came out of the pit suffering from shock and the effects of gas as did two others from the No.2 District. They were John Richardson of The Square, Parton and Tom Barton of Pica.

One of the luckiest men to get out of the pit was John McMullen of Mooreclose Road, Harrington. He was badly cut about the head in the explosion. He was helped away from the danger area by two men until the gas became so bad that they were unable to stagger along with him and they had to be left. He was found by the first rescue team and taken to the pit top and after first aid he was taken to the Whitehaven Hospital where he lost consciousness and now in in a grave condition.

As soon as the news of the explosion spread round the district groups of anxious relatives gathered at the pit top. Little news came out of the pit for hours but it was felt by the first explorers that due to falls and the gas that they had experienced that there was little hope of anyone being left alive in the explosion area.

The first man to be reached was Tom Addison. He was trapped by debris and was dead. Within 24 hours due to the efforts of the rescue teams eight bodies had been located and brought to the surface and two others had been located. By Tuesday morning it sunk into the community that there could be none left alive and at that time there were three men Tom Millar the deputy in charge of the work in that area and the two Bird brothers who were unaccounted for. Later the bodies of the brothers were recovered but there was no sign of Millar and it was assumed that he was buried under a large fall. It was some time before his body was reached. The bodies were brought to the surface and a pit-head building was used as a temporary mortuary under the supervision of Inspector E.F. Nixon and the relatives came to identify their dead loved ones.

Mr. Tom Crellin, of the St.Helens Colliery Rescue Team, told of rescue men in heavy breathing apparatus making their way slowly forward trying to restore the ventilation while behind them in a purer atmosphere working to clear away debris and shore up the damaged roof. Crellin said that there were two large falls that barred progress. The first was about 30 yards long and contained something like 100 tons of rubble and the second was similar in size. Both were about fifteen feet high but fortunately there was a space between the top of the fall and the roof through which the parties could work.

The fact that Mr. Harry Bird of Parton felt, in his own words, 'seedy' on the morning of the explosion probably saved his life. He should have been at work with his two brothers John and Tom but he stayed in bed. As soon as he heard of the accident he hurried to the pit yard and joined a rescue squad. He was on the point of entering the

cage when George Burns, a married man of Lowca, pulled his sleeve and told him that two brothers were enough to be down the pit and took his place. Mrs. Burns thought that her husband had gone for an stroll until she heard that he was down the pit.

Serving tea in the colliery canteen was Mrs. Margaret Wilson of Meadow View, Parton whose father William Hoodless, deputy, was one of the first to be reported to be killed in the explosion. The Mayor of Workington, Councillor R. Townley of Salterbeck was on his way to Carlisle on an official engagement when he heard of the explosion. He immediately turned back and changed into his working clothes and went down the pit to help with the timbering.

The last body was recovered on Saturday night and was that of Tom Miller. He was found under the largest fall of all and hundreds of tons of debris had to be removed before the body was recovered.

Those who died were-

William Hoodless aged 41 years an overman of 1, Meadow View, Lowca who was married with two children.

Tom Millar aged 44 years a deputy of 54, Salterbeck Road, Workington, married, with two children.

William H. Ennis aged 53 years a faceworker of 1, High Lowca, married 12 children.

Robert Burney aged 44 years a faceworker of 143, Queen Street, Whitehaven, married with three children.

Wilfred Chapman aged 42 years a face worker of 15, Burnside, Harrington, married with two children.

Charles Sharpe aged 26 years a faceworker of 85, Valley View Road, Greenbank, Whitehaven, married with one child.

Tom Addison aged 44 years a faceworker of 85, Valley Road, Greenbank, Whitehaven, married with one child.

Dan Lague aged 43 years a faceworker of 24, Solway Road Lowca, married with two children.

Harrison Fidler aged 37 years a demonstrator of 35, Croft Crescent, Dearham, married with two children.

Tom Bird aged 31 years a timber drawer of 7, West Croft Terrace, Lowca, single.

John W. Bird aged 46 years a timber drawer of 10, Solway Road, Lowca, married with one child.

Robert H. Brown aged 31 years a service engineer of 9, Ladypit Terrace, Whitehaven, married with one child.

John T. Hill aged 39 years a faceworker of 9, Burnside, Harrington, married with no children.

John Fox aged 43 years a bricklayer of 106 Main Street, Disington, married with four children.

Ronald Pflaumer aged 32 years a bricklayer of 12, Rose Hill, Harrington, married with no children

There were some tragic tales from the list of the dead. One of the biggest families in West Cumberland lost its father, William Ennis. He was father of twelve children the youngest of which was Annie aged four years and Jennie aged 23 years was the eldest girl at home. The two eldest boys also worked in Cumberland pits. The Lowca Council lost William Hoodless to which he had been recently elected. His father, Jack, had worked in the mines for 54 years and another member of the family was killed in a disaster at Siddick about sixty years ago. The local sports scene was badly affected and the Football Club lost many supporters. The two Bird brothers who were on the Committee and Dan Lague was a county referee. Charles Sharpe was a well known boxer and as well a child his wife was expecting another. Tom Millar started work in the St. Helens Colliery when he was fifteen years of age and after almost thirty years he

was appointed as a deputy. During his life in the pits he had several near escapes. About twelve years ago a fall of rick trapped his arm and it was feared that it would have to be amputated but he made a good and rapid recovery. Two weeks before the explosion he sat an examination to train the Bevin Boys. Robert Burney was a collector for the National Savings and was very fond of dancing while Robert Brown was the organist at the Lowca Methodist Church. He recently had completed a course on mining engineering and was related to the Birds.

Before the explosion 650 men were employed underground at the colliery in three shifts. The work in the other districts was not affected by the disaster and was expected to continue when a full inspection had been made.

Messages of sympathy came from far and wide with Mr. Shinwell, the Minister of Fuel and Power express sympathy with the relatives in the House of Commons and letters appeared in the Local Press.

“We would like to express our deep sorrow with all those in distress at this time through the Lowca Colliery disaster.”

Our children were evacuated to Whitehaven. You were good to them then when we were in distress in the south and we feel that were are linked up with you. God bless, comfort and strengthen you at this time.

L. and B. Skinn.”

“1, Mayfair Avenue,
Chadwell Heath,
Essex.

Sir,

The Lowca Pit disaster is yet another reminder of the risks of the mining community incur in the winning of coal, upon which the life of the community depends. The dependants of the 15 men who lost their lives will, we know, have the sympathy of all, but we feel that a great many people will wish to have the opportunity of making some practical contribution to their future welfare. We have therefore decided to open a fund on their behalf. Since the men were drawn from the rural district of Ennerdale and the Boroughs of Whitehaven and Workington we have thought it best that a joint appeal should be made by us. We feel sure that we can rely upon a swift and generous response to our appeal so that adequate provision can be made for both the immediate and the future needs of the dependants. donations should be sent to the hon. treasurer of the Lowca Pit Fund, Mr. Williamson, District Bank, Whitehaven or to any of the undersigned.

J. COOK.
(Chairman Ennerdale R.D.C.)

J. GILL.
(Mayor of Whitehaven.)

R. TOWNLEY.
(Mayor of Workington.)”

Donations were received from all over the country and the fund reached several thousand pounds.

THE INQUIRY.

The inquiry into the causes of and circumstances attending the explosion which occurred at the Harrington No.10 Colliery, Lowca, Cumberland on the 9th. December, 1946 was conducted by Sir John Felton, O.B.E., H.M. Chief Inspector of Mines by

arrangement with Lieutenant-Colonel D.J. Mason, D.S.O., T.D., D.L., H.M. Coroner for West Cumberland and held concurrently with the inquest into the men's deaths in The Congregational Church Schoolrooms, Whitheaven from the 25th. February to the 1st. March 1947. The report was presented to The Right Honourable Emanuel Shinwell, M.P., Minister of Fuel and Power on the 9th. September 1947.

All interested parties were represented and the coroners verdict was that-

"The cause of death in each case was due to the result of an explosion of gas on the 9th. December 1946 and that the men met their deaths by misadventure."

Investigation by the Mines Inspectors, colliery officials and all other interested parties were carried out when the ventilation had been restored and falls cleared. Electrical apparatus and cables were brought to the surface for examination and the position of the bodies, pieces of apparatus and falls were carefully noted. The direction of the force of the explosion on stoppings and supports was also recorded and Sir John Felton made an inspection of the area on the 20th. December with Inspectors and colliery officials.

It was generally agreed that the explosion was one of firedamp and that the point of origin was within an area extending half way between the No.5 and No.4 left thirl in the No. 3 heading, outbye down to and including No.4 left thirl and No.5 right thirl but excluding the No.2 heading.

It was left to the inquiry to establish the cause and the sequence of events leading to the explosion. The main cause was determined to be firedamp and the source of ignition was looked for. The investigation narrowed down the possibilities to lamps, shot-firing and faults in the fan and the electrical equipment.

Evidence emerged that there was a lack of adequate maintenance and unauthorised frequent adjustments of equipment but the electrical equipment was ruled out as a cause of the explosion. Shotfiring was also ruled out as no shots were not fired that morning.

The electrical cap lamps were ruled out, but the flame safety lamps came under a searching inquiry. There were three lamps of this type used in this district. One was with the Bird brothers and this was found to be locked and intact near their bodies and the other belonged to the deputy Miller and the overman Hoodless. The overman's lamp was damaged and had a missing pyropher bar and it was impossible to re-light it. This was not the cause but Miller's lamp was a different matter. The lamp was found in pieces with the screw threads in perfect condition. If it had been pulled apart by the explosion the threads would have been damaged. the inquiry could only decide that the lamp had been unscrewed before the explosion.

Miller had gone down the heading talking to McMullan and possibly because Hoodless's lamp was giving him trouble, left his with him. Hoodless needed to know the conditions on the other side of the brattice re-erected across No.3 heading. Possibly the lamp went out and would not re-light. He should have gone to the shaft and asked for another lamp or at least gone a considerable distance out-by before he tested it.

The inquiry found that the best possible account of events was that Hoodless went to the best ventilated area in No.4 left thirling near the No.2 fan and unscrewed the lamp. He may have been trying the re-lighter when the spark ignited the gas. The inflammable mixture moved rapidly inbye, up the No.3 heading with increasing velocity until it exploded at No.5 thirling. Sir John Felton commented-

"Such were the circumstances in which I visualise the lamp being opened. after removing the oil vessel Hoodless was, I think, trying the re-lighter when it operated and ignited the firedamp.

All the evidence points to there having been at this point an inflammable mixture which continued inbye up No.3 heading, the percentage of firedamp in the air gradually increasing until somewhere in the region of No.5 left thirl it reached explosive point and there exploded with great violence."

The men near the No.3. fan were badly injured and a searing flame raced down the No.5 right thirling reaching the No.4 heading and severely burning Addison, Hill and Largue. Witnesses reported hearing two bangs. The first explosion and the second was possible caused by the demolishing of the air-crossing or by coal dust exploding.

The inquiry established that ventilation was not adequate since although the full capacity of the fan existed the actual volume of air was not enough to ventilate the No.2 and 3 headings. All the cost cutting, corner cutting and shortages of skilled labour and Government Inspectors caused by the war were at last reaped in a bitter harvest.

Sir John Felton H.M. Chief Inspector of Mines made his report to Parliament and praised the rescue brigades and other parties for their work in rescue and recovery. He recommended that at the earliest possible time that training of skilled electricians and more attention be paid to the importance of ventilation. The switching off of fans to save electricity could lead to the accumulation of gas.

Sir John Felton made the following observations and recommendations-

“The system of working in the No.2 district was Room and Pillar fully mechanised on American lines, entailing the use of a considerable quantity of electrically driven machinery (with switch gear and cables) for cutting, drilling, loading and conveying and for ventilation, all at or in close proximity to the coal face.

This system is now in use with satisfactory results as regards output at a number of collieries and is extending. With such a quantity and variety of electrical apparatus in use it is apparent, in seams liable to give off firedamp even though not regarded as ‘gassey’ in the accepted sense, that there is need for special precautions to ensure safety.

I would call attention to a few of these, not they they are new but because they are of such vital importance as to require stressing and the urgent consideration of all concerned.

1) The first and over-riding essential is the provision and maintenance at all times of adequate ventilation. The speed of advance made possible with this method of working necessitates the careful planning ahead of ventilation requirements and a systematic checking of the ventilation by properly trained and competent officials. The use of auxiliary fans does not decrease this obligation but accentuates it, as shown in the present case.”

Sir John referred to the report on the Manvers Main Colliery explosion in which auxiliary fans played a part.

“2) The electrical apparatus should not only be (as was the case here) of the highest standard and certified flame proof or it’s equivalent where apparatus of American design and manufacture is in use, but a special and constant attention must be given to its maintenance in that condition. This will raise a question of supervision and it is hoped that efforts will be made to recrute and train more electricians as soon as possible.

3). A further point arises, viz- the necessity for ensuring that electric cables and switchgear near the face cannot be made live after a prolonged stoppage until the area in which they are situated had been examined by the deputy or other qualified official and he has certified it safe to do so.

Under the system of remote control at Harrington was made possible in certain circumstances for the attendant in charge of the main belt at the transfer point outbye to switch the current to the panels Nos 11 and 19 and so make live switch gear and even to start a scraper chain conveyor situated beyond the auxiliary fans controlling their ventilation.”

Sir John ended his report with the following paragraph-

“Tribute was justly paid by all parties at the Inquiry to the excellent work done by the Rescue Brigades and numerous others who voluntary gave their services in an endeavour, unfortunately of no avail, to rescue the victims of the disaster and

later to recover the bodies. These efforts were in accord with the well known high traditions of mining men and I gladly record thanks to all who thus served.”

BURNGRANGE. Nos.1 and 2 (Oil Shale) Mine West Calder, Midlothian. 10th. January, 1947.

The Burngrange Shale Mine was situated about 16 miles south-west of Edinburgh in the parish of West Calder in the County of Midlothian. It was the property of Young's Paraffin Light & Mineral Oil Co. Ltd which was a subsidiary of Scottish Oils Ltd. It was one of 12 mines working oil shales in Midlothian and West Lothian.

A disaster of this magnitude in a shale mine is unusual. Oil shale had been worked in the neighbourhood since 1858 on a large scale and by 1865 there were about 120 works processing the shales from the Lothian or cannel shales of the coal measures. The oil shales of the Lothians occurred in the Calciferous Sandstone Series near the base of the Carboniferous System and were a System and constituted a local development which was peculiar to the West Lothian, Midlothian and the adjacent portions in Fife and Lanark. The annual output of shale from the mines owned by six different operating companies reached a maximum of about three quarters of a million tons in 1913. All the companies were brought under one management in 1919 by the formation of Scottish Oils Limited. From 1913, for many reasons mainly arising from the 1914-18 and 1939-45 wars there had been a decline in the output and in 1946 the annual output was just over a third of a million tons.

The Burngrange Mine was relatively new, having started production in 1936. There were two vertical shafts each 14 feet in diameter and brick lined throughout. The No.1 shaft was used for winding men, minerals and other materials and the No.2 shaft was used for ventilation and pumping. Both shafts were sunk to a depth of 486 feet to work the Dunnet Shale Seam which varied in thickness from 9 to 12 feet. The dip of the seam in the No.2 District of the mine was variable averaging 1 in 5 in a north-westerly direction. The mine was ventilated by a double inlet Sirocco exhausting fan passing about 100,000 cubic feet of air per minute at a water gauge of 0.95 inches. All the workings were in the Dunnet Seam and the average daily output of shale over two winding shifts was 600 tons. The number of men employed was approximately 29 on the surface and 176 underground, a total of 205.

The shale was worked by stoop and room method and the size of the stoops varied according to depth but in the area affected by the explosion, the stoops were formed approximately 150 feet by 110 feet by driving rooms 12 feet wide and 9 feet high on a level course and at right angles to them. Where the seam exceeded 9 feet in height, the top shale was left to form a roof. In the second working, when the stoops had been extracted, splits were driven through each stoop to form small pillars which were then extracted by taking off lifts 12 feet wide and the full height of the seam. Pillar extraction was generally arranged to form and maintain a main roof line fracture at an angle of about 45 degrees to the levels.

The disaster was confined to one ventilating split which ventilated part of the No. 3 district and the whole of the No.2 District which comprised two sections of workings in one of which the pillars were being extracted and in another to the east of it large stoops were being split into small pillars. The area covered a full three acres of shale had been extracted to the north east of the middle dook which was known as 40 H.P. dook and referred to here as No.2 Dook. Extraction from these stoops in this area commenced in 1945 and was being continued on the east side of the area. From the inbye ends of Nos. 10 to 14 Levels and to the east of the stoop area, the stoops were being divided into pillars. These pillars were left to avoid subsidence at the surface which could damage a housing scheme. It was in these sections that all but one of the 15 victims of the disaster lost their lives. Before the slitting of the stoops prior to

extraction work was also proceeding on the No.3 District on the outbye or west side of the extraction area.

The shale was got by blasting and was hand filled by the miners into 20 cwt. 'hutches' which were then drawn for a short distance by drawers to a mechanical haulage. The hutches were hauled by diesel locomotive and main haulage rope to the shaft bottom. Compressed gunpowder was the explosive that was used fired by a fuse. The holes for the blasting were bored by electrically operated drills and all the machinery that was used underground was driven by electricity.

A mixed system of lighting, both open lights and safety lamps were used underground. Firedamp was a rare occurrence but it had been found before and in consequence certain precautions were taken. It was customary for the miner working at the face to use an approved electric safety cap lamp and to be provided with a flame safety lamp which was hung near the working face. The drawers, who carried these flame lamps in and out of the mine and the other outbye workmen used acetylene cap lamps. Rules were posted in the mine regarding the use of safety lamps as follows-

“FACEMEN IN CHARGE OF PLACES SHALL USE ELECTRIC CAP LAMPS.
FLAME SAFETY LAMPS SHALL BE KEPT IN WORKING PLACES.
BEFORE ENTERING PLACES AT THE COMMENCEMENT OF WORK AND
BEFORE AND AFTER SHOT FIRING,
THE FACEMEN SHALL TEST FOR THE PRESENCE OF GAS.”

The mine worked under the Coal Mines Act 1911 and was under the daily supervision of a certificated manager Mr. John Brownlie McArthur and was assisted by an undermanager Mr. Archibald Gibb Russell. Supervising them was Mr. John Caldwell and Robert Crichton, General Mines Manager and Managing Director respectively of Scottish Oils Limited. All were holders of first class certificates of competency in mine management.

The explosion occurred about 8 p.m. in the sixth hour of the afternoon shift on Friday 10th. January 1947 when 76 men were at work underground. It originated at the face of the rise split off No.14 Level, in one of James Todd's working places in the No.2 District when firedamp was ignited at an open acetylene cap lamp. One man, John McGarty was blown down the face by the force of the explosion and received injuries from which he died a few minutes later. The explosion started fires which spread to various parts of the district and 14 men who were employed in the section of narrow workings on the return side of the extraction area, lost their lives from the afterdamp and fumes from the first explosion and the subsequent fires.

During the normal course of the afternoon shift, three men, James Todd, Thomas Reid and John McGarty were at work in adjoining stooping places, No. 14 Level face and a rise split a short distance outbye from the face of No.14 Level in the No.2 district. Todd was an experienced shale miner and was the faceman in charge of these two places with Reid and McGarty as his drawers. Todd used an electric safety lamp for use in each of the two working places and Reid an open acetylene cap lamp. McGarty, contrary to the custom used an electric safety cap lamp. Each drawer carried a flame safety lamp for use in the two working places which were suspended near the face while work was in progress. In accordance with the rules of the mine, these lamps were used by Todd who had been instructed how to use them to test for gas at the start of work and before shots were fired.

These three men had worked in the two places from about 3.30 p.m. until about 7 p.m. when they went outbye to eat their food, taking two flame safety lamps with them. There were no shots fired that afternoon. About 8 p.m. the three returned to their working places, Todd and Reid to the split and McGarty to the face at the No.14 level. Todd had his electric lamp and was carrying a flame lamp in his hand and he went to examine for gas at the face at the rise of the split, while Reid, who was his drawer, remained at the entrance to the split to clear some fallen shale which Todd had pulled down on his way out for the meal.

It appeared that during the meal break, the roof in the split to the rise had weighted heavily and had broken most of the timber props that were set to support the roof. This was a great surprise to Todd and before he examined it for gas, he called to Reid to come and see it. At the time Reid was about 5 yards from the face with his open acetylene lamp which ignited gas near the roof. The ignition was accompanied by a rumbling noise and the flame travelled towards the waste. Todd shouted to Reid and McGarty to clear out and Todd and Reid had just started to run when a second report was heard and they were blown down the split for about 15 feet and slightly stunned. When they had recovered sufficiently they called for McGarty but heard only groaning they found him lying unconscious in the middle of the No.14 Level roadway about 40 feet back from his working place. In rushing out of the place he had either been knocked off balance or blown over by the force of the explosion and in falling had fractured his skull. Todd immediately went outbye for assistance which was soon at the place as the men in the adjacent places were on their way out. A few minutes later a stretcher party arrived and carried McGarty out. He never recovered consciousness and died on the way out.

The men in the adjoining places said that there had been two explosions, the second louder than the first. The results of violence were observed in the dip of the No.14 Level where the shack had extinguished lights, knocked lamps from hooks, and men over and raised a dense cloud of dust.

The story now turns to the events in the section to the east and on the return side of the stooped area where the stoops were being split. The evidence given to the inquiry came from a 17 years old benchman, Alexander Todd who was employed in the No.3 dook. His duties were to detach empties from the dook haulage at various benches and despatch the full hutches in trains or rakes of three. Shortly after 8 p.m. he was sitting at the bench at the junction of No.13 Level with No.3 Dook, talking to two drawers, Sam Pake and David Muir who had come out with full hutches ready to take back their empties to the face when he felt two wafts of air which extinguished the acetylene lamps. He felt frightened and after relighting their lamps, Pake and Muir teased him a little and went towards the face each taking an empty hutch. Todd stated that when they left him he thought they were going to tell the boys and it was clear that they did not think that anything serious had happened. The hutches that they took in were filled with shale and would have taken about 25 minutes to arrive.

After Pake and Muir left him, Todd coupled the full hutches at the bench and proceeded to signal for the empty rake to be lowered. When it arrived he noticed a lot of smoke coming down with the air. He signalled for the rake to stop at the No.13 Level and getting into it and putting out his light, he signalled for it to be hauled up again. As he approached the top of the dook he called for the lad employed at the dook-head and to the haulage engine attendant, and they all immediately went outbye to get fresh air for by this time the atmosphere was thick with dust, fumes and smoke at the No.3 Dook. After a short wait outbye, the engineman and Todd attempted to go inbye again to get their clothes but they were unable to do so because of the smoke and fumes. This would be about 8.20 p.m. so that by this time the light of the men inbye must have been precarious.

At this time there were 14 men including Pake and Muir in the working places on the inbye side of the No.3 Dook and it was apparent that they did not realise the danger until it was too late. Not one of them got out alive. The first warning that would have reached the men would have been fouled conditions in the air current as a result of the afterdamp, smoke and dust from the original explosions and the subsequent fires. There had been some short circuiting of the ventilation after the explosion and the brattice that separated the intake and the return air had been displaced. By the time that they realised that there was a danger all three exits from the workings, the No.11 level No. 10 Level or Diesel Road and the Return Airway had become impassable

because of deadly smoke and an atmosphere which contained a large proportion of carbon monoxide.

The first serious attempt to explore the workings on the inbye side where the 15 men were trapped was not made until about 8.35 p.m. At the time of the explosion there were no officials in the vicinity. The back-shift fireman, George Crombie was outbye at the Junction of McIntyre's Dook with the No.10 Level on his way home while the afternoon overman, David Brown had gone to the surface for consultation and his meal. At about 8.15 p.m. Brown was in the office discussing pit business with the manager, Mr. J.B. McArthur, when a message was received by the winding engineman that 'a doctor and ambulance were wanted for McGarty and that there had been an explosion.' After telephoning for a doctor and an ambulance, the overman and the manager went down the pit with morphine ampoules at 8.20 p.m.

As they were going down the No.1, McIntyre's Dook, they were told by one of the outgoing men that an explosion had occurred some where in the region of James Todd's place, that a stretcher party was bringing out McGarty and that all the other men in the stooping section were safe but they had no information about those in the inside dook section. Brown, the overman handed the morphine over to the manager and went quickly inbye towards the No.3 Dook. When he got as far as the heading on the outbye side of the No.2 Dook, they encountered smoke coming up from it and still more smoke coming from the No.2 Dook itself. It was not sufficiently dense to prevent Brown and Crombie from going further along the No.10 Level. They managed to get almost to the top of the No.3 Dook. In passing the junction of the heading between Nos.2 and 3 Dooks, they encountered still more smoke coming up this heading. At this time they were not affected by the heat but, because of the smoke, they had to withdraw to a point just outbye of No.2 dookhead as they said, 'for a breather'. They waited a few minutes and Brown made another attempt to go inbye alone. He actually got into the No.3 dookhead where he shouted but there was no answer. He did not see any signs of men or lights and he was forced to withdraw.

On his way out he met Crombie who said he had been trying to improve the ventilation by partially opening some brattice screens but this was of no avail. The atmospheric conditions were getting worse all the time due to the fires spreading, the extent and seriousness of which was not realised at the time. Brown fully realised the seriousness of the position regarding the trapped men and immediately sent word to the manager who was dealing with the fires in the stoop sections asking for all possible assistance and telling him that rescue work could not continue with put rescue teams wearing self contained breathing apparatus. He then set out to discover for himself where the smoke was coming from.

There were no signs of fire when the stretcher party removed McGarty from the 14 Level Face but very soon after small fires were discovered in No.14 Level and also at the waste at the edge in the split off No.15 Level. At the time these fires seemed relatively unimportant and confined to timber burning on the floor. The manager detailed men to fight these fires with under-ground fire fighting equipment which consisted of sand boxes placed in the level and portable fire extinguishers from the motor rooms and various other locations in the vicinity. Small as the fires were, the men could not put them outbye only keep them in check.

It was obvious that the small fires could not account for the dense volumes of smoke and fumes that were discovered on reaching the No.11 Level just outbye of the No.3 inside Dook. Later another small fire was discovered at the edge of the waste in No.13 Level and a much larger fire in the heading on the inbye side of No.2 Dook. The manager quickly realised the gravity of the situation and realised he needed additional fire fighting resources and trained mines rescue brigades. He satisfied himself that all the fire fighting resources of the colliery were in operation and everything possible was being done in the circumstances, he went to the surface. Urgent calls for assistance were sent to the National Fire Service and the Mines Rescue Station. The N.F.S.

received the call at 9.25 p.m. and a officer and four men arrived at 9.40 p.m., after covering the eight miles from the Fire Station with a mobile fire engine and two Proto one-hour self-contained breathing sets. The Mines Rescue Superintendent at Edinburgh received the call at 9.20 p.m. and he and his assistants arrived at the colliery in the Mines Rescue Car at 10.30 p.m. when the trained men at the colliery were waiting for them.

Although the N.F.S. was never intended for fire-fighting underground in mines, the team volunteered at once for the duty. Two members of the team donned the Proto apparatus and underground they were met by Brown, who pleaded for one of the Proto apparatus so that he and another trained member of the Burngrange Mines Rescue Team, J. McArthur, could make another attempt to get into the workings beyond the No.3 Dook. After handing over their apparatus. The N.F.S. men were taken down the No.14 Level where they tackled the fire with portable fire extinguishers. A far more serious fire had been found in the heading beyond the No.2 Dook and was tackled by trained rescue men. After making the necessary arrangements to get water to the inbye workings and getting a portable pump and hose down the mine. The N.F.S. men fought the fire under the charge of N.S.S. Superintendent Muir. Mine officials and trained rescue men under Superintendent Davidson were in attendance all the time to guide them and to keep a watch on the conditions in the roadways and of the atmosphere. The smaller fire were kept under control but the fighting of the larger fires was along, arduous and difficult operation. Until it could be brought under control, rescue operations beyond were impossible. At one time 600 gallons of water per minute were played on the fire.

Brown and McArthur, with the Proto apparatus had made an unsuccessful attempt to reach the trapped men but they were able to give details of the situation when the full rescue brigade arrived. They went into action under the direction of Davidson and the first team which was designated 'Oils No.5 Brigade' went down and were ready for action at 10.30 p.m. along with the assistant superintendent R. McIntosh and John Caldwell, the General Manager of the Mines. Instructions were left for the 'Oils No.4 Brigade' to dress and follow on. Underground, a fresh air base was set up at McIntyre's Dook where the stretchers and revivers were left under the care of Davidson and McIntyre.

At 11.15 p.m., under the captaincy of the indefatigable overman, Brown, the Oils No.5 Brigade, wearing goggles and using a lifeline, set off with instructions to explore No.10 Level and try to make contact with the trapped men. Sweating profusely, they returned at 11.30 p.m. with a report that the temperature was very high and the smoke so dense that they could not see each other's lights but they insisted in trying again. The fresh air base was moved 172 yards further on and the team set off again. When they returned they reported that they had reached a point near No.3 Dook where they found a large fall of stone and bad roof conditions. They had also heard movement of the roof weighting but could not see because of the thick smoke. The brigade then attempted to reach the men by way of the No.11 Level but they found this was impossible because a serious fire was burning at the junction of the first heading beyond No.2 Dook. Following the discovery of the fire and the report on the atmospheric conditions by the brigade it was clear to all that there was no hope for the trapped men until this fire was under control. All efforts were then concentrated in getting the maximum fire fighting resources into action. It was decided that The N.F.S. men could do the work without breathing apparatus so long as they were accompanied by a trained mines brigade rescue man with oil flame safety lamp and canaries.

The work of fighting the fire continued without interruption for four days when on the night of 13/14th. January that it was considered practicable to send a team beyond the fire. On this night Oils No.2 Brigade went in and came back with the report that they had found the bodies of eight men lying in the No.3 Dook. By this time the atmosphere was much clearer and the temperature a little above normal. After this the district was

quickly explored and all the bodies located and recovered. All the bodies with the exception of G. Easton were found in the No.3 Dook and there was evidence that Easton attempted to brattice off the face of No.13 Level where his body was found, in an attempt to keep the noxious atmosphere from him. No one could say if they were at their working places at the time of the explosion.

Those who died were-

John McGarty aged 30 years, miner's drawer,
Thomas Heggie aged 27 years, miner,
Henry Cowie aged 36 years, miner's drawer,
John Lightbody aged 41 years, miner,
David Carroll aged 36 years miner's drawer,
William Carrol aged 31 years, miner's drawer,
William Greenock aged 51 years, miner,
James McAuley aged 59 years, miner,
David Muir aged 25 years, miner's drawer,
Anthony Gaughn aged 45 years, miner,
William Ritchie aged 39 years, miner,
John Fairley aged 20 years, miner's drawer,
Samuel Pake aged 24 years, miner's drawer,
William Findlay aged 56 years, oncost worker and
George Easton aged 53 years, oncost worker.

The inquiry into the causes and circumstances attending the explosion and fire which occurred at Burngrange Nos. 1 and 2 (Oil Shale) Mine, Midlothian was conducted by A.M. Bryan, J.P., B.Sc., H.M. Chief Inspector of Mines at the Seafield Institute, West Calder on Tuesday 25th., March 1947 and was concluded on the 26th, March. All interested parties were represented.

There was no mystery about the cause of the initial explosion, it was one of firedamp which was ignited at the open acetylene lamp of Thomas Reid and must have been small since no one in the immediate vicinity was burned. The fires presented some unusual features and there seemed little doubt that the flame continued long enough to ignite dry timbers and probably originated at the edge of the goaf.

Mr. Bryan came to the following conclusions and summarised the results of the Inquiry-

“That the initial firedamp explosion originated near the waste edge close to the face of the rise split off No.14 Level, one of James Todd's working places in the stooping section, No.2 District, Dunnet Seam, when firedamp was ignited at the flame of an open acetylene lamp carried by Thomas Reid.

2). That the initial explosion was followed almost immediately by a second firedamp explosion, which spread along the waste to adjacent places and that this explosion was followed by a series of lighter explosions and the burning of gas along the waste edge, causing flame to persist.

3). That the firedamp had collected gradually over a period of time in the higher cavities of the waste or goaf formed by stooping, where its presence could not normally be detected, and that some of it had been expelled there from into Todd's working place by roof movements or falls of roof in the waste shortly before the return of the workmen after their meal interval.

4). That the persistent flame caused by fires in at least five separate places, due initially to the ignition of timber at or near the waste edge and the subsequent ignition of fallen and loose pieces of oil shale.

5). That the fires were sufficiently brought under control to permit of rescue operations but were not wholly extinguished, largely due to inaccessibility, with the result that the fire area had to be sealed off.

6). That John McGarty was fatally injured through his head striking a sharp object when he was blown down by the blast from the second explosion and that the 14 other men lost their lives from the effects of breathing afterdamp produced by the explosions and subsequent fires.

7). That there were no breaches of statutory requirements.”

The Inquiry disclosed that it was necessary and desirable to effect certain changes and made the following recommendations-

“1). That only locked safety lamps be permitted within prescribed areas to include all working faces in the Dunnet Seam but that the exemption from the full requirements of Section 32 of the Coal Mines Act, 1911 is warranted by the character of the mines in respect of those parts out with the prescribed areas.

2). That since there is some ambiguity as to the application of the Explosives in Coal Mines Order and some difficulty in applying it to oil shale mines, the use of explosives in such mines should be governed by a separate Order under Section 61 of the Coal Mines Act, 1911.

3). That by this Order any seam or part of a seam in mines of oil shale in which safety lamps are required by the Act or Regulations of the mine to be used, the use of permitted explosives should be made compulsory in all working places in direct contact with, or about to hole through on, waste or goaf.

4). That properly trained and experienced oil shale miners in charge of a working place or places, should be eligible for appointment as competent persons to fire shots where permitted explosives are used, notwithstanding that their wages depend upon the amount of mineral gotten.

5). That, whilst it would be unreasonable to prohibit by Regulation the practice of ‘stooping’ elsewhere than at the return end of a ventilation district, or, in other words, to require that the air used for ventilating a ‘stooping’ section, shall not thereafter be used for the ventilation of other workings, nevertheless this practice should be resorted to only in special or exceptional circumstances.

6). That in each geographical division of the National Coal Board there should be (a) a first-class common fire-fighting service and (b) an efficient mobile scientific service for the prompt analysis of samples of mine atmospheres and the interpretation of the results of analyses, for mines of all classes, whether operated by the National Coal Board or not, based on or co-ordinated with a common and efficient Mines Rescue Service.”

Commenting on the rescue operations Mr. Bryan said-

“The rescue and recovery operations upheld the highest traditions established by the men in the mining industry in these activities. Calamity is indeed man’s true touchstone. I should like to record my tribute to the excellent work done by all concerned under very difficult and trying conditions over the long period from the occurrence of the explosion to the recovery of the bodies of the unfortunate victims. It was unfortunate that none of the trapped men was alive, but that was in no way the fault of the representatives or officials and workmen, the National Fire Service, the Mines Rescue Brigades or H.M. Inspectors who took part in the operation.

I feel a special work of praise should be given to the members of the National Fire Service who, for the first time in their short history and, I believe, in the annals of mining, played a valuable part in the fire-fighting operations underground. Although intended and trained for fire fighting on the surface, the teams concerned never hesitated for a moment when the fire was down in the working of a mine.

Although I have said, all concerned in the rescue operations are worthy of praise, I have no hesitation in singling out the overman, David Brown, for special mention. His efforts to reach the trapped men in the early stages of the disaster, with and without self-contained breathing apparatus, alone and in the company and as the leader of a trained rescue team, were deserving of the highest praise. In all he made no fewer than five attempts to reach the entombed men. He was indefatigable he displayed exceptional courage and determination well knowing the danger involved and I have already brought this to notice with a view to its appropriate recognition."

BARNSLEY MAIN. Barnsley, Yorkshire. 7th. May, 1947.

The colliery was in the Borough of Barnsley where, in the last century explosions which had caused large loss of life had occurred in the neighbourhood. The colliery had two shafts, 400 yards apart. The No.2 downcast shaft was 15 feet in diameter and 512 yards deep and the No.4 upcast shaft was 15 feet in diameter and sunk to 640 yards. Up to the beginning of 1947 the colliery was owned by Barrow Barnsley Main Collieries Limited and in the reorganisation of the industry they had decided to close it and win the coal from two other collieries but on representations, this plan was modified and it was decided to work the Kent's Thick Seam and to cease work on all other seams. The development started from the inset in the No.2 downcast shaft on 1st December 1945 and proceeded so quickly, that on the 1st. December 1946, the output had reached 1,000 tons a day which was wound on one shift. At the time of the explosion this figure had increased to about 1,200 tons.

The electrical system was 3 phase 50 cycle alternating current at 1,500 volts supplied by the Colliery Power Station 1,250 KVA alternator. Two 550 volt KVA transformers were available to provide supply from the Yorkshire Electric Power Company. current was used at 550 volts for all power purposes except for drilling for which 125 volts was employed. the Kent's Thick Seam lay at 213 yards from the surface and was 3 feet 10 inches thick and the whole section was worked. Occasionally there was a 2 inch dirt band 1 foot 7 inches from the bottom. The seam was overlain by 12 feet 2 inch of blue bind and underlain by 5 feet 9 inches of spavin. The inclination of the No.3 face was about 1 in 18 and the full dip of the seam about 1 in 11.

The explosion occurred on the No.3 face which was 150 yards long with the conveyor or intake gate 80 yards and the main gate 30 yards from the top right hand side. The tail gates at the extremities of the face were also returns but the object of the second return of the top side was to maintain one that would not be damaged by No.8 District which was being opened out parallel to them or by other similar districts which might be opened out at a later date. No.8 District consisted of a face which had just been headed out. The connections of the two tail gates were made only within a day or two of the explosion and these explosions were being enlarged on the morning of the explosion. The effect of this new district on the ventilation of No.3 face was of considerable importance to the later events. Electricity was used for coal cutting, drilling, face conveyors, gate and trunk convectors and signalling in each district.

The system of support was mainly by chocks set at maximum distances of 6 feet centres in a row with rows at 5 feet 6 inch centres. Few props and bars were used but steel props were supplied to each filler to be set temporarily before the erection of the chocks. Packs were built at the sides of the four airway gates and the eight dummy gates at the No.3 face so that there were few actual wastes.

The sequence of operations on all the faces was that in the day shift, shots were fired in coal, and the coal loaded. On the afternoon shift the conveyors were dismantled and moved forward and shots fired in the dummy gates and at the various ripping lips and packs built. On the night shift the coal was cut 10 inches from the

bottom of the seam to a depth of 5 feet 6 inches by chain machines. There were no haulages apart from the one near the foot of the No.4 shaft for taking in supplies. At the face, coal was loaded by hand onto conveyors which delivered to gate conveyors which again fed trunk conveyors from which the coal was transferred into tubs at the round-about near No.2 Downcast shaft where the whole of the output was raised. On No. 3 low side face coal was loaded by hand on to belt conveyor and on the high side face on a shaker conveyor operated by an Anderson Boyes 20 H.P. driving gear placed near the top end of the face. Electric current for operation it was conveyed through a collectively screened 5 core trailing cable suspended from the chocks on the gob side of the conveyor. Shotholes were carefully spaced in the top and bottom coal and shotfiring considerable proportions. There was a shotfirer from each side of No.3 face and the deputy also fired a number of shots. The explosive used was Plastex in the coal and Polar Viking in the rippings.

A small amount of firedamp was made in the No.3 District but only of the order of .1 per cent with 5,000 cubic feet of air per minute flowing. Firedamp was reported at the top of the face two days before the explosion and in a cavity at the junction of the new crossgates and at the top tail gate on the No. 3 face on the day before the explosion. The gas in the cavity persisted right up to the time of the explosion. These were the only reports of gas since January previous when it was found by the manager and an Inspector at a similar place when the cross gate was put through. On account of this gas, a door which had been in position in the main return just outbye of the No.8 left hand tail gate was moved just inbye of the new crossgate junction on the day before the disaster.

The ventilation was produced by a Keith Blackwell fan which circulated 163,000 cubic feet of air per minute at a water gauge of 2.8 inches. The speed of the fan could not be varied and the amount of air circulating in the mine and through the districts were recorded in the book for the purpose. The water gauge for the mine was increased to 3.3 inches on the afternoon before the explosion since gas had been found in the cavity and the crossgate junction near the top end of the No.3 face already mentioned and the fact that the opening out of the No. 8 face might reduce the amount of air available from the No.3 district, particularly on the right hand side. Air entered the district by the conveyor gate and split right and left and sheets were hung in the No.8 tail gates, No.3 bottom gate and the slit between No.3 and 5 to act as regulators. The colliery was under the daily supervision of an Agent, Manager and Undermanager while on each shift there was an overman for the whole seam and a deputy for each district.

The explosion at 12.15 p.m. on Wednesday 7th. May 1947 in the 7th. How of the filling shift. By common consent it originated near the top end of the No.3 right face, which had been almost cleared of coal and travelled through the whole of the face and about half way down the No.3 left face. It extended about 20 yards along the conveyor gate, into the main return a few yards outbye to the crossgate junction, along the crossgate and probably some distance along the top gate, although there was no clear evidence of the passage of flame along this gate. As explosions go it was not a violent one although a newly erected door and it's brickwork in the main return gate between the crossgate junction and the face was blown down and one or two chocks at the face were blown out. There was not however, any damage to the air crossing and the main ventilation arrangements were not deranged in any way. The conveyors stopped at the moment of the explosion.

There were 40 men working on the left side of the face. Eleven colliers filing of the right side, tow repairers in the new crossgate, two borers on the left side of the face, a gear-head attendant at the face of the conveyor gate, four surveyor lads and three timber lads at the inbye end of the main return gate, one shaker attendant and one stemming lad on the right side of the face, one shotfirer for each side of the face and a deputy. There was also a ventilation measurer and a man erection sheets in the low

side of the tail gate. The two repairers in the new crossgate and six of the seven colliers filling at the top of the face and the shotfirer were killed.

According to the medical evidence, one man died from a fractured skull and the others lived long enough to die from the effects of afterdamp which they inhaled but they were unlikely to have moved after the explosion. All the remaining people on the right side of the face and in the main return were burnt except one of the timber lads in the main gateway outbye of the new crossgate junction. The gate-head attendant at the face of the conveyor gate and the fillers working on the upper half of the left face were also burnt. The burns, for the most part, were on the upper part of the body although the seam was only 3 feet 10 inches thick.

Most of the injured made their way to the shaft unaided and very little was attempted underground in the way of first aid. The distance to the shaft was small and there was a hospital close to the colliery and the injured began to arrive there almost before the staff became aware that an explosion had occurred. It was a tribute to the hospital that all the injured recovered. Those who were not injured and some that were slightly burnt made valiant efforts to assist those less fortunate and carried on with the recovery work aided by the officials and other men from other districts. The report commented-

“It is a great privilege once again to bear witness to the cool courage and determination which characterises the conduct of all concerned on these occasions regardless of all personal consequences.”

It was not possible to enter the right side of the face owing to smoke and fumes but the left side of the face cleared at once. It was remarkable that it was possible to travel the main return right up to the new crossgate junction almost immediately after the explosion and for a period of one and a half hours despite the presence of fumes and smoke on the entire length of the right hand face. Sheets were erected and these fumes were cleared and it was then possible to go in and recover the bodies of the victims.

The men who lost their lives were-

Henry Storey aged 30 years, shotfirer,
Harry Crawcroft aged 26 years, collier,
Joseph Blayden aged 26 years, collier,
Arthur Edwards aged 54 years, collier,
Edward Ernshaw aged 53 years, collier,
John Denton aged 44 years, collier,
Harry Irwin Baxter aged 25 years, repairer,
Clifford Allen aged 34 years, collier and
William Peake aged 46 years, repairer.

The inquest was held before Mr. Sanderson H.B. Gill, H.M. Deputy Coroner for Wakefield and District who sat with a jury of eight people. It occupied four full days and examined 24 witnesses and all interested parties were represented. The report on the causes and circumstances attending the explosion which occurred at Barnsley Main Colliery, Barnsley, Yorkshire on the 7th. May 1947, was made by H.J. Humphrys, D.S.O., O.B.E., M.C., H.M. Divisional Inspector of Mines and presented to The Right Honourable Hugh Gaitskell, C.B.E., M.P., Minister of Fuel and Power on the 11th. December, 1947.

Nine of the witnesses were in the district when the explosion occurred and seven of them were burnt. All of them agreed that it originated at the top end of the No.3 face and that the shaker conveyor was running at the time, suddenly stopped. It started again shortly afterwards and ran for a short time when it stopped as all power being shut off at the pit bottom.

As to the presence of firedamp, the representative of the National Coal Board, Dr. Willett, thought that it had been liberated from a waste below the conveyor driving gear by the reduction in pressure which would occur when the door in the main return on the top side of the face was opened by the surveyors. The Mines Inspector expressed the view that the stoppage of the ventilation on the right side of the face for one and a half to one and three quarters of an hour after the explosion and particularly the stagnation on the face between the intake and main return indicated that the ventilating pressure must have been low at the time of the explosion. The persistence of gas in the cavity caused the management a good deal of concern and moved the door forward. In the opinion of Mr. Bryan, the reductions in ventilating pressure on No.3 face caused by these operations caused the current to be diminished so that it would not carry away the gas which was coming from the seam at a rate of about 5 cubic feet per minute.

In consequent the firedamp accumulated in a layer near the roof of the working face probably extending the entrance to the main gate and the top end of the face. The deputy Haigh claimed to have made an examination for gas at the top end of the face only 15 minutes before the explosion, and if this theory was accepted, then it had to be concluded that his examination was not thorough enough to detect the firedamp.

There was no difference of opinion as to the source of ignition which was due to an arc formed between the cores of the trailing cable and a moving nut on the rocker arm of the driving gear of the shaker conveyor. Mr. Bryan commented-

"The makers of the gear supply covers completely enclose the rocker arms and prevent anything or anybody coming into accidental contact with them and it is most unfortunate that the cover on the gob side rocker arm was missing and had been missing for some days. It is extremely doubtful in the other cover was in position. These covers were provided primarily to prevent person making accidental contact with moving parts but their use would have prevented damage to the cable which was the direct cause of the explosion."

Other sources of ignition such as friction, shotfiring or defective safety lamps were explored but rejected.

The report recommended the appointment of a Ventilation engineer for each Group of Mines to supervise and direct the general schemes of ventilation in their Area and to advise on the many intricate problems that would occur from time to time and that substantial changes in the ventilation should not be made during a main working shift. With regard to short circuiting and leakage of the ventilation the Inspector said-

"I recommend that properly constricted wooden regulators set in brickwork be provided. A good practice is to have a short length of the road divided longitudinally by a brick wall with a regulator on one side and duplicate doors on the other. Ventilation doors should be duplicated with spaces between them, sufficient in length to accommodate the longest train that passes through them."

The Inquiry found that the number of shots that were fired was excessive and were such that the requirements of the Explosives in Coal Mines Orders could not be carried out and recommended that the number of shots fired in coal should not exceed 6 per hour or 40 per statutory shift and that they should be fired before the filling shift wherever possible.

Regarding the electrical equipment it was recommended that wherever practicable, motors driving conveyors or any other fixed machinery should be placed in the intake air and all flexible cables in use at the face should be examined at least once in every working shift by a person who is properly trained. With these recommendations the report finished.

WILLIAM PIT. Whitehaven, Cumberland. 21st. August, 1947.

Whitehaven's worst pit disaster occurred on Friday night when 104 men lost their lives at the William Pit following a violent explosion in the main haulage road about two and a half miles from the shaft. At the time of the explosion there were 117 working underground and it was soon apparent that there were 10 survivors but the remaining 107 were trapped by heavy falls. The first sign to the surface that something was wrong was the continuous ringing of the bell in the engine winding room which indicated that wires had been crossed.

Rescue operations were immediately organised and the news of the calamity spread like wildfire through the town causing relatives and friends and the men on the afternoon shift to flock to the pit. Rescue teams came from all over the country, Cumberland, Durham, Northumberland and Lancashire and they worked for over 20 hours in atrocious conditions. They were at the point of giving up hope of finding anyone alive in the pit when they discovered three men who had taken refuge in a remote working place where the air was fresher.

At first there was only rumour with no concrete news until the issue of the first bullet in by Mr. J.G. Helps, the Area Manager for the National Coal Board who was in charge of all operations at the colliery. It read:-

"At approximately 5.40 p.m.. on Friday and explosion occurred in the William Pit. A hundred and twenty one men were in the pit at the time. Of these three men have come out of the pit and seven others are known to be safe and are assisting in the rescue work.

The agent (Mr. Macpherson) and the colliery manager (Mr W. McAllister) are in the pit with the rescue teams and are endeavouring to travel along the main roadway of the working. There are a number of large falls behind which the remainder of the men are trapped and it will be some time before they are released. So far there is nothing to indicate the seat of the explosion or it's cause".

One of the three men brought out of the pit was Harry Allen of Fleswick Avenue, Woodhouse. He was on the shaft side of the explosion and was blown clear. he was unhurt, but was badly shocked and could not give a coherent account of what had happened. Mr. Allen lost a son, son-in-law, brother and nephew in the explosion..

At 2.55 am. on Saturday, Mr. Helps issued the following statement:-

"Rescue work is proceeding. Falls are being cleared and the ventilation restored. The bodies of 16 men have been located and every endeavour is being made to reach the men further in-by. There is no good ventilation up to where the rescuers are working, and the haulage arrangements have been re-started. Men working in rescue apparatus are exploring the roads a head. There is a stretch of 250 yards of the main raid obstructed by at least three falls. When these have been cleared the rescue operations can be stepped forward within striking distance of the coal faces"

On being questioned by Reporters, Mr. Helps said that the falls were about two miles from the bottom of the shaft, there was no sign of a fire and there was no way on knowing if any of the missing men were alive or not.

The news that came from the rescue teams was only bad news and the body count rose until at 3 p.m. on Saturday an official announcement declared that there was practically no hope for the men in the pit. Spirits at the pit head dropped only to be lifted by the news that three men had been found alive and had reached the shaft. They were very weak but otherwise in good physical shape.

The news raised fresh hopes and cause a redoubling of efforts both underground and on the surface and caused a second rush of relatives and friends to the pit head. Rumours that another six men had been rescued proved to be false and as the night fell on a second night at the pit hope and optimism recede with the light.

All day during Sunday the teams toiled below and they were rewarded with the location of yet more bodies and by the evening of Sunday 90 bodies had been

recovered and 64 of them had been brought to the surface. All hope was lost for those not yet recovered.

On Monday morning an official statement announced that during the night operations had been abandoned so as to give the rescuers who had been working in rescue apparatus a well earned rest. These men were exhausted and a programme was put into operation to get fresh air to the working places. This was carried out satisfactorily and at 8.15 am., rescuers wearing rescue apparatus again went to work.

Mr. Helps was hopeful that the remaining 14 bodies would soon be located and he said that nothing had been lost by the suspension of the operations during the night. He thought it was too early to make decision on the closure of the colliery.

By Monday night 98 bodies had been located and 75 brought to the surface. On Tuesday there was a novel rescue operation when for the first time in Great Britain dogs were used to try to locate the bodies under falls. The previous day the R.A.F. School for police dogs in Gloucestershire received a call from the William Pit after consultations with the representatives of the Mines Inspectorate, the N.C.B. and the N.U.M. and three Alsatian arrived at the pit under the care of Flight-Lieutenant Cooper, Corporal R. Marshall and Corporal W. Jenkins. The dogs were Jet who had saved the lives of 30 people during the London Blitz an feat that had won him the 'Dickin Award' which was the dog equivalent of the V.C. Prince and Rex who had assisted in tracking down an fugitive armed Pole in Norfolk.

The dogs were taken underground at 2 am. and were reported to be very unsettled by the strange environment but they settled down and they would be put to good use later in the day. A bulletin stated that 84 bodies had been brought to the surface and only 7 remained unlocated.

By Tuesday night conditions underground were getting better and that only three bodies were now unaccounted for.

On Tuesday Prince spent five hours underground and according to Mr. McAllister, the mine manager, showed interest in one of the falls. "It seems we may be getting results from that" the manager said to the Press. After a rest Prince again went down the pit.

Only two bodies remained underground and Mr. Helps and the air conditions were improving underground. No more bulletins would be necessary. he thought that the use of dogs in these conditions was well advised and that the remaining two bodies had been located under falls.

The work of the Rescue Parties and volunteers brought tribute. They were praised for their gallantry, enterprise and hard work as well as the selflessness in a tribute issued and signed by Mr. J.G. Helps and Mr. J.A.R. Machin for the National Coal Board and Mr. T. Stephenson and Mr J. Martin for the National Union of Mineworkers. The statement read-

"This has been a very stiff and heavy task, yet, with enterprise and team work, they have overcome very great difficulties. Those responsible for organising the rescue work deserve every commendation for the exemplary manner in which this work had been carried out. The police by efficient and sympathetic handling of the difficult task rendered valuable assistance. Too all those and many others we desire to pay tribute and tender our deepest thanks."

The rescue squads were organised by Tom Charlton of the Brigham Rescue Station who was in charge of the first fresh air base underground. The first squads to report for duty were William Pit No.1 and No.2 led by T.E. Nicholson and W. Skelly, Haigh 1 and 2, John McMillan and Tom Stewart Solway 1 H. Turrell, Lowca 1 W, Foster. Clifton G. Cameron..

It was described as miracle that three men had got out of the pit alive after being entombed for over 20 hours. The three men were John Birkett aged 50 years, Daniel Hinds aged 40 years and James Weighman aged 23 years. They astounded the rescue workers by scrambling over the falls towards them.

At first they thought they were members of the rescue teams who had worked their way round the return airway to locate and recover bodies but when they realised that they were survivors they assisted them to the shaft.

After medical assistance at the surface they were taken to the Whitehaven Infirmary by ambulance where they were found to be suffering from sever shock but were otherwise unhurt. Dr. E.H. Ablett, senior surgeon at the Hospital said that they were too weak to speak to the Press but they were saved by the experience of Birkett who was able to guide the other two to safety. After the explosion he led them with his Davy lamp and instead of making for the shaft he walked further into the pit until they came to a pocket of clean air at the end of a drift called the No. 3 Rise.

On their way they passed 36 men who refused to go with them. The trio stayed in the drift for about 18 hours when they slept fitfully but never lost conciseness.

When things became better Birkett went out with his lamp to make a tour of inspection and try to find a way out. He made several attempts to get out but the gas drove him back and eventually the gas extinguished his lamp. He persisted in his efforts and eventually thought that the air was better and decided to make a dash for safety.

Wetting their handkerchiefs with water from their bottles and pools in the roadway they covered their faces and went through the curtain of gas guided by Birkett. As they went along the Main Haulage Road they found that the air was fresh which was an indication that the rescue parties were on their way.

On their way they passed 30 to 40 dead men huddled in small groups most of them sitting in a crouching position. They saw lights in the distance and made their first contact with the rescue workers who had worked their way in through the haulage round the return air way.

The rescue workers failed to recognise the men as survivors and when they reached the squad working on the falls in the main haulage they had to explain who they were. "They weren't half surprise to see us " said Birkett.

The meeting of the rescuers and the survivors was described by Mr Rob Brannon the Secretary Treasurer of the William Pit Miner's Lodge who had worked from the start with the rescue parties.

"We were timbering up on next to the last big fall when one of my mates said, 'There's shadow down there Bob.'

I said, 'You're dreaming, it's time you were out-bye.'

He insisted that he could still see a shadow so I went to investigate and it really was a shadow coming from the lamps. I though it was the rescue men who had worked round the return airway and I shouted, "Is that Jack. Are there any bodies down there? A voice shouted back, 'Is that Bob Brannon? Thank God, there is God in Heaven.' It was Birkett who shouted. With him were Hindle and Weighman.

We comforted them as much as possible and helped them to the pithead."

Alongside the Rob Brannon the rescue party was George Mossop, Dick Glaister, his nephew, John Brannon. His brother Tom was still in the mine and he left the pit when the survivors were found saying, "' don" want to be with the party that finds Tom so I am leaving it to others to have a go.'

Rob Brannon was one well known in the Whitehaven district and as one of the oldest 'Terriers' to have served in both wars. His father had died the Christmas before from injuries received in a mining accident some years before that and his brother was killed in the William Pit eleven months before the disaster. Another brother Jack, was awarded the King's Medal for the rescue efforts in the Wellington Disaster of 1910 and the name Brannon appeared in every colliery disaster list in the Cumberland coalfield from 1823.

The men who died were-

Andrew Agnew aged 36 years, a brusher. Married with two children he lived at 17, Todhunter's Buildings, Queen Street, Whitehaven.

Thomas Allan aged 33 years a stoneworker who was married with two children of 25, Buttermere Avenue, Seafield.

Harry T. Allan aged 39 years a brusher who was married with two children of 45, Hill Top Road, Arrowthwaite.

John Allen aged 59 years a contractor married with one son of 5. Buttermere Avenue Seacliffe.

John Anderson aged 50 years married with six children of 28, Buttermere Avenue, Woodhouse.

James Atkinson aged 45 years a brusher who was married with four children of 4, Gameriggs Road, Greenbank.

Richard Atkinson aged 28 years a pipe fitter who was married of Lady Cottages, Whitehaven.

Henry Barker aged 34 years a hewer married with five children of 4, Eden Road Cleator Moor.

James. R. Barwise aged 49 years a brusher married with two children of 5, Low Harras Moor, Whitehaven.

James M. Bowes aged 34 years a coal cutter married with three children of 5, Garfield Place, Parton.

Thomas Brannon aged 57 years a chocker married with four children of 55, Haigh Avenue, Bransty, Whitehaven.

Joseph Brannon aged 45 years married with three children of 21, Greenbank Avenue, Greenbank.

Jacob E. Bridges aged 37 years a coal cutter married with three children of 85, Grasmere Avenue, Woodhouse.

Hartley Byers aged 35 years a brusher married with four children of 15 James Street, Frizington

Herbert Calvin aged 40 years a brusher of 67, Peter Street Whitehaven who was married with three children.

Joseph Campbell aged 40 years married with one child of 81, Woodhouse Road, Woodhouse.

Harold J. Carr aged 22 years a shifthead single of 9, Jane Street Frizington.

Richard Cartmell aged 25 years single of 59, Valley View Road, Greenbank.

William Clark aged 46 years a brusher married with one child of 15, The Square Parton.

James Clifford aged 26 years a brusher married with two children of 72, Frizington Road, Frizington.

Robert Conkey aged 43 years a brusher married with two children of 29, Smithfield, Egremont.

William H. Crofts aged 45 years married with four children of 111, Queen Street Whitehaven.

Samuel Delvin aged 27 years a shifthead married with two children of 9, Union Buildings, Low Road, Whitehaven

Joseph G. Diamond aged 33 years a brusher married with four children of 8. Grasmere Avenue, Woodhouse.

Thomas G. Dixon aged 55 years a brusher married with three children of 25, Yeathouse Road, Frizington.

John H. Doran aged 50 years a brusher married with eight children of 8, Low Harras Moor, Whitehaven.

Wilfred Farrer aged 34 years a pan-puller married with two children of 66, Windermere Road, Woodhouse.

William Fisher aged 39 years a brusher married with four children of 12, Gore's Buildings, Whitehaven.

Thomas Fox aged 24 years a hewer single of 29 Bowness Road, Greenbank.
Joseph Fox aged 35 years an airways repairer single of 11, Woodhouse Road, Woodhouse.
John N. Garner aged 37 years married with two children of 41, Frizington Road, Frizington.
James Gibbons aged 47 years a brusher single of 60, Seven Acres, Parton.
Henry Gibson aged 36 years shifthand married with three children of 17, Foundry Road, Parton.
Edward Galister aged 49 years a brusher married with nine children of 14, Windermere Road, Woodhouse.
Robert M. Glossen aged 39 years pan-puller married with five children of 67, Windermere Road, Woodhouse.
Richard E. Grearson aged 47 years a brusher married with six children of 173, Main Street, Parton.
William F. Grearson aged 36 years brusher married with five children of 96, Main Street, Parton.
Joseph W. Hewer aged 40 years a deputy overman married of 18a, Seven Acres, Parton.
Ronald W. Hewer aged 38 years a brusher of 110, Main Street, Parton, married with four children.
Ronald Hughes aged 20 years a shifthand single of Hospital House, Bransty.
George Hutchinson aged 44 years occupation development married with one child of 7, James Pit, Whitehaven.
William Johnson aged 27 years a trainee married with two children of 43, Trumpet Road, Cleator.
George Johnston aged 41 years a hewer married with three children of 38, Lakeland Avenue, Woodhouse.
James W. Lambert aged 35 years a brusher married with two children of 1, Plumblands Lane, Whitehaven.
Thomas Lancaster aged 27 years a brusher single of 33, Basket Road, Arrowthwaite.
William H. Lee aged 27 years married of 29, Aldby Street, Cleator Moor.
James Leeson aged 48 years a brusher single of 10, Dyke Street, Frizington.
Dennis Lyons aged 31 years a fanman single of 4, Lakeland Avenue, Seacliffe, Whitehaven.
John H. Maddison aged 22 years a hewer married with two children of 72, Fell View Avenue, Woodhouse.
Joseph B. Marshall aged 48 years a shifthand widower with two children of 70 George Street, Whitehaven.
William Martin aged 32 years a coal cutter married with two children of 3, Wellington Row, Whitehaven.
Edward McAllister aged 24 years a brusher married with two children of the Sun Inn, Parton.
Isaac McAllister aged 54 years shifthand married with eight children of 15, Bentink's Row, Back Ginns, Whitehaven.
James McMullen aged 27 years deputy married with two children of 16a, Sandhills Lane, Whitehaven.
William T. McMullen aged 22 years coal hewer married with one child of 20a, Roper Street, Whitehaven.
Vincent McSherry aged 37 years a brusher married with two children of 2, Crummock Avenue, Woodhouse.
John Milburn aged 40 years a brusher married with three children of 94, Grasmere Avenue, Woodhouse.
John E. Moore aged 37 years shifthand married with three children of 3, John Square, Peter Street, Whitehaven.

Joseph Moore aged 46 years brusher married with three children of 64, Seven Acres, Parton.

James Moore aged 63 years hewer married of 96b, George Street, Whitehaven.

John R. Mowat aged 26 years shifthead married with one child of 3, Lowther Street, Whitehaven.

Francis Murdock aged 38 years shifthead married with three children of 11, Todhunter's Buildings, Queen Street, Whitehaven.

James Murray aged 36 years a coal hewer married with four children of 22, Crummock Avenue, Woodhouse.

William Murray aged 39 a pan-puller married with three children of 5, Ladypit Terrace, Sunnyhill, Whitehaven.

Lawrence H.P. Murtagh aged 41 years, pit deputy married with three children of 73 Buttermere Avenue, Seacliffe, Whitehaven.

Patrick Murtagh aged 28 years pan-puller married with two children of Old Woodhouse, Whitehaven.

William R. Musson aged 22 years brusher married of The Rose and Thistle, West Strand, Whitehaven.

Richard Mussen aged 36 years a trainee single of 22, Brisco Crescent, Parton.

Thomas Nelson aged 36 years brusher married with three children of Summergrove Cottages, Hensington.

William Nicholson aged 33 years deputy married with one child of 1, Temple Terrace, Catherine Street, Whitehaven.

Joseph Norman aged 41 years a borer married with three children of 1, The Close Bransty.

Sydney O'Feo aged 34 years hewer married with three children of 62, Windermere Road, Woodhouse.

John A. Paragreen aged 30 years engine fitter married of 9, Bransty Row, Bransty.

William L. Pickering aged 24 years a pan-puller married with one child of 28, Haig Avenue, Bransty.

John Pilkington aged 33 years a brusher married with four children of 5, Longmire's Court, Queen Street, Whitehaven.

William Pilkington aged 66 years a brusher married with five children of 60 Windermere Road, Woodhouse.

William Pilkington aged 51 years brusher married of 21, Woodhouse Road, Greenbank.

Thomas Pilkington aged 27 years a brusher single of 60, Windermere Road Woodhouse.

George Porthouse aged 54 years a brusher married with a grown up family of 16, North Road, Bransty.

John Quirk aged 38 years brusher married with one child of 23, Victoria Road, Whitehaven.

Adam Raby aged 26 years a brusher married of 45 Fleswick Avenue, Woodhouse.

Edward A. Ray aged 31 years a shifthead married with one child of 1, Front Row, North Side, Workington.

John J. Renwick aged 39 years coal cutter married with two children of 12, Gameriggs Road, Greenbank.

Thomas Richardson aged 40 years brusher married of 150, Queen Street, Whitehaven.

James Rigg aged 28 years brusher married with one child of 12, Marlborough Street, Whitehaven.

John Robbs aged 56 years brusher married with nine children of 6, Brayton Road Bransty, Whitehaven.

Albert E. Saulters aged 40 years a hewer married with one child of 12, Meadow View, Castle Croft, Egremont.

Leonard Seward aged 36 years brusher married with two children of 7, Pasture Road, Rowrah.

Thomas Shackerley aged 40 years a pan-puller single of 75, Low Church Street, Whitehaven.

Mark J. Shaw aged 45 years shifthand married with seven children of 30, North Road, Bransty.

Henry Shilton aged 44 years brusher married of 32, Main Street, Parton.

Thomas B. Smith aged 62 years brusher married with three children of 2, Troentine's Buildings, Tangier Street, Whitehaven.

Thomas T. Smith aged 32 years a brusher married with three children of 7, South Row Kells.

Harold Smith aged 41 years a brusher married of 31 Solway Road, Marseby Parks.

Thomas Turner aged 46 years shifthand married with one child of 17, George Street, Whitehaven.

Albert Tweddle aged 31 years faceworker married of 6, Fleswick Avenue, Woodhouse.

William A. Walby aged 46 years shifthand married of The Lodge, Ewanrigg Hall, Maryport.

Ralph Walker aged 34 years shifthand married with two children of 16, Valley View Road, Greenbank.

William Williamson aged 27 years a brusher married with one child of 14, Hilton Terrace, Whitehaven.

George H. Wilson aged 29 years brusher married with one child of Douglas Burn, market Place, Whitehaven.

Matthew Wilson aged 46 years deputy single of 27, South Row, Kells.

Joseph Wilson aged 38 years married with two children of 72, Valley View Road, Greenbank.

Thomas Woodend aged 64 years shifthand married of 11, South View Road, Bransty.

Walter Wylie aged 26 years a brusher married with two children of 36, Fell View Avenue, Woodhouse.

Professor A.M. Bryan, H.M. Chief Inspector of Mines, conducted the public inquiry into the disaster which opened on Tuesday 7th. October, 1947 in the Methodist Schoolroom, Scotch Street, Whitehaven.

The Health and Safety Department was represented by Mr. J.R. Edwards, H.M. Divisional Inspector of Mines, Safety, Research and Testing Branch by Mr. H.F. Coward, the National Coal Board by Mr. S.H. Sandlands K.C., the National Union of Mineworkers by Mr. A. Moffat, the National Association of Colliery Managers by Mr. R.W. Anderson and the Deputies Association by Mr. B. Walsh.

Before opening the inquiry Mr. Bryan paid tribute to the 104 men who had lost their lives and a vote of sympathy with the relatives was passed by all standing on silence. It was noted that none of the widows were present on that first day but the hall was filled with men from local pits.

Mr. R.W. Gallantry presented detailed plans of the pit to the court to help the members of the inquiry decided the cause of the explosion as with many inquiries into pit disasters, the first evidence that is given to the court came from the survivors of the explosion and from these is gleaned a first hand account of the events underground. The first survivor to give his evidence was Stephen Ferguson a 28 year old deputy. He had held the post for about 18 months and before that he had been a haulage worker and a shot-firer. He was in the Bannock District when the explosion struck shortly before 5.30 pm.. His first thought was one of 'the impression of a spurt of compressed air". He went to an underground telephone and a voice told him that there was something wrong in-by. The district was not too big for efficient supervision and he made regular tests for gas. Of the six men that were working with him on that shift two had been killed, Thomas Fox and Joseph B. Marshall.

Fred O. Smith, a brusher, was also underground at the time and had been sent out-by to get some oil and grease. He had telephoned John Maddison to tell him he could not get any oil and during the call the air seemed to stop and then come rushing back and it seemed to him that fog had come down.

The air resumed its normal course and he saw George Galister coming towards him and tell him that the phones seemed to be dead. Both Fred Smith and Stephen Ferguson went in-by to help with the rescue operations.

Joseph McAleavey, a shifthead, was working in the main haulage road when a blast of wind blew him about 10 yards towards the shaft. He was working with Thomas Kervin and Henry Allen who was injured. Allen was helped towards the shaft by Joseph and Mr. McAllister.

Thomas Kervin, who was also a brusher, was in a manhole at the time of the explosion and he lost consciousness. When he came to he had lost his helmet and his teeth. He was half in and half out of the manhole and did not know where he was. He thought that an air pipe had burst.

William McAllister, the manager of the colliery, was the next to give evidence. He had been manager for ten months at the pit and lost an uncle and a cousin in the disaster. He left the pit just before 5.40 pm to go home and when he arrived his wife told him to go back to the pit as something had happened. He went down the pit where the on-setter told him that an air pipe had burst but he sensed that there had been an explosion and he gave instructions for N.C.B. officials, miner's representatives, ambulance workers, rescue workers and others to be sent for immediately as he went further into the pit he met other men and he took them with him. On the way he saw tubs lying all over the place. Girders were down and the roof was leaking badly and a few yards past the No.2 crossing the roof was leaking and the road way was completely blocked by a fall. He was joined by Mr. Dawson and Mr. Macpherson as they worked the best plan of operation. Mr. McAllister went to the surface between one and two o'clock on Saturday morning and went home but he could not sleep and he was back at the pit the next day where he took his turn underground and then on the surface.

The manger was viably moved as he recalled his experiences in evidence and he was allowed to stand down but was warned that he would be required later to give technical evidence an outline of the cause of death of the men was given by Dr. A. Roberts of the N.C.B. who said that the majority of the victims had died from carbon monoxide poisoning, some from gassing and burns and a few from the effects of violence of the explosion a stir of excitement ran through the court room as John E. Birkett, the leader of the three survivors was called to give evidence. Without emotion, he told how he joined up with Daniel Hindle and John J. Weighman to seek safety in-by, waited and lead them out of the pit. At one time he thought that they were not going to get out but the other two helped him along.

His evidence was supplemented by Hindle and Weighman and all three were complimented by Mr. Bryan on their good mining sense and he congratulated them on their escape.

William A. Ashbridge was the overman in charge of the underground workings the night before the explosion. He carried out the routine inspection and found nothing out of the ordinary but he had a report from a deputy named Aitken of 1.5 per cent firedamp. There was a report of 2 per cent firedamp gas in Allen's Drift. The witness was closely questioned by Mr. Edwards and Mr. Moffat about the gas in Allan's drift. Mr. Edwards asked, "Did you go into the place?"

"No".

"Have you had previous reports of gas in the place?"

"Yes".

"When were you last in the No. 2 dip before the explosion?"

"On Wednesday night. Everything was normal then."

Mr Moffat asked, "Did you find the ventilation satisfactory?"

"Well, there were resorts of gas in Allen's Drift".

"If deputies had submitted reports of gas, what would you have done?"

"I would have asked them what they had done to clear it."

"On that night did you do anything personally?"

"Not on that night".

"When did you last test for gas in the No.2 dip?"

"Sunday night".

"Did you find any gas?"

"Just in Allen's Drift".

"Are you satisfied with the return airway from the No.2 drift?"

"It was in fairly good condition. Men were working there".

"How long have you seen holes bored from the face?"

"Quite a long time".

"Months?"

"Yes".

"Years?"

"Maybe".

"Have you studied the regulations for 1946?"

"I've read them but not studied them".

Mr. Walsh took up the questioning and asked, "Is it a practice to have conferences with your deputies?"

"I won't say every night".

"Do you have confidence in your deputies?"

"Yes".

"You made periodical tests for gas?"

"Yes".

Mr. Sandlands then questioned about the mine being stone dusted and the witness answered that the dusting was adequate.

Gas was alleged to have been found the night before the explosion by Thomas A. Aitken, a deputy in charge of No.3 and No.2 dip districts. The gas collected because there was brattice down and it was cleared by putting up the brattice that was down.

Mr. Edwards asked if the places were stone dusted before firing shots and Aitken said that he satisfied himself before they were fired. He admitted to Mr. Moffat that he fired about forty shots on the production shift but he would not commit himself on how long it took to prepare each shot. Mr Moffat asked, "Did you find it difficult to carry out all the regulations and fire 40 shots a day?"

"Yes. I have reported it to the overman".

Mr. Walsh then asked him, "Regarding these 40 shots per shift. Can you do your other jobs satisfactorily?"

"No".

"Why did you not ask for assistance?"

"I can not say".

He had complained that he had too much work and had been given a shot-firer.

On the morning of the explosion the senior overman, Thomas E. Nicholson, said that he had visited all the areas of the pit except Allen's Drift. He did not carry a lamp that day or make any tests for gas. Mr. Edwards asked if that was unusual and the witness replied that he did not have any reports of gas except in Allen's Drift and he did not go there. Mr. Edwards continued that he appeared to be more concerned with "getting the wheels going" and the witness said that was his job

Mr. Moffat asked if he had examined the whole area for gas and he replied that he had not even though this would have been advisable. Mr. Sandlands established by questioning that the overmen were responsible for safety and the officials were to test

the dust and measure the ventilation. The witness agreed that he should carry a lamp at all times in the mine and he never asked about the reports.

The course of the inquiry then turned to the questions of shot-firing in the mine and the methods of boring and the witnesses were asked if there was any connection between a change in the boring methods and the introduction of a five day week.

Norman Allen acting deputy on the night before the explosion said that Allen's Drift was clear of gas when he tested and there was no one working there that night because there had been a break in the roof and gas had been found. The witness said that the week before the holidays a bore hole had been made in Allen's Drift and a blower had been opened and no more work had been done in the drift until the blower had stopped.

Wilfred Kirk who was formerly the training officer at Lowca No. 10 Colliery, said that he had been an overman at the William Pit for two years and on the day of the explosion he was in charge of the No. 2 Deep right and left faces. He said that on that day 70 to 80 shots had been fired in the No.2 face by the deputy and the shot-firer. Some of these shots were fired from the face into the waste.

He thought that the ventilation was good but he did not check up on the written reports and he was surprised to learn later, that there was a considerable amount of gas in the return air from the No.2 at six o'clock on the morning of the explosion. Wilfred Kirk had not seen holes bored from the coal into the waste nor had he seen holes like this fired and he had given instructions against this type of boring in the previous January or February.

In answer to questions from Mr. Walsh the witness said that there had been reports about excessive coal dust on the No 2 Dip but a wet cutting was introduced on that face which was a success.

Wilfred Kirk agreed with Mr. Sandlands that when the five day week came into force a new method of boring evolved and the question of shot firing again was out before the court when the next witness, Wilson Graham, a 42 year old deputy who was in charge of the No 2 Dip the previous evening stated that at time 42 shots were fired. In reply to a question from Mr. Moffat he said that he had tested for gas about 150 times that day but he could not give a definite answer as to how many times he had reported the presence off gas. Mr Moffat went on to question the witness closely about the practice of shot firing on the mine and he told the court that he was trying to prove lack of supervision of firing shots.

Thomas Harrison, a shotfirer, said hat he bored from the face as he thought it was dangerous to bore from the waste. He said that he had had no instructions on the procedure and the majority of the holes bored in the No.2 were bored in this way.

William H. Armstrong a borer said that if he was working from a 'good' waste he bored there but in the case of a 'bad' waste he bored from the face. He bored holes from the face before the five day week came in. He told the court that a year ago they were using proper dummy gates and were then told to bore from the waste into the face.

Mr. Noel B.M. Platt superintendent of the testing office for the Ministry of Fuel and Power said he had examined the electric cap lamps and flame safety lamps from the pit. One of the lamps had a glass pierced but he could not say if this was damaged in the explosion. The state of the undamaged lamps showed good maintenance by the lamp room staff.

The next witness was Mr. George D. Nussey, H.M. Inspector of Mines for Cumberland, Westmoreland and North Lancashire and he was asked if he had an opinion on where the explosion originated.

He said he concluded that the explosion resulted from blasting of No 3 shot hole on the right of the face of No.2 Dip long wall. The men on the No.2 Dip longwall died from carbon monoxide poisoning with the exception of Murray who died from the effects of a fall. Murtagh, the deputy, was almost uninjured and Brannon the chock drawer had

lacerations and a fractured skull but he had died from the carbon monoxide gas. From the position of the bodies, Mr. Nussey considered that the work was carrying on as normal along the face. No.3 shot hole had been blasted just before the explosion because the shot firing gear was found leading to it.

He thought that Murtagh was ready to fire No.3 shot hole and ordered Brannon to prevent people approaching. He had then fired a shot which lighted the gas in a roof cavity and this initiated the explosion. Mr W.T. Badger of the Mines Inspectorate, agreed with the evidence. There was evidence from Mr. Davey of the Mines Inspectorate that the stone dusting was exceptionally good. It was possible that the shot had ignited some gas in the cavity and this had burned for some considerable time before the explosion.

The manager, Mr. William McAllister, was closely questioned on the safety precautions adopted at the pit especially as to the ventilation and the spreading of stone dust which was used to control the coal dust. The manager thought that the ventilation equipment was not as efficient as it should be and that it should be replaced with new equipment.

During his questioning it became very clear that he would not let the demands for increased production to interfere with his plans to increase safety and of the 800 to 900 men employed in the mine only 25 per cent were engaged in coal production. Mr J.R. Edwards the Divisional Inspector of Mines wished it to be put on record that McAllister had given every possible assistance to himself and his staff in the investigation.

The manager was very closely questioned about a stemmer used at a shot hole that the experts thought was the cause of the explosion. He stated emphatically that if he heard of a deputy of a borer using a stemmer without a scraper he would have dealt very firmly with him. Mr McAllister was questioned for almost an hour and Mr Moffat turned to the Commissioner and said, "I want to express my satisfaction with every straightforward way in which Mr. McAllister has answered the questions. I have never met a more straightforward colliery manager". This prompted a spontaneous burst of applause and the tribute was endorsed by other officials.

The experiment of using the dogs to locate bodies trapped under falls was commented on by Mr. Ivor G.E. Leak who was the Rescue Testing Officer for the Yorkshire Area who said that the National Coal Board had agreed to have dogs trained for this type of work.

Mr Daniel McPherson the agent for the William Pit and four other pits in West Cumberland said that he had sent much time at the William Pit since he was appointed last March and he was not satisfied with the ventilation at the colliery. There were plans in hand to improve it and to enlarge the main and subsidiary air ways.

Joseph Garside Helps was appointed the Mining Agent for the United Steel Company at Workington in 1943 and in January 1946 was appointed general manager for Cumberland under the N.C.B. told the court that he had every confidence in the manager and they had had discussions and decided that even though there was a very great pressure to produce coal for the country they would concentrate on development work. This was a disposition with which the Divisional Headquarters agreed and there had never been any sacrifice for safety for the sake of getting extra coal.

The inquiry was coming to an end and the forty sixth witness was called. Mr George Price was a consulting mining engineer from Sheffield and he agreed with the evidence that had been given by Mr Nussey. He expressed the opinion that had a stemmer been used by the deputy who fired the fatal shot been fitted with a scraper, the break in the shot hole might have been discovered and the accident averted but he did not think that the direction of the boring made any difference. Ventilation did not have any bearing on the explosion since the pint where the explosive gasses were ignited was out of contact with the air on the coal face.

Mr. Edwards the commissioner summed up. He said that inquiry was to determine the cause of the explosion and the question of contraband could be entirely ruled out as could defects in any electrical system. The question of the compressed air lines was considered and while this had no bearing on the explosion it was pointed out that patched air lines were dangerous. After considering all possible causes the experts agreed that the explosions was due to the igniting of gas in a break in the No.3 shot-hole. He submitted that every possible step had been taken to eliminate shot firing as far as possible and with regard to the ventilation he submitted that there had been breaches of the Coal Mines regulation Act and he strongly advised the appointment of a qualified ventilation engineer.

Mr Moffat said, "Nothing we can do or say can bring the one hundred and four men back to life but we do hope that what we have learned will help to prevent other accidents". The inquiry found that there was no blame from the evidence to fix the blame on any one person or system a vote of thanks was proposed to Mr Bryan and he hoped that the improvements which had been indicated for the safe working of the William Pit would be effected without waiting for the report, Any lessons learned at the inquiry should immediately be applied.

The Coroner sat with a jury of whom Mr. L. Gillitt was elected foreman and Mr. Nussey confirmed the evidence that was given to the inquiry and after hearing the evidence the Coroner addressed the jury and said-

"The whole picture is one that does show some lack of care, and the price paid was a terrible one. Perhaps, from it, some useful lesson had been learned, namely that pit discipline, by which I mean self-discipline, is the greatest safeguard against mining accidents".

Mr D.J. Mason Coroner for West Cumberland in summing up said, "In my long experience of mining tragedies I find that familiarity does breed contempt that the men who work underground do take risks. They must, however, realise that the lives of other men depend upon each individual doing his job thoroughly and well."

The jury on the direction of the Coroner returned a verdict of 'Accidental Death' which was duly recorded.

LOUISA. Stanley, Durham. 22nd. August, 1947.

The Louisa Colliery, including Morrison Old was formerly in the South Moor group of collieries belonging to Holmside and South Moor Collieries Limited and had been transferred to the 'C' Group of No.6 Area of the Northern Division of the National Coal Board at the time of nationalisation. It was at South Moor, near Stanley in North West Durham and worked the middle series of the Durham seams, the Maudlin, Low Main and Hutton in an area bounded on the west by the outcrop of these seams in the Lanchester district. The upper seams in the same royalty, the Shield Row, Five Quarter and Main Coal were worked from Hedley Colliery and both mines had a common shaft which was an upcast, called the Charley Fan Shaft where and electrically driven Sirocco fan produced 175,000 cubic feet of air per minute at two and a half inches water gauge. The lower seam in the district were the Townley, Busty and Brockwell which were worked from Morrison Old Colliery which was a separate mine with its own upcast and downcast shafts.

The Louisa Colliery was served by three shafts, the Louisa, the William and The Morrison North. The colliery employed 1,480 people underground and 350 on the surface with an average daily output of 1,450 tons. All the output was wound at the Louisa shaft except a small amount of overflow coal at the Morrison North shaft.

Many changes in the main officials had been brought about following public ownership of the mines on the 1st. January and on the 22nd. August, the day of the explosion, Mr William Welsh was the No.6 Area General Manager, Mr. G.H.

Braithwaite, Agent, 'C' Group, Mr. J.F. Meek, the manager of the Louisa Colliery with Mr. R. Peel, undermanager of Louisa and William Sections of the Louisa Colliery and Mr. R. Simpson the undermanager of the Morrison North Section of the Louisa Colliery. A third undermanager, Mr. E.W. Marshall who was normally in charge of the William Section and had been temporarily withdrawn to act as the manager of another mine in the group. He had acted as manager during July 1947 before which Mr. J. E. Bragan had managed the mine for four years and Mr Meek had been left in charge from 1st. August only.

Mr. William Welsh was formerly the chief mining engineer for the South Moor group. He was trained at the colliery and had been the manager of the Louisa Colliery for some years and he had a intimate and detailed knowledge of the underground workings and conditions. Mr. Braithwaite was appointed Agent on 1st. March and Messrs. Marshall, Peel and Simpson had been employed in the South Moor group for some years.

Each section of the colliery had it's own compliment of overmen covering the period from 3 a.m. to 11. 30 p.m. daily and the uncovered period if the night shift was under the sole charge of a master-shifter who worked from 10 p.m. to 6 a.m. On the Friday night in question, the fore-shift overman of the Louisa section, John Hutchinson started his Saturday shift in accordance with the established routine. He also took an important part in the rescue operations which will be described later.

In the Low Main and Hutton seams open lights were used until 1941 apart from certain districts inbye where safety lamps were used. In 1941, following a suggestion by the Divisional Inspector who had draw attention to the fact that workmen were hiding matches and other contraband on the main intake haulage road which serving one of the safety lamp sections. He pointed out that a serious fire in the Low Main Seam in 1929 had been caused by an acetylene lamp and the Chief Mining Engineer, William Walsh, decided to install safety lamps throughout the Louisa Old and William sections excluding the Morrison North section of shallow work under wet conditions approaching the outcrop. The full implications of safety lamps were accepted in these two areas in respect to searching persons and the application of the Explosives in Coal Mines Order, and the use of certified flame proof electrical apparatus and firedamp detectors. The 4th. North Morrison District, which was within half a mile of the Morrison North shaft and over one and a half miles from the Louisa shaft was formerly an open light area of Morrison North but in order to meet the workmen's claim that this district should be included in the Louisa Workmen's Lodge, it was placed under the jurisdiction of the Louisa undermanager and worked with safety lamps.

The Hutton Seam at the colliery was on average, two and a half feet thick with a strong shale roof and a seggar floor and gave a high quality gas coal. It had been worked extensively and there was little to extract. The 4th. North District was a small area of the seam that had been affected by the fire of 1929 in the Low Main seam which was 30 feet above. It had been necessary to seal of a pillared area of about 100 acres in this upper seam. During 1944 the fire was encountered and new seals erected near the focus of the old fire. This made the working of the Hutton seam available and the lower seams under the area to be worked from the Morrison Busty Colliery. There was no record of inflammable gas being found in the seam prior to the explosion.

In the Fourth North District the depth the seam was about 450 feet and it dipped slightly 1 in 29 to the south east. The small piece of solid coal that was to be worked was bounded on all four sides either by goaf of bord and pillar workings. The area was then entered by its north end by means of a 1 in 6 stone drift driven due east from the 4th. North Low Main Haulage Road and continued in the seam skirting the whole of the workings n the north side. From the east heading another heading was driven south through the heart of the area and longwall faces were won to the east and west.

By August, 1947, four conveyor faces had been worked to the west to a barrier line fixed to protect the 4th. North Low Main Haulage Road. Two conveyor faces and been

worked up to and connected with the Old Wembley gateway face and two other faces, the Straight East and the 2nd. East were being worked to the east. The Straight East face was the first conveyor face to be started in the district but it had to be stopped in September 1946 because of very wet conditions. It was not restated until July 1947 by which time it had become dry. To the south of the 2nd. East face there were two tub gateway faces working narrow strips of coal between the 2nd. East face and the barrier being left to support the Low Main Cross-cut Haulage Road to the Louisa shaft.

All the coal in the district was hewed with air picks and shots had never been fired in the coal. Top rippings were got down by shots in all the roadways and the roof on the conveyor or faces caved regularly between the gateside packs. All the conveyor machinery and a small haulier on the South Heading were electrically driven, but one small pump in the East Motor bord old right face was driven by compressed air. The two face conveyors were of the chain type. The Straight East conveyor delivered to a chain conveyor in the gate and the 2nd. East conveyor to a belt chain conveyor delivered to tubs on the South Heading. The tubs were hauled from both loading points by rope haulage. Chain conveyors had also been employed in Nos. 3, 4 and 5 old West bords.

The ventilation of the district was supplied from a split from the 4th. North Low Main Haulage Road leading from Morrison North shaft and since it was close to the upcast shaft, the quantity of air passing was heavily regulated. At the Wembley connection there was a fixed cloth across a wooden door which had been damaged by the roof weighting and on the North Heading return airway off the Straight East gate there was the usual type of wooded regulator door. The quantity of air recorded on 18th. August which entered the district was 9,040 cubic feet per minute. The air was coursed by means of canvas cloths into the South Heading up to No.2 West bord and the around the district. Roughly half the quantity was allowed to pass into the return as the Wembley connection and the remainder which was measured at 4,135 cubic feet, ventilated the Straight East face and gate on it's way out to the North Heading return airway. No measurement had been taken at or near a point in the airway 10 yards on the intake side of the first working place as was required by the No.6 (c) Coal Mines (Ventilation) General Regulations, 1947 but the quantity entering this return airway was recorded as 4,820 cubic feet on 18th August which indicated little leakage through the heavy canvas cloth across the short length of the Straight East gate between the district main intake and the return airway and the inquiry thought that the ventilation of the district under normal conditions was adequate.

The district was worked in a succession of shifts which commenced at 3 a.m. on Monday and ended on 6.30 a.m. on Saturday in each week. Four shifts of men and three shifts of deputies, one on each shift in rotation covered this period. The fore shift, 3. a.m. to 10. 30 a.m. with the fore shift deputies working 2 a.m. to 10 . 30 a.m., the back shift 9.30 a.m. to 5 p.m. and the deputies 10 a.m. to. 6 30 p.m., the third shift 4 p.m. to 11.30 p.m. and the night shift 10 p.m. to 5. 30. a.m. and 11 p.m. to 6. 30 a.m. with the night shift deputies 6. p.m. to 2.30 a.m. The arrangement for work in the district was rather complicated. Coal was produced on all shifts except the night shift. In the Straight East face, 40 yards long, six hewers completed a daily advance at the face of about 4 and a half feet in one shift, which changed on a weekly rotation. On the 2nd. East face, 60 yards long, hewers were employed on the other two of the three coaling shifts. Conveyor movers and the conveyor gate caunchmen came in on the shift immediately following the coal loading shifts, which meant they were worked and of the four shifts in different weeks. On the night shift the gateway caunchmen, back caunchmen and the gate conveyor extended and men cleaning up spillage and stone dusting were employed while two stone drillers were usually employed between 7 p.m. and 12 midnight. Since the introduction of the 5-day week some of the men normally employed on the Friday for or back shifts were able to be brought in at 11 p.m. the same night.

On Monday of each week the for-shift deputy made a pre-shift inspection after which work was continuous for the week and each of the three deputies made two during-shift inspections and entered a report on each during his shift. The overlap of the three shifts was sufficient to enable them to relieve each other at the meeting station in the district. On Friday evening of each week, the deputies came on shift earlier and on the day of the explosion, Friday 22nd, August, the back shift deputy was J.W. Maughan from 10 a.m. to 6. 30 p.m. and the night shift deputy was T. Hebden from 4 p.m. to 11.30 p.m. This deputy, however, reached the surface of the Morrison North shaft at 11.20 p.m. where he met the fore shift deputy John Estell, who should have descended at 11.20 p.m.. Before he left the district Hebden arranged provisionally with a deputy in charge of another district to take charge if Estell eventually failed to turn up.

All the third shift had left at about the same time as Hebden and the persons on the shift in the district about 11.55 p.m. when the explosion occurred were, two stone drillers, Johnson and Kilgallon, who had descended the Louisa shaft and were admitted to the district by Hebden at 7 p.m. The men who had descended the Morrison North shaft at 10 p.m. and were admitted to the district by Hebden at 10.20 p.m. were, three conveyor movers, Bell, Chapman and Fenwick who had gone to advance the 2nd. East face conveyor, two stonemen, Appleby and Rowland who were going to take out a low girder on the South Heading outbye of the 2nd. East loading point and two other stonemen, Simpson and Brown who were going to continue a caunch along the West face line towards the inbye tailgate.

The men who descended at 11 p.m. and had reached their working places after Hebden had left, probably before Estell had arrived at the kist were two stonemen, Bailey and Talbot who were going to renew the 'Warwick' girder near the outbye end of the Straight Loader gate. Two stonemen, Monto and Wesgarth who were to complete the re-aligning of the Straight East gate conveyor and to clean up. Three datal hands, Reed, Moore and Bell who were to clean up on 2nd. East Loading gate, three datal hands McKeever, Roe and Martin, to repair the rail track on the South Heading outbye and the 2nd. East loading point and four stonemen, Hodgson, Grimley and Rutherford and Birtle who were going to the caunch in the 2nd. East loading gate and the 2nd East tailgate, and the inbye tub gateways. The deputy Estell, who had reached the kist at the meeting station within a few minutes of the occurrence.

Four of the fourteen men who came on shift at 11 p.m. had already worked on the fore shift, and four others on the back shift of the same day. There were thus eight additional persons to the normal night shift on shift at that time. Each of these men carried an Edison 'J' electric cap lamp but none carried a flame lamp gas detector as was required by the rules of the colliery. Hebden stated that he reported the fact to Estell at the surface but apparently Estell took no action in the matter and his flame lamp was the only gas detector in the district at the time of the disaster.

On the fore shift on 22nd, August the for overman, John Hutchinson, had inspected the whole of the district including the West face line and had found the ventilation very satisfactory and free from firedamp. Maughan found no firedamp during the back shift nor did Hebden on the third shift and the overman, T. Amos, tested at the ripping face lip at the Straight East gate and found them clear as late as 10 p.m. two hours before the explosion. Two drillers had left the East faces about 15 minutes before and they stated that conditions were normal at that time.

The explosion occurred at 11.55 p.m. during the first and second hours of the fourth or night shift on Friday 22nd, August 1947. All twenty four men who were working in the district were involved, nineteen were found dead, and of the five that were recovered alive two subsequently died. None of the other 192 that were in the mine were affected.

The first persons to raise the alarm and to reach the scene of the disaster were a party of three deputies, W. Younger, J. Shanley and Henry Robinson, all of who were

trained rescue men and who were regularly employed in the area near by where there had been a fire. The party usually carried a canary and flame detectors lamps and they had with them a reviving apparatus for use in any emergency. They had examined the fire stoppings alongside the 4th. North Low Main Road on their way inbye from Morrison North shaft and had just reached their station in the fire area which was about 250 yards to the south and beyond the off takes of the 4th. North District when they felt a momentary cessation of the intake air followed immediately by a rush of dust laden air coming from the direction of the Morrison North shaft. This occurred at 11.15 p.m. according to Young's watch.

They fully realised what this meant and they picked up the canary and their flame lamps and ran to the north to the Morrison North shaft which was the seat of the trouble, as they thought. They soon found that the problem was in the 4th. North District. Shanley then returned to the 4th. Bankhead and telephoned the surface while Younger and Robinson entered the 4th. North District taking the canary with them. They went to the Straight East gate, through the heavy canvas cloth which they found intact when they saw a light and heard moaning sounds ahead. Thirty yards further up they found Minto alive but unconscious and Bailey and Talbot apparently dead.

Robinson went back to the 4th. North oftakes to telephone for urgent help and to get a stretcher for Minto with whom Younger and stayed with him. It was then 12.20 a.m. according to Younger who then discovered Bailey alive so he went to meet Robinson who was returning with a stretcher and sent him to get reviving apparatus from the fire area. Robinson soon returned with Shanley and the fore-overman John Hutchinson, who had gone down the Morrison North shaft at midnight and had been informed of Shanley's telephone message. Younger and Shanley then recovered the three men in the Straight East gate while Hutchinson and Robinson attempted to explore the South Heading, but the air this time, was too hot and thick with fumes to enable them to go very far. Later on, and without effecting any repairs to canvas cloths, these four men were alive to get along the Heading as far as the 2nd. East loading point and up to the East loading gate as far as the face line. The cloths across the Old East gate had been disarranged and the one across the 2nd. East gate had been destroyed. They came across the two drillers, Johnson and Kilgallon who were alive but unconscious at the deputies' kist and they brought them back into fresh air.

By the time the first rescue tea, had arrived in the district, at about 1.30 a.m. These men had also recovered deputy Estell still alive at the kist and had brought out five dead bodies from the South Heading and they had located four bodies in the 2nd. East loading gate. An attempt was also made to get to the loading pint on the Straight East gate, where they could see signs of fire, but the fumes were too heavy for the, to make any progress. They were not, at that time, aware that were any men on the West side but the canvas screen across the South heading to divert the current into the No.1 West bord had been destroyed and this side was consequently fouled by afterdamp.

About this time the undermanager, Mr. Peel, arrived at the scene and took charge of the operations. The rescue teams quickly located the remaining bodies on the South heading beyond the 2nd. East loading point and on the 2nd. East gate beyond the face line and on the West side. Other rescue teams entered the Straight East gate where they found Westgarth with his clothing on fire. Other clothing that was there and a wood chock carrying the gearhead, were smouldering. They put out the fires with sand and brought the body out. The fumes in the gate quickly disappeared. They found no falls that were seriously impeding the ventilation which was quickly restored by re-erecting the cloths across the South Heading and the 2nd. East loading gate and renewing those in the old East gates. The remaining bodies wee recovered without the use of rescue apparatus.

Those killed-

Harold Talbot aged 34 years, stoneman.

Alfred Bailey aged 49 years, stoneman.
Edmund Westgate aged 39 years, stoneman.
John Estell aged 38 years, deputy.
Thomas McKeever aged 46 years, datal hand.
Walter Roe aged 18 years, datal hand.
Francis Eric Martin aged 21 years, datal hand.
Thomas W. Appleby aged 45 years, stoneman.
John Rowland aged 54 years, stoneman.
Gerald Moore aged 21 years, datal hand.
William Reed aged 37 years, datal hand.
Thomas Bell (1). aged 28 years, datal hand.
Joseph S. Hodgson aged 28 years, stoneman.
Thomas Bell aged 49 years, conveyor mover.
Norman Fenwick aged 32 years, conveyor mover.
Joseph Chapman aged 37 years, conveyor mover.
Colin Simpson aged 39 years, stoneman.
Reginald L. Brown aged 32 years, stoneman.
John Grimley aged 41 years, stoneman.
William Rutherford aged 32 years, stoneman .
Robert Birtle aged 27 years, stoneman.

The injured-

Clement Minto aged 42 years, stoneman,
William H. Johnson aged 40 years, driller and
James Killgallon aged 40 years, driller.

Gerry Moore and Eric Martin were two Bevin Boys, conscripted by arbitrary lot to work in the mines between 1943 and 1945 to help the mines continue working through the dark days of the Second World War and immediately afterwards. They were the only two Bevin Boys that lost their lives while working in the pits though many others were injured in the collieries throughout the country.

The inquiry into the causes and circumstances attending the explosion which occurred at Louisa (including Morrison Old) Colliery, Durham on 22nd, August 1947, was conducted by R. Yates, D.S.O., M.C., H.M. Deputy Chief Inspector of Mines and presented to The Right Honourable Hugh Gaitskell, C.B.E., M.P., Minister of Fuel and Power on 21st. February 1948.

The exploration of the district was possible within a few hours of the disaster at which time the undermanager found a small quantity of firedamp in a roof cavity at a 3 foot fault at the roadhead of No.4 West Bord, about a foot from the roof but which was not detectable in the general body of the air. This had dispersed the following day. It became evident that coal dust had played a major part in the explosion and in view of the amount of coking and the previous history of the seam at the colliery it was first thought that it had been an explosion solely of coal dust and that firedamp had not entered into it at all. The investigation showed that there was no evidence of any pre-formed cloud of coal dust had been created at the onset or that there had been any igniting medium of sufficient intensity to initiate a coal dust explosion. The explosion generated very little violence. The Inspector said-

"It is, I think, reasonable to deduce from this evidence that a mild firedamp explosion in which coal dust played no part at first had traversed the east face line between the Straight East loading gate and the 2nd. East loading gate and had extended outbye along the gates and the intermediate East Motor bord, so as to open up several separate coal dust explosions, one in each of the gates."

As to the presence of firedamp, Mr. Yates commented-

"in the absence of any other feasible explanation for the source and presence of this inflammable mixture on the East side, that the firedamp came from the lower workings and that the locus of the emission was on that part of the East face line immediately on the return side of the Wembley connection where the area would be above the most intensive abutment pressure zone in the Towneley Seam. The evidence of increased violence at this place indicates a richer inflammable mixture there."

After the explosion there was a thorough search for contraband was made by two Inspectors of Mines, accompanied by the Manager and Undermanager and representatives of the workmen. Cigarettes, matches and one pocket lighter were found, some in the pockets and clothing belonging to the victims. There was also some in tins hidden near the working places, 26 spent matches and three cigarette ends were found beneath and behind the deputies kist and other contraband was found lying exposed on the floor or near the delivery end of the Straight East gate conveyor. The condition of the contraband did not indicate that there had been smoking on the night of the explosion. Those found at the end of the Straight East gate was significant. The contraband consisted of two whole but badly damaged cigarettes in an open and damaged cigarette case and a spent match. All were lying close together in the full tub track near the loading point. A short distance away there was a whole cigarette which had not been lighted but had one end slightly damaged as if it had been placed in the mouth ready for lighting. This seemed to indicate that a match was struck at this point just before the explosion. The inspector came to the following conclusion-

"That during the night shift of Friday 22nd. August 1947, there was an emission of firedamp from the strata below the Hutton Seam which created an inflammable mixture of firedamp and air on the East face line and the Straight East gate that shortly before midnight a lucifer match struck about the loading point on the Straight East gate for the purpose of lighting a cigarette ignited this mixture and initiated a very mild firedamp explosion, which developed additional force as it progressed and which was propagated by coal dust along the mechanised roadways, both exiting and disused, throughout the district and that the explosion was finally extinguished by stonedust on the South Heading and the Main Drift."

The inquiry made the final observations and recommendations following the explosion-

"1). The disquieting feature of this exploit was the ready propagation of the flame by the coal dust along the roadways on which conveyors had either been used or were in use, and there seems little doubt from the evidence left by the explosion that after having been initiated by firedamp it received its main 'kick-off' by coal dust explosion about the loading point on the 2nd, East gate.

2). The danger of coal dust on disused roadways was demonstrated by this explosion and I would stress the necessity for adequate treatment of such roads so long as they remain accessible, as required by the Coal Dust Regulations, and that when these roads become untravellable they should either be sealed off or otherwise protected by a substantial barrage of stone dust at each end.

3). In view of the increased hazard of coal dust brought about by mechanised mining, I further recommend that on respect of No.10 of the Coal Dust Regulations the Modification order of 1939 made under the Defence Regulations, 1939 be revoked to allow the minimum percentage of incombustible matter laid down by the Schedule to Regulation 3 to have full application in the cases of coals having a volatile matter content exceeding 27 per cent.

4). The igniting cause of the explosion can, in the last analysis, be attributed to 'mixed light', conditions and I recommend that unless the different sections of workmen are completely segregated from the surface in by the use of open lights

should be prohibited in any mine where safety lamps have been introduced into any part (other than as a temporary precaution)

5). The potential danger of an emission of firedamp from the intervening strata due to concurrent working of the lower seam or seams needs to be emphasised and a careful watch should be kept for such a contingency, especially in that part of the workings overlying the abutment area of coal ribs in the lower working, to enable suitable precautions to be taken in time.

6). I consider it expedient that the searching of persons for contraband should be made compulsory in all mines or parts of mines in which safety lamps are used, whether or not they are required by the Coal Mines Act, 1911.

7). Lastly, the question of inculcating a safety lamp outlook amongst the miners of the North West and Mid Durham in particular remains to be tackled. Many of these men have at some time or other worked under open light conditions, and following a change of mine or the latter adoption of safety lamps at mines previously on open lights, they find it difficult to give up old and ingrained habits of smoking while at work hence their apparent indifference to, and disregard of, the rules prohibiting the taking of contraband underground.

It is a sad reflection on Durham that four explosions of firedamp, each involving loss of life, which have occurred in the county during the past eighteen months have been due to contraband and in the case of the fifth explosion in 1944 probably due to the sparking of coal face switchgear, contraband was found on the body of the victim.

I am well aware that this question of contraband had exercised the minds of the representatives of the workmen for some time, but I suggest they should intensify their efforts to overcome the apathy of many of their members to the menace to the safety of Durham mines."

The inspector concluded his report thus-

"It is fitting to conclude this Report with a reference to the excellent work done by the three deputies, Younger, Shanley and Robinson and Overman Hutchinson immediately after the explosion. These men were called upon to take what, in the circumstances, might be described as a judicious risk of further explosion, and they acted with commendable promptitude and courage, and displayed great resourcefulness and circumspection. At no time were they tempted to do anything foolhardy, and it is to their great credit that not only did they discover and bring out to fresh air five badly injured men and ensure prompt first-aid attention to them but they also satisfied themselves at an early stage that there were no persons remaining alive in the district. High tributes to their conduct were paid at the Inquest by the Coroner and all the representatives of the various parties. The National Coal Board had formally recommended that recognition be given to these men for their work and a case is now being prepared by the Divisional Inspector for your consideration."

INGHAM. Dewsbury, Yorkshire. 9th. September, 1947.

The colliery was at Ingham to the south of Dewsbury in West Yorkshire and had been producing coal from about 1860. It was connected to the Combs Colliery underground and there was a tramway on the surface along which the coal produced at Combs was hauled to the screening plant at Ingham. Part of the ventilation system was common to both mines but despite these connections Ingham and Combs were worked as two separate mines and were divided by proper boundaries under Section 25 of the Coal Mines Act, 1911.

At Ingham there were two shafts which were used for coal winding, the No.1 was downcast, 13 feet in diameter and the No.2 was upcast and 14 feet in diameter. Both shafts were sunk to the Black Bed seam at a depth of 277 yards and each shaft had

an inset at 188 yards in the Beeston Seam. One hundred and eighty tons was wound daily from the Black Bed and Blocking Bed Seams from the Black Bed level in No.1 shaft and 450 tons from the Beeston and Wheatley Lime Seams was wound from the Beeston Seam inset in the No.2 shaft which gave a daily total output for the colliery of 630 tons, 80 percent of which went to the coke ovens. The Wheatley Lime Seam had been worked for 85 years so that it's characteristics were well known.

At Combs Colliery the downcast shaft was 11 feet in a diameter and was sunk to the Black Bed Seam at 369 yards. The daily output of the shaft was 140 tons per day and from an inset in this shaft to the Beeston Sea, at 224 yards, a road was driven in the seam which formed an intake for the No.2 South District, Wheatley Lime Seam, Ingham Colliery. This was the district in which the explosion took place. There was also a pumping shaft at Combs, 12 feet 6 inches in diameter sunk to the New Hard Seam at 106 yards from which there was a connection to staple pit sunk to the Blocking Bed Seam. These water pits were not connected with the working of the mine but were used for drainage.

The ventilation was produced by a steam driven Walker fan, 7 feet in diameter which was at the surface of the Ingham upcast shaft and passed 140,000 cubic feet of air per minute at a water gauge of 3.6 inches. Safety lamps were used throughout out the mine and for general underground use Ceag 2-volt electric cap lamps and Ceag 4-volt electric hand lamps were issued. For gas testing the workmen were issued with Davis-Kirkby flame safety lamps which were magnetically locked and the officials with Prestwich type No.6 flame safety lamps fitted with internal re-lighters and lead rivet locks. To meet the requirements of the General Regulations in respect of precautions against coal dust and to facilitate systematic cleaning-up, stone-dusting and sampling, the roadways were apportioned in numbered zones. Gypsum dust was used for stone dusting throughout the colliery at a rate of 2.5 lbs. per ton of coal output.

The agent and manager of the Ingham Colliery was Mr. E.E. Cleaver and the undermanager of the No.1 Pit was Mr. C. Walshaw and for the No.2 Pit Mr. B. Aston. Mr. Cleaver was also agent for the Combs Colliery which had a separate manager but no undermanager. Mr. Cleaver came under the direction of the Area General Manager, Mr. J. Scoular who, in turn, came under Mr. H.M. Hundspeth, the Deputy Production Director and Mr. J. Hunter, production Director of the North Eastern Division of the National Coal Board.

As to the history of firedamp in the colliery there was a an explosion in 1893 which occurred at he bottom of the Combs downcast shaft when 139 men and boys lost their lives. The shaft was then sunk to the Blocking Bed Coal at 165 yards but the seam that was being worked at the time was the Wheatley Lime which was entered from an inset 34 yards higher up in the shaft across which a wooden staging had been fixed leaving a four foot space at one side of the passage of air down the Blocking Bed seam. Safety lamps were used throughout, except in the immediate vicinity of the shaft where six open paraffin lamps were used to illuminate the shaft inset. A joint report on the disaster was made by F.N. Waddell, H.M. District Inspector of Mines and Sir Henry Hall who concluded that firedamp had accumulated below the staging and communicated with a feeder of firedamp behind the brick shaft lining. The gas was ignited by one of the paraffin lamps and the explosion was mild and not extensive. The heavy death toll resulted from suffocation as smoke from the wooden fittings and the wood staging at the Wheatley Lime inset which were set on fire by the explosion. The shaft passed through a fault and an attempt had been made previously to pipe the gas made there to light the inset. Gas had been ignited at this point some months before the explosion.

The area of coal in the Wheatley Lime Seam in which the present explosion occurred was opened out some years before from two stone drifts driven from the Beeston Seam, through 40 yards downthrow fault. One drift was driven at an inclination of 1 in 7 in line with, and as a continuation of, the Evison Bord in the

Beeston Seam and this roadway was used as a return airway, travelling and haulage road to the workings in the Wheatley Lime Seam. The other drift, which was used as the intake airway, was driven at an inclination of 1 in 2. The seam was 2 feet 11 inches thick and the immediate roof was of strong bind with well defined bedding planes. The floor was of hard fireclay and the only district working at the time was the No.2 South. It was worked by an advancing longwall with gates at the extremity of the face which served as the intake and the return airways. Three dummy gates were also driven to provide material to pack the waste. The face at the time of the explosion was 140 yards long and the coal was undercut by longwall coal cutters to a depth of 4 feet 6 inches and was loaded on to the face conveyor on the main haulage road which discharged the coal into tubs at a loading point near the top of the 1 in 7 drift. From this point the coal was hauled to the No. 2 upcast shaft in tubs of four and a half and six and a half cwt. By an endless rope haulage running at one and a half miles per hour. The first 1500 yards of this haulage road was the Evison Bord including the 1 in 7 drift. Five hundred yards from the shaft the haulage passed round a right-angle bend into the South Ending where it received coal coming from the South Districts in the Beeston Seam so the haulage and conveyor roads were all in the return airway which was also the travelling road for the No.2 South District.

The deputies meeting station was near the top of the 1 in 7 drift and was also the return airway. Throughout the district, the conditions were slightly damp and water collected in certain parts and had to be pumped outbye. Electricity was used for operating the coal cutters, conveyors, pumps, drills for coal and stone, signalling system and for the telephone circuit, which extended almost to the working face. The air intake came to the No.2 South District from the Combs shaft by way of a roadway in the Beeston Seam. This roadway and although small, was nevertheless well regulated. The air intake then passed up the 1 in 2 drift parallel to the 1 in 7 return drift through the 40-yards fault and then on to the Wheatley Lime Seam. A statutory air measurement taken at the top of the intake drift on 26th. August 1947, a fortnight before the explosion, showed 15,500 cubic feet of air per minute to be entering the district. Other measurements showed that of this quantity only 5,950 cubic feet reached the face of the No.2 South so that leakages, which occurred at three main points, were very heavy.

On the 5th. June 1947, the No.2 South Face was 185 yards long and at that time the right hand side of the face extended 30 yards beyond the No.2 South Conveyor Gate to a fault which had been stripped at the time. The left side of the face extended for a shorter distance beyond the intake airway tail gate. In this 30 yards of face between the No.2 South Conveyor Gate and the fault, a subsidiary tail gate was packed 9 yards from the fault side. On 5th. June 1947, when the third in a series of ripping shots was being fired in this subsidiary tail gate, firedamp was ignited in a break which crossed the shothole and the flame passed 64 yards back along the side of the fault. In consequence, the face was shortened in order to concentrate and improve the ventilation, and a 9-inch brick wall, with a two yard brick pack on the outside of it, was built in the crossgate to seal off the subsidiary tail gates. The ignition of gas was investigated at the time by H.M. Inspectors of Mines and Officers of the Safety in Mines Research and Testing Branch. It was later proved that there was no connection with this explosion and the explosion of the 9th. September.

The explosion occurred in the No.2 South District of the Wheatley Lime Seam on Tuesday, 9th. September, 1947 at 11.15 p.m. during the first hour of the night shift. There were normally 105 men employed in the district during the 24 hours but owing to a wage dispute on the No.2 South Face had not been filled off since the previous Friday and in consequence, ten normal sequence of work was interrupted. On the day shift of the 9th. September, men, other than the usual colliers were employed filling coal at the face and boring shotholes in the coal as the filling proceeded. At the end of

the shift there was still 30 to 40 yards of face to fill off. Other workmen were employed in enlarging the intake airway near to and on the outbye side of the Geldhill Crossgate and one man was attending the pump in the intake tail gate. Apart from the broken belt, which was repaired, in the outbye conveyor in the South 2 Conveyor Gate, the shift was uneventful.

On the afternoon shift, five men were erecting bars at the face of the South 2 Conveyor Gate and one man was again attending the pump. Seven others were enlarging the intake at a point near Old North 2 District. The deputy on this shift said he made tests with a flame safety lamp for firedamp at various points in the district but found none. He went up the shaft at 10.30 p.m. with five men who had been working in the South 2 Conveyor Gate, leaving the district, so far as he knew, in a perfectly normal condition and not anticipating danger of any kind. The remainder of the men on the shift had left the mine about an hour before the deputy.

The night shift of the South 2 District was made up of 13 men, 12 of who died in the explosion. there was one survivor, Jesse Clarke, a shotfirer who was discharged from hospital on the 5th. November 1947, apparently fit and unharmed apart from scars and burns, but unfortunately suffering from loss of memory and quite unable to remember anything of the events of the tragic night. Had he been able to recall what had happened, he would have been a very valuable witness at the inquiry.

The night shift deputy F.W. Pearson, two shotfirers, Bernard Hewitt and Jesse Clarke and two beltmen, Arthur Wilson and Clifford Howarth, descended the mine at 10 p.m. This was an hour before the normal time for the descent of the night shift proper. At 10.05 p.m. before proceeding inbye, Pearson consulted with his opposite number on the afternoon shift. About 10.15 p.m., workmen of the afternoon shift, while on their way outbye from the no.2 South District, met Pearson and his men at the outbye end of the Evison Bord on their way inbye to work. The beltmen, Wilson and Howarth, had been instructed to run the conveyor belts and, after the explosion their bodies were found in the position they would have occupied had they been performing this task. The switch in the switch-box controlling the conveyor motor was found to in the 'on' position but a pilot switch alongside one of the dead men was in the 'off' position. It was possible that the men may have had time to open the pilot switch. On the other hand, the conveyor may not have been started up. What exactly happened will never be known but in the opinion of the inquiry, was not a material question.

The bodies of Pearson and Hewitt and the unconscious Clarke were found after the event at the deputies' meeting station near the top of the return drift. the time that was required to walk from the shaft bottom to the meeting station was 20 to 30 minutes so these three would have arrived about 10 to 10.33 p.m. Their movements after this were a matter of deduction a surmise. It was known that Pearson telephoned from the meeting station to the night onsetter, Herbert Collomosse, in the shaft bottom at a time which Collomosse put at 10.50 p.m. The call enquired about the number of men on the regular night shift who had descended the shaft at 10.30 p.m. and who were on their way to the No.2 South District in the Wheatley Lime Seam. The conversation went on to general topics and did not finish until 11.05 p.m. Collomosse said Pearson sounded cheerful and certainly not a man who expected any danger. Immediately after this conversation, Collomosse received a call from a deputy in another district who was also inquiring about the numbers of men likely to proceed to the district. This conversation finished about 11.10 p.m.

At the Inquiry, Collomosse said, "Well, at 11.15 p.m., there was thud. This was the time it happened as far as I can say. I went out of the office and looked round the pit bottom, and I could see there was something unusual had happened. There were clouds of smoke and things coming into the pit bottom which should not have been." After trying, unsuccessfully trying to get into communication with the inbye districts, he telephoned to the surface to raise the alarm.

Four of the night shift workers were travelling the South Ending when the explosion occurred. They had reached a point about 350 yards from the upcast shaft, where two doors led into an intake airway along which they customarily travelled on their way to work in the Beeston Seam. One of these workers saw a terrible flash and heard a report and was thrown 5 or 6 yards, he described how the air became thick with smoke and he could not see his hand before him as he stood upright. It was very hot but clearer and cooler nearer the floor. After that he and his mates pulled themselves together and assisted each other through the doors into the intake where the air seemed to be stagnant but was clear. They then travelled outbye along the intake and through the separation doors to No.2 shaft. A deputy, who was in the West No.3 Bord in the Beeston Seam intake 480 yards inbye from the junction of the Evison Bord with the South Ending, said that he noticed a swell of dust which blew open the separation doors between the intake and the return. This deputy also stated that he parted from Pearson and his two shotfirers at the junction of the Evison Board at 10.15 p.m., as they proceeded on their respective ways. This established that Pearson and his mates had left the junction of the Evison Bord with the South Ending.

The night shift proper for the No.2 South District in the Wheatley Lime Seam descended the shaft at 10.30 p.m. and consisted of eight men. They were still on their way inbye and were travelling up the 1 in 7 Drift but had not reached the meeting station when the explosion occurred. They met the full violence of the blast and were all instantly killed. This brought the death toll to 12 killed and one man injured.

Mr. B. Aston, the undermanager of the No.2 Pit, arrived at the colliery at 11.45 p.m. on the night of the explosion and was told by the manager that smoke was coming from the fan drift. He descended the No.1 downcast shaft and saw a number of the workmen, from districts other than the No. 2 South in the Wheatley Lime Seam, congregated round the office near the bottom of the upcast shaft. He withdrew them into the intake, which he then proceeded to explore with a small party of deputies and workmen. On arriving at the separations doors about 350 yards from the pit bottom, they found both doors damaged, the one nearest the return airway being the most seriously damaged. They made a temporary repair one of the doors and then went along the intake to the separation doors near the outbye end of the Evison Bord, they found the doors completely blown out and smoke and fumes coming from the Evison Bord. Realising that an explosion had taken place in the No.3 South District the undermanager saw at once that the exploration of the district at that time by way of the Evison Bord was impossible. He returned to the shaft and ascended to report the position to the Manager, leaving instructions with the deputies to erect brattice sheets in the connection between the intake and the return at the outbye end of the Evison Bord.

After consultation it was decided to explore by way of the intake airway to the district from the Combs Shaft and at 1.40 a.m. on the 10th. September, Mr. Aston accompanied by Mr. I. Keeton, assistant Superintendent of the Wakefield Rescue Station and a Rescue Brigade, descended Combs shaft and reached the stricken district. Although the intake airway was undamaged by the explosion, it was not a good travelling road because of the height, rough floor and the steepness which was 1 in 2. On reaching the slit between the intake and the return just beyond the intake drift, they found the two separation doors and their frames blown out away from the return airway. On travelling through the slit they thought they heard a moan and on going forward they found Jesse Clarke, the shotfirer, in the return haulage and travelling road with his head resting on the full side rope which was elevated a little above the floor. It was then about three hours after the explosion and the reason Clarke had survived had an important bearing on the cause of the explosion and was examined at the Inquiry. Clarke was brought out into the intake, received first aid and was kept warm.

They went back into the slit beyond the haulage road at the point where Pearson had made his last telephone call and within a few yards recovered the bodies of

Pearson and Hewitt. Mr. Keeton returned to the surface for first-aid material, blankets, and brattice cloth and for further assistance including another Rescue Brigade as there were no telephones available. He then returned to the fresh air base at the top of the intake drift about 3 p.m. and to restore the normal ventilation circuit, brattice sheets were erected where the stoppings had been blown out. The party explored further along the intake to the inbye end of the Evison Bord and the back along the Bord to the junction of the South No. Conveyor Gate where they found the bodies of the beltmen Wilson and Howarth. They also found that the brattice sheets that had been erected just beyond the junction of the Evison Bord and the South 2 Conveyor Gate had also been blown out. Meanwhile Clarke was taken out of the pit to hospital.

While Mr. Keeton was at the surface work went on trying to restore the ventilation and more assistance arrived. Mr. H.J. Humphrys, H.M. Divisional Inspector of Mines, Mr. I.G.E. Leek, Rescue Apparatus Testing officer, Mr. H.M. Hundspeth, Deputy Production Director and Dr. H.L. Willett, Head of Research and Safety for the North Eastern Division of the National Coal Board and up the party which descended the Combs shaft at 6.15 a.m. In passing through the second slit to the Evison Bord they detected a trace of firedamp rising to about 3 per cent at the entrance to an old road opposite and on the far side of the Evison Bord. They returned to the intake and at a point about 300 yards inbye of the South 3 they found a fall which blocked their way although a small quantity of air was passing through.

It was then about 7.30 a.m. and the undermanager was left at the fall with the instructions to get a travelling road through it. About this time the Production Director, Mr. Hunter and Mr. W.E. Jones, Secretary for the Yorkshire Area of the National Union of Mineworkers arrived together with Mr. Cleaver the Colliery manager and Agent. After consultation an exploration of the South 2 Conveyor Gate was undertaken by a party wearing rescue apparatus although the canary carried by the party was not affected, the percentage of carbon monoxide in the air proved to be harmful for several members became affected and were forced to retire. Their exertion and hence their breathing was heavy due to the road being badly obstructed by falls, some several feet in height.

Another party under the charge of Mr. J.G. Bond, Deputy Area General Manager with Mr. M. McCarthy, H.M. Assistant Inspector of Mines and two rescue brigades under the charge of Mr. C.C. Riley, Superintendent of the Brierley Rescue Station started an exploration from Evison Bord from the outbye end. They descended the No.1 downcast shaft at Ingham Colliery at 9.45 a.m. on the 10th. September and travelled inbye until they came to the recently erected sheets at the outbye end of the Evison Bord. On passing through the sheets they were unable to detect firedamp and the canary was not affected. On travelling Evison Bord they found the bodies of five men near the bottom of 1 in 7 drift which was heavily fallen. They were unable to find the three other victims which were discovered later in the day further up the drift under heavy falls which almost blocked the airway near the top of the drift. The area was thoroughly inspected and evidence gathered,

Those who lost their lives were-
Fred William Pearson aged 40 years, deputy,
Bernard Hewitt aged 42 years, shotfirer,
Clifford Howarth aged 20 years, beltman,
Arthur Wilson aged 44 years, beltman,
George Walshaw aged 32 years, ripper,
Milton Frudd aged 51 years, machineman,
Ernest Johnson aged 68 years, byeworker,
George Grayson aged 49 years, byeworker,
Percy Robertshaw aged 49 years, ripper,
John Middleton aged 38 years, drawer,

Stanley Middleton aged 37 years, drawer and
Jesse Clarke aged 34 years, shotfirer was injured.

The inquiry was held at the Council Chamber of the Town Hall, Dewsbury from the 11th. on the 14th. November 1947 when all interested parties were represented and the report on the circumstances attending the explosion which occurred at Ingham Colliery, Thornhill, Yorkshire on the 9th. September 1947, was conducted by A. M. Bryan, J.P., B.Sc., F.R.S.E., H.M. Chief Inspector of Mines. The report was presented to The Right Honourable Hugh Gaitskell, C.B.E., M.P., Minister of Fuel and Power on the 10th. May 1948.

All the expert witnesses were of the opinion that the explosion started as an explosion of firedamp. There were several ideas as to the source of the gas but Mr. Bryan thought that a large build up gas came from the Old North 1 District and entered the Wheatley Lime Seam. At the Coroner's Inquest into the death of the men the jury found that the firedamp came from the Old North 1 District and it was ignited by a spark from a safety lamp which was opened contrary to regulations. They considered that tests for firedamp should have been deeper into the hold district than at the entrances where fences had been erected and better still, it should have been permanently sealed off from the remainder of the workings.

As to the source of ignition only one possibility was put forward at the inquiry. It was a Prestwich type 6 flame safety lamp No.9 fitted with an internal re-lighter and locked with a lead rivet. The lamp was issued to Bernard Hewitt, the shotfirer, before he descended the pit at 10 p.m. After the explosion the lamp was found in two parts. The oil vessel, an opened pocket knife, and two portions of lead rivet were found close to the telephone at the meeting station where Hewitt's body was found. The top of the lamp was found on the haulage road close to Pearson's body. The conclusions that were drawn that the lamp had deliberately been opened by the knife cutting the rivet, though the evidence on this point was not conclusive. The lamp would have ignited firedamp if the relighter had been operated.

The inquiry came to the following conclusions-

- “1) The source of ignition was a spark produced by the operation of the relighting device from the flame safety lamp after the deliberate removal of the spirit vessel which was made possible by cutting the lead rivet. The lamp was opened to adjust the relighter which was not working properly.
- 2) The spark from the relighter in the opened lamp ignited inflammable firedamp-air mixture in the general body of the air current passing the meeting station at the time, causing a firedamp explosion.
- 3) The flame from the explosion traversed a distance of approximately 3,000 yards, including nearly all the inbye working roads and faces and more than 1,000 yards along the main return haulage road outbye the meeting station.
- 4) The explosion developed moderate violence in the South 2 Conveyor Gate and in the 1 in 7 Drift in the Evison Bord haulage road, but elsewhere the explosion was mild in character.
- 5) The explosion was mainly of firedamp and it is not possible to say with certainty that coal dust contributed to it, or if it did, to what extent.
- 6). The main source of the firedamp was the abandoned workings in the Old North 1 District this firedamp was forced out of the Old North 1 District by the fixing and closing, or nearly closing, of a door in the intake airway between two entrances to the old district this door had been fixed on the night shift about half an hour or thereby before the explosion occurred and it is not possible to say which of the five persons in the district at the time of the explosion fixed the door.”

The inquiry made recommendations about the part played by coal dust in estimating a firedamp explosion, coal conveying in return airways and prevention of the removal of the accumulation of gas. About the lamps the inquiry recommended that the lead

rivet in lamps should be replaced with the more efficient magnetic locks and the Pyrophor Relighter for the lamps should be replaced with a more positive and efficient type of relighter.