

KNOCKSHINNOCK CASTLE. New Cumnock, Ayrshire. 7th. September, 1950.

Knockshinnock Castle Colliery was situated in the Parish of New Cumnock in Ayrshire about 22 miles due east of the town of Ayr. before the accident the colliery employed about 600 men underground and 120 at the surface with a weekly output varying from 4,500 to 5,000 tons. The output came from two seams, the Main Coal and the Turf Coal with the major proportion coming from the Main Coal. The downcast shaft was completed in 1942 and was used for the winding one men, materials and mineral and was 16 feet in diameter sunk to 122 fathoms. The older Knockshinnock No.1 pit served as the upcast shaft and as the second exit which only about a quarter of a mile to the north of the downcast shaft and was 12 feet in diameter and 70 fathoms deep.

The ventilation was produced by an Aeroto fan which was at the surface of the No.1 pit and passed 65,000 cubic feet of air per minute at a water gauge of 4.5 inches. Safety lamps were used throughout the mine and the type provided for the workmen underground were the Oldham, Wheat Q Type, 4-volt electric cap lamp. For gas testing, the workmen were issued with Prestwich Patent Protector, Type SL, magnetically locked flame safety lamps and the officials with the Prestwich Patent Protector, Type No.6 flame safety lamp fitted with internal re-lighters and magnetically locked. Limestone dust was used for stone dusting throughout the colliery. At Knockshinnock Castle downcast shaft an underground pump with the capacity of 500 gallons per minute which ran for three hours a day and a second with a capacity of 125 gallons per minute which ran for 12 hours a day.

The colliery was operated by the National Coal Board, Scottish Division and was one of fifty producing collieries, many relatively small which were in the Ayr and Dumfries Area. The Area was divided into three Sub-Areas, each of which were divided into Groups. Knockshinnock Castle was the largest of the six collieries in the New Cumnock Group in the Dunaskin Sub-Area which had 21 collieries in it. The manager of the colliery was Mr. W.C. Halliday who was assisted by an Undermanager, Mr. B.Y. Kennedy. There was an overman, Mr. J.N. Houston who was in general charge underground of the day shift and he was followed by a second overman, Mr. Andrew Houston, who was in charge underground on the afternoon shift. There was no overman on the night shift. Five firemen were in charge of the working districts on each of the three shifts, Mr. J. Bone was the Agent for the New Cumnock Group. the Dunaskin Sub-Area was under the general charge of Mr. A.M. Smart, the Sub-Area Production Manager who was in turn responsible to Mr. A.B. Macdonald, the Area Production Manager. Mr. D.L. McCardel was the Area General Manager. All these higher officials held a first-class Certificate of Competency.

The Sub-Area had a Planning Department and a Surveying Department. The Planning Department employed planning engineers and planners. The Sub-Area Planning Engineer was Mr. Alex Gardner who held a first-class Certificate of Competency and Mine Surveyor's Certificate. His assistant was Mr. Donald Mackinnon who possessed a first class certificate. The Sub-Area Senior Planner was Mr. J.H. Cairns who controlled activities of four Assistant Planners, one for each of the Agent's Group of collieries in the Sub-Area. The Assistant Planner concerned with the Knockshinnock Castle Colliery was Mr. R. McLean who held a Mine Surveyor's Certificate. The Sub-Area Chief Surveyor was Mr. C. Stewart and his senior assistant was Mr. T.D. Brown. The surveyor attached to the New Cumnock Group was Mr. R. Arbuckle who was assisted by an apprentice surveyor, Mr. Ian Murray.

This portion of the Ayrshire coalfield in the New Cumnock district lay at the extreme southern edge of the coal measures and was bounded on the south by a large upthrow fault, the Southern Uplands Fault. The coalfields was unique among the coalfields of Britain in that the workable seams that are found in four groups of the carboniferous rocks, the Barren Red Measures, True Coal Measures, Millstone Grit Series and the Limestone Series. There were twenty eight coal seams which were greater than two feet

thick which had been proved and of these seventeen are over three feet thick and nine exceeded four feet. These seams were unknown in the Knockshinnock Castle Colliery Area until a few years before the disaster and the existence of the Main Coal was only finally proved in 1938.

Apart from the Southern Uplands Fault, the New Cumnock coalfield was very faulted which resulted in the field being broken up into areas that were more or less detached and in some of these areas coal had been worked for many years. One of the seams that had been worked over the years was locally known as the 'Eight Feet'. In an older colliery near the Knockshinnock Castle Colliery a thick seam had been worked for many years and it was believed to be the Eight Feet. About 19320 the Geological Survey suggested that this was not the Eight Feet but was an entirely new seam and the geological position of this seam was about 100 fathoms below the Eight Feet in the True Coal Measures. To test this theory a borehole was put down in 1924 but the recorded results were disappointing and did nothing to alter local opinion. Some years later the views of the Geological Survey were reconsidered and it was decided that further boring was justified. A borehole was put down in 1938 and gave excellent results. It proved the existence of the Main Coal at the approximate position previously indicated by the geologists of the Survey as well as that of three other workable seams. Further boring confirmed the existence of these seams over several square miles which added many millions of tons to the reserves of the area. This valuable extension to the coalfield led very soon to the planning of the Knockshinnock Castle Colliery and the sinking of the downcast shaft began in 1940 and was completed in 1942.

Because of the inclination of the seams and the decision of the previous owners, the New Cumnock Collieries Limited, to use locomotive haulage in the main roads leading to the bottom of the pit, the shaft was not sunk to a particular seam but to a suitable horizon from which almost level mines or stone drifts were driven as main haulage roads to give access to the seams that were to be worked, especially the Main Coal. In common with the coalfield as a whole, the area of coal to be worked by the colliery was heavily faulted and due to these disturbances the gradients of the seams varied from comparatively level to 1 in 2 and in parts even steeper. In addition the composition and thickness of the seams were subject to variation. This was particularly true in the Main Coal which was approximately eight feet thick in which there were three distinct coal beds which were separated by dirt bands and with either a strong sandstone or a relatively weak 'calmstone' forming the roof. Where the sandstone formed the roof, the full thickness of the seam was extracted and where the roof was calmstone the top leaf of the coal was left. The seams were naturally damp and it was not uncommon for the working places to be wet.

In the district where the disaster occurred, the No.5 Heading Section in the South Boig Area, the composition of the Main Coal remained reasonable constant and the coal lay in three beds which were known locally as the 'head coal', the 'breast coal' and the 'bottom coal', separated by dirt bands with a calmstone roof above the head coal. Above the calmstone here was another thin bed of coal known as the Pennyvenie Seam which was overlain by a bed of sandstone. The method of working was Stoop and Room, the rooms being driven 16 feet to 18 feet wide to form stoops approximately 100 feet square. The direction of advance of the No.5 Heading Section was to the south east towards the Southern Uplands Fault with the gradient steepening from 1 in 14 to 1 in 2 in the No.5 Heading which was the main haulage road for the district and was the leading place. Because the calmstone was weak and difficult to support the head coal was left to form the roof and only the breast coal and the bottom coal were extracted with the associated dirt bands which gave a working height of about 7 feet.

The coal was blown from the solid by explosives and the shotholes were bored by electrical machines with approximately 18 holes being bored for each round of shots. The faces advanced about 9 feet per shift and two shifts of coal getters were employed. The coal was hand loaded on to scraper conveyors which delivered to a series of belt

conveyors, two in the No.5 Heading and one in the Belt Conveyor Heading. At a central loading point at the junction of this heading with the South Boig Mine, the coal was delivered into tubs which were hauled to the pit bottom by locomotives by way of the South Boig and the West Mines, both of which had a gradient dipping slightly towards the shaft. In the headings going steeply to the rise, the No.5 Heading, a short shaker conveyor was used next to the face. For several days before the accident this heading had been stopped and the shaker conveyor partly dismantled.

At the neighbouring Bank No.6 Colliery, the Main Coal was reached by a dipping drift driven from the surface, mostly in stone but partly in coal, with a gradient varying up to 1 in 3.6. The mouth of the drift lay approximately a mile to the south west of the Knockshinnock Castle Colliery. About 1944 a district in Bank No.6, known as the Waterhead Section, was worked to the rise by a longwall face. Later the Main Coal in Knockshinnock Castle was also worked in the Waterhead Area towards Bank No.6 leaving a barrier of coal 200 feet wide between the two collieries. In order to facilitate drainage from the Knockshinnock side, a roadway was driven into this barrier up to a point about 24 feet from the Bank No.6 workings. A borehole was then put through the remaining part of the barrier to carry the water. It was through this part of the mine that the escape road was driven, by which 116 men imprisoned by the disaster were eventually rescued.

Deposits of peat moss occurred on the surface in the immediate neighbourhood of both the collieries and were shown on the 6-inch Geological Survey Map of Ayrshire, Sheet XLII S.W. One such deposit was shown, part of which actually covered the place where the disaster originated. There was no previous history of an inrush of moss in the area but a few years before work had been carried on underground in Bank No.6 Colliery when Mr. J. Bone was the Agent, when a surface peat deposit had to be probed to determine its thickness in order to comply with the General Regulations of 1920, relating to precautions to be taken when working under a peat moss.

The accident occurred at about 7.30 p.m. while the afternoon shift was at work on Thursday 7th. September 1950 when a large volume of liquid peat or moss suddenly broke into the workings from the surface in the No.5 Heading Section of the Main Coal Seam. The inrush started at the point where the No.5 Heading, which rose at a gradient of 1 in 2, had effected a holing at the outcrop of the seam beneath superficial deposits and had made contact with the base of a relatively large natural basin containing glacial material and peat. The liquid matter, rushed down the steep heading and continued to flow for some time and soon filled up a large number of existing and abandoned roadways as well as several working places, until it eventually cut off two means of egress to the surface from the underground workings of the colliery.

There were 135 people underground at the time. Six working near the shaft bottom escaped to the surface by the downcast shaft before it became blocked while 116, with all means of escape cut off, found their way in by a part of the mine which was unaffected by the inrush leaving 13 men who were missing. The 116 men were rescued about two days later and the 13 missing men, all of whom were employed in the No.5 Heading. One was the fireman in charge of the district, one shotfirer and nine coal getters who were employed at the face and three working in other places. There were also two men who were working on the haulage of the district.

The No.5 Heading Section had been developed to exploit the area of Main Coal which lay to the south of the shafts and a pair of headings at 100 feet centres was driven into the coal at a rise in a south easterly direction. These headings were about 18 feet wide and 7 feet high. Connexions were put through between the headings to form stoops about 100 feet square. One of these headings was known as No.5 Heading. It was used as the main haulage and travelling road for the Section and was always kept in advance of its companion heading.

A contoured development plan had been sent to the Manager by the Sub-Area Planning Department in April 1950 and this indicated in blue, the extent of the expected

progress of the workings until 1st. September 1950 and in orange the progress expected from then until the 1st. February 1951. It was nothing more than a progress plan based on the already established Stoop and Room system of the working but it did not show that the main development Headings would reach the conjectural position of the Southern Uplands Fault and that at that stage it would have at least 100 feet of cover from the surface. These conjectural planes were based on the unworked coal ahead rising at a gradient of 1 in 4. After that time, as might have been anticipated in a seam rising towards a major upthrow fault the gradient became steeper and on the 6th. July 1950, when the last quarterly survey was made before the inrush, levellings showed that the face of the No. 5 Heading was only 196 feet vertically below the surface. By this time it had become obvious to the management that the main headings would not strike the Southern Uplands Fault because of the gradient of the seam, which had been increasing for some time, continued to steepen until it became almost 1 in 2 and that the headings would reach the outcrop of the seam near the surface at a point somewhere south of the shafts. The report commented-

“this fact does not appear to have been treated by the management as a matter of concern nor as something to which the attention of the planning department should have been drawn.”

For at least a year before the inrush it had been realised by the management that if certain inbye districts of the colliery were to be fully exploited and adequately ventilated, it would be necessary to increase the quantity of the air circulating underground. Eventually, in order to achieve this, it was decided to drive a new dipping drift starting from the surface to meet the underground workings and thus provide an additional airway. This drift was in the course of being driven at the date of the disaster. When this drift was commenced, no one knew that the development headings in the No.5 Heading Section were likely to reach the surface. But as soon as the management realised that the headings, if continued, were bound to reach the surface, the prospect of being able to drive a road in the coal to the surface seemed to have appealed to them. At any rate, during the year the matter was discussed by the undermanager, manager and agent but strangely enough no decision was taken about it. At the inquiry, the undermanager believed that it was the intention to drive No.5 Heading through to the surface to provide a new airway but the manager said that the idea was considered by the agent and rejected. The agent said that the matter was still under consideration a few days before the disaster. The report commented- "Altogether, the evidence on this important matter of planning was unsatisfactory, conflicting and disappointing."

Whatever was said, the No.5 Heading and the companion heading were driven rapidly forward. Nothing untoward happened until about 10 a.m. on the day shift of Wednesday 30th. August when a shot was fired in the breast coal at the face of the No.5 Heading by the fireman, D. Strachan who was one of the victims of the disaster. This shot blew through and exposed what appeared to be a bed of stones, leaving an opening described as two to two and a half feet wide for the full height of the breast coal and four to five feet deep. Water started immediately to run out of this opening but, of the many witnesses that saw none could estimate the flow with any degree of accuracy. It was best described by one of them as the amount that would flow from a two inch pipe. The water was clear and fresh and had no smell and it was allowed to flow freely down the floor of the heading. The flow of water remained fairly constant until the morning of the accident and did not appear to have caused much alarm to anyone, certainly not any of the officials in the colliery from overmen upwards.

When the holing was effected the place was stopped and no more coal was won from it. The dayshift overman, J.N. Houston, who was on duty in the section at the time, saw the hole about 15 minutes after the shot had been fired. Several other shotholes had been bored in the coal at the face of the heading but none of these had been fired. Water came from one or more of them but there was disagreement on the number by the witnesses at the inquiry. The manager inspected the place about an hour later and

very wisely decided that wooded chocks or pillars should be built to support the roof to supplement the props and bars ordinarily used to support the roof, to make the place more secure. Eight chocks were built in the following week.

Mr. Kennedy the undermanger, visited the face of the heading about noon on the day following the holing but Andrew Houston, the overmen in charge of the back shift did not inspect the face after the shot had blown through. He had been made aware of the position by the day shift overman who informed him that the heading had holed through 'on the crop' had been stopped. Mr. J. Bone, the Agent, was also told that the heading had reached the outcrop but he did not visit the place.

On Thursday 31st. August, as soon as the No.5 Heading had holed through, the Agent gave instructions for the underground workings to be surveyed and levelled by Mr. Ian Murray, an apprentice surveyor, to determine the exact position of the face of the No.5 Heading and it's depth below the surface. The survey showed that there was about 38 feet of cover between the roof of the heading and the surface. On the same day a survey was made on the surface by Mr. T.D. Brown, the senior assistant surveyor for the Sanquhar and New Cumnock Colliery Groups. During the course of the survey, a pointed wooden peg, two feet long and two inches square, was knocked into the ground to mark the point immediately above the face of the No.5 Heading. This peg was knocked in by Murray who used a 2-lb. hand hammer and the peg went in more easily than he expected for per of it's size. He was not curious and did not think any more about it but he did notice that the ground underfoot was a 'wee bit soggy' Mr. T. Brown, who had walked over the ground while he was taking his measurements described it as ordinary soil. To him it was green pasture with grass on it.

About that time, Mr. Halliday, the manager and Mr. Bone the agent together with Mr. D. Mackinnon, the Sub-Area Planning Engineer, also walked over the ground to see where the No.5 Heading would come out if it were driven right through to the surface. The report commented-

"surprising as it might seem, although Mr. Bone and Mr. Mackinnon had previous experience of workings under moss at other collieries, neither of the, noticed the presence of peat or moss or anything unusual in the character of the ground, or even any feature to arouse any suspicion of danger."

As the development headings had been stopped, the miners who had been working in them had been transferred outbye to new places on the left of the dip side of the No.5 Heading, one place being six and the other seven stoop lengths back from the face of the heading. The other set of miners was put to work in a place going to the right or rise side of the companion heading, six stoop lengths back from the face of the heading.

The flow of water through the hole in the No.5 Heading remained fairly constant unil the morning of the 7th. September, the day of the disaster, when a marked increase in the flow was noticed. It was described as two or three time the flow that had been previously noted. About 9.30 a.m. the day shift fireman, Thomas McDonald, informed the day shift overman, J.N. Houston about the increase on the flow of water. The overman went to the face of the heading and found that the hole in the coal was a little wider but the stones at the back appeared to be in the same state as when the shot was fired. As the water was finding it's way into the outbye working places on the dip side of the No.5 Heading the overman gave instructions to one of the oncost men to dig gutter to confine the water to the heading. The undermanager arrived shortly afterwards but, as he had hurt his knee, he did not go right up to the face but stopped 100 feet short. He discussed the position with the overman but they seemed to have been more concerned as to whether the outbye pumps would be able to deal with the increase of water than with any danger that might lurk there.

The increased flow of water carried a lot of loose coal down the heading and an occasional stone or pebble. This caused problems with the conveyor belts wit the result that very little actual work was done on that morning. When the overman came to the surface at 3.30 p.m., he informed M.r Kennedy, the undermanager, that the flow of water

had not increased since 9.30 a.m. Mr. Bone, The Agent and Mr. Arbuckle, the surveyor were present. He told then that the fireman had reported that two chock pillars had fallen out before the end of the shift. It appeared that the base of the chocks had been levelled on loose dirt and the water had washed this away, loosening the pillars.

On the afternoon shift of the 7th., three sets of miners were sent to work in the places already described, off the No. 5 Heading. the men working in the right hand place were J.D. Houston, T. Houston, and W. McFarlane. In the outbye dip-side place were J. Smith, S. Rowan and W. Lee and in the place a stoop length above were J. Love, J. Murray and J. White. About 6.30 p.m. the No.5 Heading Section fireman, Daniel Strachan, sent a message saying he wished to see the overman, Andrew Houston. Houston sent word to the fireman to come out and he met him 50 yards inbye from the pit bottom. Strachan said that there had been a big fall at the face of the No.5 Heading and that it extended to a point roughly 300 feet from the return end of the conveyor and that the water had practically stopped running. Houston instructed him to go back and satisfy himself as to the condition of the Section while he went back to have a look at the surface.

Houston went to the surface and found a hole in the ground 25 to 30 feet long and 10 to 15 feet broad and 2 feet deep. about 6.40 p.m., he telephoned the manager and told him about the fall and the hole on the surface. The manager gave instructions for a fence to be erected round the hole as a right of way existed across the field and as there were not sufficient men at the surface, he told Houston to bring three men out of the pit. The manager had been absent on leave earlier in the day but when he got Houston's message, he came to the pit to see things for himself.

Houston then went underground to look at the position in the No. 5 Heading. he went along the South Boig Mine and met John Dalziel at his working place at the foot of the Belt Conveyor Heading and at it's junction with the No.5 Heading he met William Howatt, switch attendant. Houston continued up the No.5 Heading and as he reached a point just inside the return airway he felt a sudden blast of air which came down the heading. He went on inbye and met J. Montgomery, another belt attendant. He spoke to him and almost immediately, J. Haddow, the switch attendant at the tandem belt came outbye. Haddow had seen the framework of the conveyor moving outbye and was making his way out of the pit. At that moment all three heard a 'terrific roar' and the trunk belt began to move outbye down the road.

Houston at once took the men with him and turned up the heading on the rise side which lead to the borehole from the surface and from there made his way into the return airway to the top of the Garrowscairn No.3 Dook. From there he went across to the telephone at the end of the West Mine and sent messages to each of the district fireman telling them to withdraw their men immediately. He then went out along the West Mine where he met two men, A. McLatchie and W. Walker running inbye. They had tried to get out but had found the road closed by a mass of sludge. Houston went back to the inbye end of the West Mine where he collected the firemen and their workmen. It was then established that the following men were missing-

Daniel Strachan, fireman in charge of the No.5 Section

John McLatchie, shotfirer in No.5 Section, William Howatt, switch attendt, John Dalziel, loader attendant and the nine miners who had been working in the three places off the No.5 Heading.

Meanwhile, a party of men under the leadership of J. Craig, Garrowscairn Section fireman, and s. Capstick, shot firer in the Turf Coal had gone exploring up the return airway down which Houston had recently come. These men had gone to see if it was possible to get out to the surface but had found all roads blocked with sludge. Fortunately the telephone from the pit bottom to the surface remained in working order and Houston was able to inform the manager of the position. A second exploring party was organized under the leadership of Capstick to go into the No.5 section by way of the return to try to locate the missing men and to see by this time if any road had opened to the surface. This party soon returned without finding any trace of the missing men and

confirmed that there was no escape in that direction. This meant that 116 men were imprisoned.

In the meantime, the three workmen who had earlier been directed by Houston to go to the surface to help with the erection of the fence, had left the pit. They went over to the hole in the field with two surface workers. The party had just started to erect the fence when the ground in the vicinity started to subside rapidly, the ground flowing in from all sides and the hole extended rapidly. Mr. W.C. Halliday arrived at the colliery about 7.30 p.m. in response to the message from Houston. He went to the surface to see the hole and at once got in touch with the agent. He then returned to the field and the hole was getting bigger. He sent for Cunningham, one of the men who had got out of the pit and asked him if he would go back down the pit and get in touch the overman and tell him that the subsidence in the field was getting bigger. Well knowing the danger, Cunningham at once volunteered.

The manager described the crater as water flowing down a sink. He then went to the pit and when he got there received a message from Cunningham at the pit bottom telling him that he had made several attempts and he could not get up in to the section because the roads were filled with sludge which had driven him back to the pit bottom. The manager instructed him to tell the firemen to withdraw the men from the pit and bring them out. He then went underground himself accompanied by Cunningham. They found the road blocked to the roof with mud near the junction of the North level and the West Mine. They tried to get up the return airway but found it also blocked with mud. Mr. Bone then came down the pit and it was at that time that Andrew Houston telephoned out saying that he had all the workmen with him except for those from No.5 Section. The manager and Cunningham made several more determined efforts to get inbye but found it impossible. An attempt was made to deal with the mud at the pit bottom by filling it into hutches and winding it up the pit, but the sludge kept slowly ozing outbye and in the end reached the pit bottom and further efforts to deal with it had to be abandoned. In the course of the next 24 hours the sludge rose 16 feet up the winding shaft.

The surface subsidence had increased until the area involved was approximately 2 acres in extent and 40 to 50 feet in depth. In an attempt to prevent the moss or peat running into the pit, bales of straw and hay, trees and pit timbers and hutches were thrown into the crater. This effort was ineffective though some of these articles were later found in the workings. The assistance of the local Fire Brigades was obtained and portable petrol pumps were installed at strategic points round the subsidence and fresh ditches were dug in order to prevent or reduce the amount of surface water flowing into the crater. In addition several surface drains and a bur were dammed and the outer was pumped into the River Afton. Messrs. Wimpey were called in to secure the side of the hole and to take steps as were possible to make it safe for an exploring party to enter the exposed roadway at the bottom of the subsidence. This work started on the 8th. September. By 4 p.m. on Sunday 10th. September, a party of six men descended into the workings from the crater, followed by a second party at 10 p.m, but they found that the two main headings were completely blocked at a point 800 feet down.

It was known that Houston and 115 men were at the inbye end of the West Mine and it was apparent that the greater part of the roadways between the shafts and this point were locked by sludge that would take months to clear. News of the disaster reached the higher officials in the Ayr and Dumfries Area and the National Coal Board, representatives of the mineworkers and the Mines Inspectorate and many of them were at the scene in a very short time. The position was discussed and it soon became obvious that the only hope of rescuing the imprisoned men was to make a connection through the narrow barrier, between Knockshinnoch Castle and Bank No.6 at the point where the water was pumped through. Andrew Houston was informed of the decision by telephone and he was instructed to explore the Waterhead Dook from his side. This was done and he found that the roadways were open and that the place containing the borehole was accessible.

At the surface a Headquarters Base was established at Knockshinnock Castle, where communication by telephone was available to the trapped men, Bank No.6 and the surface crater. An operational base was established at Bank No.6 Mine and the G.P.O. telephone at this base was reserved for outgoing calls and incoming priority calls by arrangement only. The higher officials of the National Coal Board were told to take all practical measures to minimise the inflow from the hole on the surface to the Knockshinnock Castle workings. Rescue apparatus had been made available at Knockshinnock from Kilmarnock and Auchinleck Rescue Stations and calls were sent out for the local rescue brigades. The Central rescue Station at Coatbridge was put on stand-by readiness.

In view of the distance inbye which was about two miles and the lack of haulage facilities, volunteers were asked to stand by to act as carriers to the rescue teams. To go in with them with the equipment, to wait while they completed their turn of duty and to return with the equipment when they left. The rescue operations fell into three stages. At 11.30 p.m. on 7th. September, Mr. G. Rowland, H.M. Inspector of Mines and Mr. McParland, manager of the Bank No.6 Mine, the Superintendent and his Assistant from Kilmarnock Rescue Station, together with two local brigades equipped with Proto apparatus and Novox Revivers, descended the Bank No. 6 with the instructions to make a preliminary inspection of the abandoned Main Coal workings. In the meantime, Mr. A. McDonald. Area Production manager had staffed the operational base at Bank No.6 office. The Coatbridge Rescue Station Superintendent was detailed to take over responsibility for making and maintaining a rescue team rota as the men became available.

McDonald and Richford, the District Inspector of Mines, went down the mine at 2.30 a.m. on the 8th. September and met Rowland and his party who were returning to make their report. They had been able to travel along the old road inbye to the point where the connection with the Knockshinnock Castle would be made. The roads were full of firedamp and the inspection had had to be made with breathing apparatus. On this information a fresh air base was made at a crosscut.

Electricians, engineers and volunteers were now available and detailed arrangements were made on the spot to install auxiliary fans in an attempt to clear the accumulation of gas and by midday on the 8th. September the gas had been cleared up to 300 feet up the right hand roadway. A sound powered telephone was obtained from the Coatbridge Rescue Station and this enabled communication to be continued underground and the surface at Bank No.6. About 4 p.m. on Friday 8th. September when the telephone to the imprisoned men was showing signs of weakening, the trapped men were instructed to start to making a passage through the barrier. They were told to halt just short of the old road as there was a risk of the firedamp on the other side fouling their atmosphere. It became obvious that the Bank No.6 side would have to be cleared quickly and urgent measures would have to be taken on the Bank side if the gas was to be cleared in time. A great deal of arduous work went onto improve the ventilation and after five hours, it was found that no appreciable progress had been made.

When the trapped men received their instructions to start making a passage through the barrier, they were warned to keep a small hole in advance and to watch the direction of the air. If it came from Bank side then they were to immediately stop the hole. It was found that, when the hole was made the air travelled from the Knockshinnock side to the Bank pit so instructions were then passed to the rescue men to make the hole larger and pass through food and drinks to the trapped men and arrangements were made to take the food and drink.

On the night of Friday 8th. September, Andrew Houston went to the holing to meet the first rescue team and take the, to the trapped men. Up to this time the messages that Houston had sent to the surface said that the Knockshinnock side was free from gas but when he was on his way back with the rescue men he found men erecting a brattice at at the top of the Waterhead Dook and two of the trapped firemen told him that

gas was collecting there. The trapped men had been told of the large body of gas in the Bank No.6 roads but the news of this gas in the Waterhead Dook was kept from the main body of trapped men in case it should affect their moral.

Naturally, with the arrival of the rescue brigade men and food, the men thought that they had nothing more to do but to walk out of the place with the rescue team. Houston had to explain to them about the gas in the roadways of bank No.6 and that it had not been cleared and that it could yet be a considerable time before they were rescued. the food and drink cheered them greatly but the news that they must wait came as a bitter disappointment.

It was not obvious to those in charge of the operations that the clearing of the gas represent a major problem and consideration was given to bringing out the trapped men with self contained breathing apparatus and instructions were given to collect as many set of Salvus apparatus as possible from all readily available sources. This apparatus was also self generative and the air could be breathed over and over again as the carbon dioxide was taken out of the exhaled air. The oxygen was carried in a steel cylinder containing 95 liters when fully charged at a pressure of 1,800 lbs. From the cylinder the gas passed valve which delivered two liters per minute into a bag from which it could be inhaled and then through a carbon dioxide absorbing and cooling medium to a mouth piece. It was intended for half an hour of use and was lighter than the Proto, weighing only 18 lbs.

Following on inspection and a careful review of all the circumstances in the early morning of Saturday 9th. September, the face had to be accepted that there was no real progress in clearing the gas from the roads, not was there any immediate chance of success, so a scheme was the formulated for the use of rescue teams of six men to escort three of the trapped men out wearing Salvus apparatus. It was estimated that it would take forty hours to get all of the men to safety but , although regrettable, the men had fresh air and a supply of food and drinks and the plan caused no undue alarm.

It was fully realised the the scheme had it's risked since the men were not trained to use the apparatus and the hope was that the gas would be cleared and the men could walk out in fresh air. Soon after the holing had gone through, rumours began to circulate about the state of mind of the trapped men. They were restless and puzzled at the delay and there was a rumour that some of the younger men were talking of a dash through the gas filled roadways which would have been suicidal. At this point Mr. D.W. Park, Deputy Labour Director of the Scottish Division of the National Coal Board suggested to Lord Balfour, Chairman of the Divisional Board this it might be a good thing if someone put on a Proto apparatus and went through to join the trapped men in order to fully explain the situation to them.

Mr. Park volunteered to do this. As a boy he had worked in the New Cumnock Pits and at one time had been a member of the local rescue brigade and also had experience as a member of the permanent rescue brigade at Houghton-le-Spring Fire and Rescue Station in County Durham and the men that had been trained there had experience with the Salvus apparatus. He also knew many of the imprisoned men personally including Houston. He was given a medical examination and he joined a team which entered the Knockshinnock workings at 3.40 a.m. on Saturday 9th. September. in evidence at the Inquiry, Andrew Houston said, when he appeared, "Well, I don't think another man breathing could have come in that would give me more confidence that Mr. David Park". Mr. Park called the men round him, told the, what was being done to rescue them, calmed their fears and generally restored their morale and so assisted the overmen to restore discipline. His action was largely responsible for the safe rescue of the men.

After addressing the men he had a look round and found that the atmospheric conditions were far from satisfactory. Firedamp was appearing in the area and the percentage steadily increasing. He instructed the captain of the rescue team to in from those in charge of the operations at the fresh air base of this and the situation was much

more serious that he could say on the telephone in the presence of the trapped men. There was 3 to 5 per cent firedamp in the general body of the air and unless something was done quickly he thought it would be too late.

It was then realised by those in charge of the operations that drastic measures would have to be taken at once and a new scheme was drawn up by the officials at the fresh air base, McDonald, Richford and Stewart. This was to form a 'chain' of rescue brigade men along the whole length of the gas filled roadway on the Bank side who would pass sets of Salvus apparatus through to the rapped men. a rescue team would enter the Knockshinnock workings and instruct the men in the use of the apparatus, fit them with them and pass them back along the chain. Mr. Stewart returned to the surface or report the proposal and to request that a general call should be made for additional trained rescue men from Lanarkshire to enable the scheme to be put into operation. The principle officials felt that this plan was not in accordance with the Rescue Regulations but agreed with grave misgivings. About midday on Sunday 9th. September instructions were given for the scheme to be put in operation.

By 12.30 on Saturday there were five rescue teams at the fresh air base. there were ample reviving apparatus and stretchers, blankets and first-aid men available as well as doctors and medical supplies. One of the imprisoned men was in a very weak state and would have to be brought out on a stretcher and a team was sent through to give him and injection provided by the doctors. It was then decided that it would give the trapped men a great deal of confidence of the sick man was the first to be rescued. A team was sent in with stretchers and blankets and two sets of Salvus apparatus at 12.30 p.m. At 2.45 p.m. the sick man was brought to the fresh air base but by this time, owing to various delays and incidents, all the five teams at the fresh air base had been used and there would be a further two hour delay before sufficient teams could be assembled to enable the chain operation to be attempted.

At 5 p.m. the position was as follows, 87 sets of the Salvus apparatus had been brought from the surface to the fresh air base, together with 100 spare cap lamps and more Salvus sets were on the way. A 'chain' of man at intervals of a few yards, extended from the fresh air base to the main base where doctors were waiting and 30 stretcher bearers and food water and hot tea was available at both bases. One of the rescue teams was held for any emergency at the fresh air base and instructions given not to go to the advance fresh air base until a fresh team from the surface arrived at the base. One team was kept at the advance fresh air base and as a fresh team arrived they were sent to the operational zone.

The main operation was ready and a team from the Coatbridge Rescue Station was instructed to proceed directly to the Knockshinnock Castle side, disconnect their apparatus, do all they could to raise the moral of the trapped men and explain the general plan and the use of the Salvus apparatus before fitting each man and sending him out. They were asked to remain of this job without relief, if possible. Immediately afterwards four other teams set off carrying Salvus apparatus and spare lamps with instructions to pass them forward to the Coatbridge Brigade of the Knockshinnock side. They were to establish the chain when the remainder of the Salvus and spare lamps could be passed forward through to the trapped men.

All the teams were briefed on the following lines-

(a) That the intervals in the chain were to be shortened as fast as trained rescue brigade men became available.

(b) Each new team was to go to the head of the chain i.e. the end nearer the Knockshinnock Castle workings, so that the rescued men with decreasing reserves of oxygen would be place down the chain towards the advance fresh air base.

(c) In the event of any rescue man using more oxygen than the remainder of his mates, he was to return to the fresh air base as an individual, but the remainder of the team was to remain as long as possible.

(d) Stretcher cases were not to be attempted unless authorised from the advanced fresh air base.

(e) Definite instructions were given, that if any man wearing Salvus apparatus collapsed, they were not to do anything to impede the general scheme of evacuation.

(f) As it took twenty-five minutes for a team to travel from the advance air base to where the trapped men were assembled, as a guide for their personal safety, each rescue man was told to allow himself sufficient oxygen to cover the period for his retirement.”

Houston drew up a rota regulating the order in which the men were to be taken out. He decided that the older men should be the first to go but as the strain was beginning to tell on some of the younger men, many of them were allowed to go before the older men. As the operation proceeded, two doctors, Dr. Sharp, H.M. Medical Inspector of Mines and Dr. Bannatyne of the Aye County Hospital remained at the advance fresh air base whilst three others, Drs. Gooding, Fyfe and Watson remained at the main fresh air base. All the rescued men were medically examined before they were allowed to go to the surface. About 8.15 p.m. the overman, Andrew Houston, was instructed to come out, leaving Mr. Park in charge of the remaining men, his presence was required in order to ascertain the last known positions of the missing men.

Towards the end of the evacuation, it was reported by one of the returning rescue men that one of the trapped men was suffering badly from asthma and it was suggested that he was brought out on a stretcher. The doctors were informed and suggested that he be given pills and other injection which they provided. A rescue brigade man was instructed and the man was brought out safely without any further trouble.

The last of the men reached the fresh air base at 12.05 a.m. on Sunday 10th. September and the operation had taken eight hours. Twenty brigades had been used in the operation. As the Salvus sets were brought to Mr. Park he examined them and discarded quite a number for a variety of reasons. Had he not done this there was a possibility that there could have been more casualties. When the last man had left Mr. Park organised a search with a rescue brigade to make sure that no one had been left and he was the last man to leave.

When Andrew Houston reached the surface he was able to direct operations in the places where the missing men had last been seen working prior to the disaster. Two of the missing men, John Dalziel and William Howatt in the No.1 Heading. It was felt that if any of the missing men escaped the inrush and had taken refuge in the workings on the rise side of the No.5 Heading they would have been found by the exploring parties from the trapped men and would have been rescued along with them. All interested parties came to the sad conclusion that there was no hope of the 13 missing men being alive. A decision was taken that no more rescue brigades should be sent through the escape hole and efforts were then concentrated on an exploration of the crater as the exposed end of the No.5 Heading could now be seen there. It was thought that it may be just possible to get far enough down the No.5 Heading to give access to the inbye workings in a further search for the missing men.

The work on the crater to make it safe had commenced on the morning of the 8th. September when two exploring parties had reached 800 feet down the Heading. Unfortunately heavy rain had persisted and made worse the precarious sides of the crater. Masses of moss were slowly but continually closing the opening. The gradient of the heading was 1 in 2 and all the roof supports had probably been swept away and due to falls it was probable that the exploration of the heading would be a dangerous and difficult affair. Efforts were being made to clear the Knockshinnock shaft but operations were very slow.

By Monday 11th. September a meeting was held by all representative parties and a decision was taken that no further should be carried out underground until the side of the crater and the No.5 Heading were secured. By this time it was felt that there could

be no hope of reaching or rescuing any of the 13 men and that there was no justification for risking the lives of rescuers.

The men who died were-

John Dalziel aged 50 years, loader attendant,
James D. Houston aged 46 years, coal miner,
Thomas Houston aged 40 years, coal miner,
William Howat aged 61 years, switch attendant,
William Lee aged 48 years, coal miner,
William McFarlane aged 36 years, coal miner,
John McLatchie aged 48 years, shotfirer,
John Murray or Taylor aged 33 years, coal miner,
Samuel Rowan aged 25 years, coal miner.,
John Smith aged 55 years, coal miner,
?? Stachan aged 38 years, fireman and
John White aged 26 years, coal miner.

The report on the causes and circumstances attending the accident which occurred at Knockshinnock Castle Collier, Ayrshire on the 7th. September 1950 was conducted by Sir Andrew Bryan, J.P., F.R.S.E., at the Ayr Council Chamber of the County Buildings from the 7th. to the 10th. November and from the 13th. to the 16th. November 1950. The final report was presented to The Right Honourable Philip Noel Baker, M.P., Minister of Fuel and Power on the 2nd, March 1951. All interested parties were represented and the The inquiry came to the following conclusions-

- “1). The disaster was due to an inrush of peat which broke through from the surface into the face of the No.5 Heading in the South Boig District from the Main Coal Seam on the night of the 7th. September 1950.
- 2). The No.5 Heading had been driven up towards the surface and had holed through on a deposit of boulder clay, sand and gravel at or near the base of a hollow of channel which had been eroded along the softer parts of the coal bearing rocks.
- 3). This hollow had a maximum depth of about 44 feet , was lined with a bed of boulder sand and gravel, above which was a layer of almost impervious mud overlain by a deposit of peat which extended to the surface.
- 4). The maximum depth of the peat deposit was about 12 feet, of which the top layer, about 2 feet thick, was consolidated above the level of the field drains, the remainder being water logged and in a fluid condition.
- 5). The No.5 Heading holed through when a shot was fired in the breast coal at the face of the heading on the night of 30th. August and released a flow of water draining from the surface through the bed of boulder sand and gravel.
- 6). This flow of water remained almost constant until the morning of the disaster when, owing to an extraordinary heavy rainfall, the flow trebled with the result that it washed away debris under the base of the two hardwood pillars which had been built to give extra support to the props, causing it to collapse. A fall of roof resulted and rapidly extended and so weakened the thin supporting barrier of rock and coal at the face of the heading and next to the the base and side of the hollow, that it finally collapsed. the bed of boulder sand and gravel gave way, then the layer of mud, and the peat flowed into the heading.
- 7). The peat continued to flow for some time and soon filled up miles of the underground roadways and blocked all means of exit from the underground workings to the surface, resulting in the loss of 13 lives and the trapping of 116 other workmen.
- 8). Although the position of the deposit of peat was shown on the geological survey map of the district and this map had been consulted in the planning department,

the symbol indicating the presence of peat in the field concerned in this disaster was overlooked.

9). The field concerned had been visited on several occasions by officials, but they were misled as to the true nature and character of the ground by its superficial appearance due to limited effect of the field drainage system.

10). A proper examination of the nature and character of the ground in the field was not made by colliery management nor by the planning engineers at any time either before No.5 Heading approached the surface or after the heading had reached the outcrop beneath the superficial surface deposits.

11). In my opinion the subject to questions of legal interpretation, there was a contravention of Regulation 29 of the General Regulations, 1920 (Working under Moss, etc -Precautions) in that the No.5 Heading had been worked under a deposit of peat with a depth of cover of less than 60 feet or ten times the thickness of the seam, without taking precautions required by the Regulation.

12). There was a weakness in organization in that insufficient arrangements were made to ensure that the planning engineers were kept adequately informed of the subsequent changes disclosed by the progress of the workings in the No. 5 Heading Section to enable them to check the accuracy of the forecasts in the development plan, made in April 1950, for the district of the mine.

13). In my opinion and subject to the questions of legal interpretation, there was no contravention of Section 67 or of Section 68 of the Coal Mines Act, 1911."

As a result of the Inquiry Sir Andrew Bryan made the following recommendations-

"1). a copy of any map and of any relevant memoir published by the Geological Survey and relating to the district in which the mine is situated should be kept in the office of the manager of the mine and also in the offices of the surveying and planning departments relation to that mine.

2).Where the geological map or any boring, mining geological or other records shows the presence of peat or any unconsolidated deposit within, or in the proximity to, the boundaries of the mine, the limits and nature of such deposits should be shown on the working plan of the mine, and the General Regulations, 1920, No. 1423 (Workings under Moss etc. - Precautions) should apply to all working under areas so defined.

3). Before any working approaches within 600 feet of the surface until the nature of the intervening ground between the surface where the nature of the intervening ground between the surface and the expected horizon of the working had not been determined, the manager should obtain the advice of a competent field geologist as to the nature of the intervening ground and should consider such advice in determining which precautions, in any, are necessary before further working in undertaken.

4). No working should approach within 150 feet of the surface until the nature of the intervening ground between the surface and the expected horizon of the proposed working had been determined by boring or other approved means.

5). Except with the permission of the inspector and subject to conditions as he may think fit to impose, any working which is being driven towards the surface or a superficial deposit and had approached within 50 yards of the surface of the base of the deposit should not exceed 10 feet in width.

6). Research should be started to explore the possibilities of a rapid and accurate geophysical or other method of surveying to determine the thickness nature and extent of all unconsolidated superficial deposits.

7). The provision of some form of simple, light-weight, self-contained breathing apparatus which could be worn by any workman after minimum instruction should be investigated without delay and, when such apparatus is available, arrangements should be made to maintain supplies at all General Rescue Stations or other suitable centres in every mining district.

8). Where practicable, the provision of a 'escape' roadway giving direct access to an adjacent mine should be considered.

9). Consideration should be given to the provision of a type of telephone cable for underground use in the mines which will be highly resistant to damage from inrush, inundation and fire.

10.). A suggestions I made in my Final Report on the Explosion at Whitehaven 'William ' Colliery, (Cmd.7410) namely that consideration should be given to the desirability of providing temporary erections such as tents or prefabricated structures to cope with the accommodation necessary for large numbers of persons employed in rescue and recovery operations at the time of a disaster, should be acted upon.

11). In the National Coal Board organization the status and responsibility of all Planning Engineers, Planners and Surveyors at all levels should be clearly defined in relation to those of Colliery Agent and Managers."

Sir Andrew concluded the report with an expression of thanks to every one who had taken part in the rescue operations and the inquiry.

The George Medal was awarded to Houston and Park for their conduct during the events following the disaster. When salvage squads eventually were able to enter the pit they found evidence that the missing men had survived the original fall. On a bait tin which had been left by one of Houston's party, and he had left unopened, a salvage worker found someone had opened it and not a crumb of the contents remained. Later messages were discovered on a conveyor belt signed by Dalziel and Howatt. The message was dated 12th. September, three days after the main party's escape. It was timed at 6.10 p.m. and it informed the readers- "Still trying. We intend to make for No.21 Road" but every exit had been blocked and the mine became their tomb.

CRESWELL. Creswell, Derbyshire. 26th. September, 1950.

The Creswell Colliery was previously owned by the Bolsover Colliery Company Limited and was taken over by the National Coal Board in 1947. It was in the No.4 Sub-Area of the No.1 area of the East Midlands Division and was situated in Derbyshire near the Nottinghamshire border about six miles south west of Worksop. The mine was under the supervision of Mr. G. Inverarity who, after a spell as a spare manager under the Bolsover Colliery Company, was appointed manager of the Creswell colliery in November 1946. Mr. G.S.W. Payton was appointed undermanager in January 1948 after a period as Safety Officer at the colliery. To assist them they had six overman, a safety officer, a training officer and a number of deputies and shotfirers. The Agent was Mr. J.A. Tankard, the Sub-Area manager was Mr. W.E.S. Peach, the Area Production Manager, Mr. J. Brass, the Area General Manager, Mr. W.V. Sheppard and Mr. W.H. Sanson was the Divisional Production Manager. All the officials from the undermanager upwards held First-Class Certificates of Competency under the Coal Mines Act, 1911.

The mine had two circular shafts each 18 feet in diameter and these were completed in 1896. They were sunk to the Top Hard Seam at 44 yards. The High Hazel seam was intersected by both shafts at 329 yards. In 1939, the upcast or No. 2 shaft was sunk to the Low Main seam and a connection was made to the No. 2 shaft. In 1933 a cross measure drift was driven at 1 in 3 from the Top Hard up to the High Hazel seam to enable faces in this seam to be opened out. The output from the High Hazel was gradually increased and that of the Top Hard declined. Work ceased in the Top Hard in 1941 and after that all the output came from the Top Hazel and at the time of the disaster an extensive area of this seam had been worked out.

The High Hazel had an average inclination of 1 in 30 and was about 4 feet 6 inches thick. It was worked by an advancing longwall face in three main districts which were known as the North-West, South-East and South-West Districts. There were 1,144 men employed underground and 355 on the surface. During the three months prior to the fire,

the weekly output of the colliery was just over 14,000 tons, about half of which came from the South-West District. The coal from all three districts was transported to the pit bottom by trunk-belt conveyors and wound at the downcast shaft. Coal filling and winding were done on the day and afternoon shifts. Repair and maintenance were done mainly on the night shift but also both the other shifts. The general sequence of the work on the coal faces was, cut, fill, pack, and turnover.

The South-West District was the one affected by the fire and there were two main roads serving the district, the Main Intake, which was used for the transport of coal to the trunk-belt conveyors and the Main Return, which was used to transport men by an endless rope haulage mon-riding set. These two main roads were about 60 yards apart for one and a quarter miles from the pit bottom and 34 yards apart for the remaining one and a quarter miles. A little more than half way inbye a downthrow fault, known as the Elmton Fault, was encountered. Originally, the South-West District was laid out to work the coal only up to the fault but in 1945, it was decided to work coal beyond the fault. In that year two dip drifts, the intake dipping 1 in 9 and the return dipping 1 in 6 were driven through the fault, which at this point was in the form of a trough, the first throw being a downward displacement of 195 feet, followed by an upthrow of 85 feet which made the total displacement 110 feet.

Apart from the 57's heading, which was winning out a new face not far inbye from the shafts, there were five double-inlet faces in the district. Of these the No. 59's, the only one on the outbye side of the fault, was a double unit face, 295 yards long. These were undercut by machine to a depth of 4 feet 6 inches in a dirt band one foot above the floor. The coal was shot down by explosives and hand filled on to conveyors. It was regarded as a standby face and was worked only as required.

Beyond the Elmton Fault there were four working faces and a abandoned face, No. 63's, which had been stopped when it reached an unproved fault at 840 yards to the right off the main intake. Materials had been drawn off this panel except for the supports in the right hand side of the gate and the central loading gate. The four working faces were known as the 74's, 64's, 68's and 65's respectively.

The 74's face was 167 yards long and formed the development panel for the area. Four gates were formed in this development to provide two intake and two return airways. The working face was two and a half miles from the pit bottom. No.64's was a double unit face, 300 yards long which had advanced 1,000 yards to the left of the main intake. The 68's face was 450 yards long but only two thirds of its length was in production. This part of the face had advanced 410 yards to the left of the main intake, while the remaining one third had advanced 450 yards and had been stopped. No 65's was a double unit face 330 yards long which had advanced 330 yards to the left of the main intake.

With the exception of the No.68's, the working faces were machine cut at the floor level to four feet six inches and the coal hand filled onto conveyors at the face. The production in this part of the 68's was worked by a Meco-Moore cutter loader which took off coal to a depth of three feet three inches along the face and loaded it onto a face conveyor. Coal from the face conveyors in all faces was transported by gate conveyors to the main trunk conveyor system on the South-West District main intake road. Steel props and bars were used throughout on these faces and the 'three props per bar system' was in general use. The normal thickness of the seam on these faces was 4 feet but from, 5 feet 6 inches of top coal was left up to form the immediate roof.

Prior to 1948, under-tub endless-rope haulage had been used for transporting coal to the pit bottom along the main haulage road but in July 1948, a complete change over was made to trunk-belt conveyors to a central loading point 90 yards from the pit bottom. The belts wee 7-ply with rubber facings. At the time of the accident, this system comprised three conveyors in tandem. No.1 belt from the no.1 transfer point near the pit bottom to No.2 transfer point, a distance of 1,703 yards. No.2 belt from No.2 transfer to No.3 transfer point, a distance of 1,080 yards and No.3 belt form No.3 transfer for a

distance of 1,060 yards to a point where the gate conveyor from 74" face delivered its coal. With the exception of the coal from the 59's face which was delivered to the No.1 belt at a point 69 yards outbye the No.2 transfer point, the coal from all the faces was fed on to the No.3 belt. The three main belts were each 36 inches wide and were driven by 100 h.p. Sutcliffe Goliath Units. The belt speed was about 350 feet per minute. Each transfer point was covered by a sheet metal canopy and water sprays were fitted to keep down the dust. The roadway throughout was of ample cross section and an endless-rope haulage was installed along one side of the conveyors for the transport of supplies. On the outbye side of the Elmtion Fault, the roadway was supported by steel arches, camber girders and straight girders, but to the inbye side of the fault, steel arches were used as standard practice.

The compliment of workmen on the South-West District on three shifts was 93 on the day shift, 163 on the afternoon shift, and 122 on the night shift. On the night shift of the 25th./26th. September, because of the transference of the workmen from the South-East District, 133 persons were employed in the South West District.

The general direction of the ventilation entered the main South-West intake conveyor road at about 60,000 cubic feet of air per minute and approximately one mile inbye was split to ventilate 59's panel, leaving 44,000 cubic feet of air per minute to pass on down the intake drift through the Elmtion Fault. After this splits were taken off to ventilate the 64's and 68's on the left side of the face and the 65's on the right side of the face. The remainder of the air went forward to the 74's development face. Safety lamps were used throughout the mine.

The fire fighting measures both underground and on the surface were well organized. Fire-fighting water ranges were laid along the main intake airways from the shafts to point near each working face. Hydrants were installed at 250 yard intervals and at points such as gear-heads, junctions and transfer points. Fire stations were arranged at points along the main road and rules laid down for the organisation and conduct of fire fighting and drills carried out regularly.

The arrangements to transport the men to and from work in the South-West District consisted of two man-riding trains operated in the main return airway by an under-tub endless-rope haulage known as the 'Paddy'. The trains were attached to the rope, one at the outbye end and one at the inbye end, so that one train travelled inbye when the other was travelling outbye. A three rail track was used with a length of double track at the 'meetings' which was between 400 and 500 yards outbye from the top of the Elmtion Drift. There were telephones in the South-West District and the main underground system was controlled from switch board in an office in the main return airway near the bottom of the upcast shaft. One man was employed at the switchboard during a shift.

All parties are agreed that the fire started at the No.2 transfer point about 3.45 a.m. on the 26th. September 1950 when 232 persons were underground. 133 were employed in the South West District beyond the scene of the fire. Shortly before the fire started, two work men left the district leaving 131 inbye at the time. Of these 51 people escaped by way of the return airway and the remaining 80 were caught by fumes and lost their lives. They were all later certified as having died from carbon monoxide poisoning.

During the day shift of the 25th. September, it was observed that No.2 trunk belt was scored. At the beginning of the afternoon shift that day, J.R. Hindley, a belt maintenance man, was called to examine it. He found a groove about 6 inches from the belt edge on the supplies side of the belt and it extended along the belt for almost 300 yards. In no place was the belt cut through but for a short length the groove had penetrated about two thirds of the thickness of the belt. Hindley examined the belt with others for all its length and found nothing that could account for the grooving. The conveyor was started and Hindley inspected it at intervals during the shift. His last inspection was at 8.30 p.m. A full shift of coal had been transported without mishap and arrangements were made for Hindley to stay overtime to repair the belt. These arrangements were cancelled because H. Godfrey, the overman in charge of the district on the night shift, found that a

length of coal on No.65's face had not been filled off, and gave instructions for the belt to continue running until the coal was cleared.

When Joseph Morris, the No.3 transfer point attendant, arrived at his place at the start of the night shift at about 11 p.m. He examined the belt and estimated that the grooving extended for 200 yards and that for about 6 to 8 yards was cut through. He said he was able to push his hand through the slit. The condition of the belt had clearly become worse since Hindley noticed the damage but it was started and nothing was noticed until 3.10 a.m. when Morris signalled to W.H. Hird, the attendant who was stationed at the telephone 70 yards on the outbye side of No.2 transfer point, to stop the No.2 belt. Hird did so and Morris then telephoned Hird through the pit bottom exchange and told him that the belt was torn and had a 'trailing end'. He arranged to travel outbye while Hird travelled inbye so that they could find where the damage to the belt had started. Morris set off and when he was 400 yards from the no. 2 transfer point he encountered smoke and when still 150 yards away he saw fire at the transfer chute and flames between the chute and the sidewall of the roadway.

Hird went 70 yards inbye to the No.2 transfer point where he saw the transfer hopper full of torn belting. He described it as, "if three or four men each side ... had been laying it out." He then returned to the telephone and informed the men in charge at the pit bottom telephone exchange what had occurred and asked to be put in contact with Godfrey, the night overman in charge of the South-West District. During this time the No.1 belt continued to run although Hird stated that he had signalled for it to stop. A few minutes later Hird saw fire in the chute at the transfer point and again telephoned the pit bottom for the power to be cut off and for help to be summoned. He had just completed this call when Joseph Morris arrived and asked him if he knew which transfer point was on fire. Hird did not look at his watch but it was then 3.45 a.m. From the time No. 2 belt stopped until the fire was discovered, Morris had travelled nearly 1,000 yards, including 350 yards up a drift rising at 1 in 9, examining the conveyor structure and belt on the way. Hird, although he was the first to see the fire made no efforts to deal with it. Morris, on the other hand, as soon as he arrived, asked about portable fire extinguishers. There were two at the 59's junction and he applied the first with little effect, and the second failed to function.

The fire station was on the inbye side of the No.2 transfer point and soon became inaccessible because of the fire. When the station was first established it conformed to the normal and good practice of the colliery, it was sited on the intake side of the vulnerable point, because it then served the old 59's junction which was 260 yards inbye from it. Even if the fire station had been on the outbye side of the transfer point, it was doubtful whether it would have altered the course of vents. Before the actual fire was discovered by Morris and Hird, strips of torn belting within the metal enclosure of the chute were probably alight and so inaccessible that portable fire extinguishers or buckets of sand would have been of little use. After experiments at the Buxton Research Station it was found that nothing less than copious amounts of water would have put out the fire.

Immediately Hird's message had been received, F. Kirk, the pit bottom telephone exchange attendant, sent warnings of the fire to the South-West District and called for fire fighting teams from other parts of the mine. The manager and the undermanger were informed at 4 a.m. and messages were sent to the Central Rescue Brigades at Chesterfield, senior local officials of the National Coal Board, H.M. Inspector of Mines and the officials of the Mineworkers' Union. When the undermanger got to the pit, he spoke to the manager at his home by telephone, and then went underground. He was assured that the inbye workmen had been warned of the fire and that they were on their way out. He then went straight to the scene of the fire.

When he got there he found some members of the pit fire fighting teams led by J. Rodda, overman in charge of the North-West District, had been in action since shortly after 4 a.m.. They had travelled in the 'Paddy' in the return airway, taking with them a

supply of hoses and nozzles. The fire fighters at once coupled up their hoses to the water man but got little more than a trickle. The flow of water was so small that their efforts with the hoses was described at the Inquiry as- "just like standing in a garden watering flowers" The water supply at normal pressure had failed unaccountably. Repeated messages were phoned for an increased water supply. As soon as the undermanager arrived he telephoned instructions for the source of the trouble to be investigated straight away without delay. It was then 5.15 a.m.

In the meantime, supplies of portable fire extinguishers, sand and stone dust were collected and sent to the scene of the fire. These were used with great effect and the impression was gained that the fire had been got under control. As a result a message was sent to the surface that the fire was nearly extinguished. This was not the case. The steam and smoke in the roadway had reduced visibility to practically nil and had masked the spread of the fire along the roadway, an extension which, no doubt, had been accelerated when the burning No.2 belt, which was still under tension, broke and the burning end sprang inbye.

At 5.20 a.m. a team of trained rescue brigade men from Chesterfield arrived at the fire but because of the lack of a water supply they were unable to do any real fire fighting work. While the fire fighters continued with portable extinguishers the rescue men put on liquid air apparatus and tried to get past the fire in an attempt to stop it spreading inbye. The heat was too great and the attempt failed.

The lack of water supply was later found to be the result of a set of unfortunate coincidence. The underground fire mains were supplied constantly from a 1 inch pipe from the No.2 upcast shaft but the quantity was only sufficient to supply the dust sprays. For the larger quantity of water required for fire fighting, there were 5 inch pipes on a rising main in the No. 1 shaft. During the night shift, this main was fed with water from the the Top Hard pump but during the other two shifts the water was fed into the main from surface tanks through suitable valves. The routine control for the change of water supply to the shaft main was well established but unfortunately, for the first time for many years, the Top Hard pump failed to start at the commencement of the night shift of the 25th./26th. September and the fitters who examined it considered that it could not be repaired during the shift. The pumpman informed H. Godfrey of the break down but neither the overman nor the fitters thought it necessary to inform any surface official so nothing was done to adjust the surface valves to ensure that the main was fed with water from the surface tanks.

When the hoses were coupled to the fire main near the seat of the fire, which was about 175 feet above the shaft bottom, the water supply was almost nil. The failure at a critical time proved disastrous and costly. The position was not put right until a considerable time after the arrival of the colliery engineer at 5.10 a.m. but by the time a reasonable amount of water was available, the fire in the chute at No.2 transfer point had burned itself out and the fire had spread a long way inbye. Water was still necessary to cool down the hot, smouldering material.

Another attempt was made to reach the advancing fire by working forward along the roadway, but because of the damage to the roof supports, the effects of heat and water on the strata and the deterioration of the roof and sides, conditions became so dangerous that the attempt was abandoned. Later temporary support were set to try to reach the advancing fire but only 60 yards was made and the erection of seals became essential and stopped all further fire fighting efforts.

While this was going on, several men from the inbye workings in the South-West District had come out safely through the main return airway. At about 5 a.m. J.W. Turner who was working inbye, came out by way of the 59's loader gate. He had travelled by the main return to 59's right-hand return, over the overcast on the main intake and then along the 59's right side face. On his way he had opened the doors at the overcast and saw the fire raging under it. He was in a distressed condition and reported that there

were more men behind him. The fire had travelled at least 125 yards inbye in about one and a quarter hours.

It was realised that the men inbye were not getting out as expected and rescue teams were at once sent into explore the main return. They found one body about 500 yards inbye from 59's left return gate and brought to to the fresh air base. Artificial respiration was tried but there was no response. eventually the rescue teams brought out two other bodies and reported that they had seen tow more. By this time the smoke in the main return at 59's left side return gate was very dense and had a very bad effect on the eyes of the rescue men. A canary carried by the rescue men showed that the atmosphere was deadly that is was impossible to think of anyone being left alive in the workings. It was decided that, with the exception of parties that would made exploration of the main return towards the shaft, rescue work should be stopped. The exploring parties reached the stable slit without finding anyone.

A conference of the officials of the National Coal Board, the workmens' Unions and the Inspectorate was called to discuss the position and decide of any further action. The meeting came to the unanimous conclusion that, since there was little hope of finding anyone left alive and the dangerous conditions prevented any fire fighting, the only other possible way of extinguishing the fire and avoiding the risk of a firedamp explosion, was to seal off the district. The sites of the seals were agreed and arrangements were made for improving the haulage facilities to transport the necessary materials inbye. During this period, the rescue teams had a well earned rest.

After examinations of the area it was found that the smoke was less dense and a discussion took place as to the possibility of recovering the ten bodies that had been seen by the rescue man. It was agreed that this should be done. More bodies were found just beyond the point where the ten were found and altogether 47 bodies were recovered. Conditions were found to be deteriorating and it was advisable to with draw the rescue parties. The rescue men had located 27 other which left six men that were unaccounted for.

The stoppings were built with sand bags, the intake stopping was 8 yards long and the return stopping, which was built under very difficult conditions by men wearing breathing apparatus, was 7 yards long. The outbye ends of the stoppings were strengthened by 3 feet thick brick walls. The atmosphere was constantly sampled and eventually there was an indication that the fire was out. A meeting was called by all interested parties on the 18th. December 1950, when it was decided to set up a panel of experts to draw up a plan to re-open the district and have it ready for work during the Easter holidays which began on 22nd, March 1951. It was thought that this would give ample time for the strata to cool down.

With the start of the Easter holidays, the work of re-opening the district began and rescue teams broached the seals. Careful control of the air passing into the district was the methane content was monitored. Operations went according to plan and the district was cleared as far as the bottom of the Elmtion Fault drifts but the quantity of air was restricted by a heavy fall on the conveyor road between 59's timber slit and the compressor slit at the top of the Elmtion Drift. At the time there was sudden drop in atmospheric pressure which liberated gas from the inbye panels with which the ventilation could not overcome. It was decided to seal off the district once again but before doing so, 27 bodies were recovered and two more located. This time the seals were built in both roadways at the top of the Elmtion Drift.

During the exploration it was found that the fire had extended as far as the No.2 transfer point to the outbye side of the compressor slit, a distance of 610 yards. The new position of the new seals allowed a full inspection of the all the fire area and enabled the conveyor road to be repaired so that full ventilation could be restored. The final clearing of the working panels was completed on the 19th. August 1951 and the remaining six bodies recovered.

Bodies recovered on the 26th. September 1950.

In all cases death was due to carbon monoxide poisoning.
Leonard Bower aged 38 years, shotfirer.
Harry Godfrey aged 51 years, overman.
Horace Attenborough aged 45 years, packer.
William Henry Bird aged 39 years, ripper.
John Henry Bowden aged 29 years, Meco Moore operator.
Ernest Briggs aged 33 years, packer.
John William Brocklehurst aged 44 years, packer.
Robert Brough aged 36 years, cutterman.
Alfred Edgar Bryan aged 56 years, packer.
Herbert Stanley Buckle aged 48 years, gummer.
Sam Cocking aged 42 years, cutterman.
Ernest Deakin aged 60 years, gummer.
Ernest Dodd aged 37 years, ripper.
John Dodd aged 45 years, packer.
Fred Doncaster aged 27 years, conveyor erector.
John William Doxley aged 45 years, packer.
George Ellis aged 51 years, packer.
Charles Foulkes aged 49 years, cutterman.
George William Gillert aged 38 years, ripper.
Kenneth Amos Goucher aged 42 years, conveyor erector.
Peter W. Green aged 53 years, packer.
C. Hemmingray aged 25 years, conveyor erector.
Cecil Hendley aged 34 years, cutterman.
Reginald C. Holmes aged 44 years, cutterman.
Arnold Hutton aged 48 years, packer.
J.T. Jackson aged 58 years, gummer.
Robert James aged 52 years, packer.
Ernest Johnson aged 36 years, packer.
E. Johnson aged 46 years, packer.
Reginald Kirk aged 39 years, ripper.
William Mellish aged 55 years, steel supervisor.
Edward Millward aged 44 years, packer.
Ernest Leslie Needham aged 44 years, stone contractor.
William Henry Orvice aged 49 years, conveyor erector.
Kenneth F. Robinson aged 25 years, packer.
G. Sydney aged Rogers aged 44 years, ripper.
Victor Rose aged 52 years, cutterman.
Leslie Rutherford aged 25 years, cutterman.
Thomas J. Senior aged 42 years, packer.
J. Shaw aged 56 years, ripper.
Herbert Shipley aged 38 years, cutterman.
Thomas Smith aged 51 years, packer.
Thomas Traylor aged 43 years, cutterman.
Robert William Thomas Walker aged 38 years, packer.
C. Ward aged 30 years, packer.
Frederick Whitlam aged 52 years, packer.
George Yearham aged 57 years, face timberman.

Bodies recovered on the 25th March, 1951.
Leslie Marshall aged 42 years, deputy.
Reginald Teasdale aged 46 years, supports economy officer.
William Adams aged 51 years, packer.

Frederick Barker aged 41 years, ripper.
Lee John Buxton aged 59 years, steel supervisor.
Allen Davis aged 63 years, stone contractor.
Leslie Dodd aged 47 years, ripper.
Tomas Henry Evans aged 50 years, packer.
Gordon Fox aged 62 years, ripper.
Leslie Hancock aged 28 years, packer.
James Arthur Harrison aged 60 years, cutterman.
Thomas Hart aged 39 years, datal.
John William Hunphreys aged 50 years, ripper.
Albert Lewis aged 46 years, packer.
Edward Limb aged 55 years, datal.
John Henry London aged 48 years, ripper.
William James London aged 51 years, packer.
Albert Cecil Mallender aged 47 years, ripper.
William Mellish aged 36 years, datal.
Eric Parkin aged 36 years, cutterman.
Roberyt Idris Price aged 34 years, packer.
Arnold Loftin Robinson aged 29 years, packer.
James Lewis Sadler aged 41 years, ripper.
Thomas Arthur Severn aged 46 years, datal.
William Ernest Stonach aged 36 years, ripper.
Joseph Taylor aged 42 years, face timberman.
George Wass aged 37 years, packer.

Bodies recovered on the 11th. August 1951.
Thomas William Hunt aged 51 years, deputy,
Harry Clarke aged 46 years, ripper,
Geroge Charles Cope aged 59 years, datal,
McDara Connolly aged 28 years, ripper,
John Edward Oliver aged 53 years, ripper and
Carey Gresham Thorpe aged 46 years, gummer.

The inquiry into the causes and circumstances attending the accident which occurred at the Creswell Colliery on the 26th. December 1950 was held by Sir Andrew Bryan, D.Sc., F.R.S.E. at the Miners' Institute, Creswell on the 17th. October 1950 and the evidence of witnesses was heard up to the time the fire was sealed off. The inquiry was adjourned two days later and resumed on the 27th. November 1851. the final report was presented to The Right Honourable Geoffrey Lloyd, M.P., Minister of Fuel and Power, in June 1952.

Sir Andrew Bryan concluded that-

“Following the failure to effect timely repairs to the badly damaged conveyor belt which resulted in torn strips of belting collecting in the No.2 transfer chute, the disaster was due to four successive causes

- 1). a rapidly starting and growing fire spreading in the main-intake airway
- 2). the failure of the fire fighting arrangements
- 3).some delay in warning the men inbye and,
- 4). the main return was the only means of escape for the men on the inbye side of the fire. Unless fires could wholly be prevented, and it is not possible to be sure of this, then there is a potential hazard from them and it is necessary to consider how best this hazard can be mitigated by action under those four heads. There is little doubt that recent practice in many mines leaves much to be desired and that it can and should be improved.”

The Inspector put forward the following recommendations-

“1). PREVENTION OF CONVEYOR FIRES.

- a). The roadway should be straight, well graded and large enough to allow ample clearance above and below as well as on both side of the conveyor. ideally, the largest lump of mineral conveyed should be able to fall sufficiently clear to avoid rubbing the belt.
- b). All parts of the roadway where there are transfer points or driving units should be of fireproof construction, extending for five yards on either side of such places. Non-inflammable material should be used for pillars supporting the conveyor structure, and the roadway, in general, should be kept free from combustible material and especially from accumulations of coal dust.
- c). As soon as they are proven in practice and are commercially available, only belts which are non-inflammable or are highly resistant to fire should be used.
- d). Automatic safety devices to prevent overloading, belt-slip, overheating and piling up at transfer points and to detect damaged belts, should be developed and used.
- e). Attendants should be stationed at all transfer points not safeguarded under d).
- f). Competent persons, specially trained for the work, should be appointed to patrol trunk conveyor system when in operation and for the hours after stopping.
- g). Effective means of stopping a conveyor from any point along the roadway should be provided.
- h). Substantial damage to conveyor belts should be reported forthwith and should be examined by a competent official who should have authority to stop the conveyor and repair the damage.

2. FIGHTING OF CONVEYOR FIRES.

- a). The fire-fighting organisation of every colliery should be thoroughly checked and improvements effected where necessary, and the need for speed in action should be emphasised. in particular, special attention should be paid to the training (which should include fire-drills) and the calibre of the fire-fighting personnel
- b). Underground fire stations should be situated in the intake side of vulnerable points and when the material or equipment at these point is moved, the fire station should be moved to meet the new conditions.
- c). Persons stationed at transfer points or near fire stations should be trained in the use of portable fire-fighting appliances provided and should be physically capable of using them in an emergency.
- d). Fire-fighting water mains should be installed throughout and the water should be supplied from a source which feeds into them directly and continuously. The fire mains should be capable of providing sufficient water at adequate pressure at any transfer point, and tests should be made at suitable intervals to check the quantity and pressure of water available. The pressure of the water supply at any transfer point should be measured at the beginning of every working shift and the result should be recorded. A conveyor should not run if the supply of water is inadequate.

3. WARNING MEN INBYE.

- a). Where the lives of men are endangered by a fire, a responsible official should be charged with the sole duty of seeing that the threatened men are warned without delay and that everything possible is done to facilitate their escape.
- b). There should be included in the code of signals used on telephone systems a distinctive signal to indicate that a state of emergency exists which requires the immediate withdrawal of the men. It would be an advantage if this alarm signal could be heard by as many as possible of the men threatened by the danger.
- c). Inbye telephones should be sited as near as practicable to the working faces and should be so placed that there is always someone in their vicinity during working hours.

- d). Underground telephone exchanges should be ventilated by intake air and arrangements should be made before-hand to have them specially manned in the event of an emergency.
- e). Repairs which would interfere with the running of man-riding trains in an emergency should, as far as possible, be avoided when a full shift of men is at work inbye.

4. MEANS OF ESCAPE.

- a). Wherever practicable, there should be two intake airways and these should be provided for all major ventilation districts in all new mines or new developments in existing mines.
- b). Underground details of improved forms of self-rescue apparatus should be expedited.
- c). As soon as an emergency arises, man-riding and other travelling facilities in escape roads should be cleared for action.
- d). Where rope-haulage man-riding arrangements are situated in return airways, arrangements should be made, where practicable, to ventilate the haulage engine-house by intake air."

EASINGTON. West Hartlepool, Durham. 29th. May, 1951.

The colliery was situated on the coast of Durham between the ports of Seaham Harbour and about nine miles north west of West Hartlepool. There were two principle shafts, both circular, 20 feet in diameter. The North Shaft, the downcast was sunk to the Hutton Seam at a depth of 1,130 feet. The South shaft, the upcast was 1,500 feet deep to the Hutton Seam. Both shafts were used to wind men and materials. There was a third shaft, the West, 470 feet deep which was connected to the South Shaft by a drift at 164 feet. Sinking was started in 1899 but coal drawing did not start until 1910 because of difficulties encountered in passing through the water bearing strata.

The mine was one of eight in the No.3 Area of the Durham Division of the National Coal Board. The principle officers were the Area General Manager, Mr. F.W. Fry, the Area Production Manager, Mr. J.P. Hall, the Group Agent, Mr. T.N. Sneddon, the Assistant Agent, Mr. H.E. Morgan, the Manager of the colliery, Mr. T. Hopkins, the Undermanager of the North Pit, Mr. H.E. Enery and the Undermanager of the South Pit, Mr. A Carr. at the time of the disaster 2. 235 persons were employed underground and 625 on the surface. The average daily output of the colliery was 3, 600 tons.

The mine was worked in three shifts which was the common practice at the time in the Durham coalfield. The foreshift started at 3.30 a.m. and finished at 11.07 p.m., the back shift from 9.45 a.m. to 5.22 p.m. and the night shift from 4. p.m. to 11.37 p.m.. In addition to these main shifts, a repair shift known as the stone-shift, consisted mainly of stone workers and coal cutter operators, descended at 10 p.m. and came up at 5.37 a.m.

The workable seams at the colliery in descending order were the Five Quarter, the Seven Quarter, The Main Coal, the Low Main and the Hutton. Before the explosion there were 14 producing districts in the North Pit of which five were in the Five Quarter, two in the Seven Quarter and seven in the Low Main. Bord and pillar working was usual and the pillars were formed by arcwall heading and extracting by lifts worked by the aid of either pneumatic picks or arcwall machines. Longwall on both advancing and retreating faces was also practised at the colliery.

The explosion occurred in the Five Quarter Seam in the New or West District, which was known as the Duckbill District. It lay to the north west of the shafts and north of an area reserved for the protection of the colliery village. At the shaft in the Five Quarter Seam, including three bands of stone totalling 13 inches, was six feet two inches thick, the roof was of shale seven feet thick, with laminated sandstone above. This was

followed by about seven feet of alternate bands of coal and clay. In the Duckbill District, the seam was about six feet ten inches thick, the shale was thicker than at the shaft and the floor was fairly hard. The seam was 1,050 feet deep and dipped 1 in 32 to the north east.

From the downcast shaft the main haulage road and intake airway extended in the Main Coal Seam for 380 yards to the north and then 640 yards along a road known as the West Level. At this point a stone drift rose 1 in 6 to the north and after passing through the Seven Quarter Seam, entered the Five Quarter. The West Level and its companion roads in the Main Coal Seam continued for about 600 yards beyond the drifts. No coal was worked in this area but it was used for training new entrants and was known as the Training Section. In the Five Quarter Seam from the top of the drifts, three roads, known as the Straight North places, with connecting stentons, continued north. From them, at about 200 yards from the top of the drifts, three roads, known as the First west materials, Belt and Return roads branched off and still further on to the north, were roads that formed the Second and Third West areas. From the Second West roads, a small area was formed into pillars which were then extracted. The Third West places were open but not working at the time of the explosion. It was from the First West Roads that the area chiefly affected was developed.

Up to the introduction of the duckbill machinery in 1948, all these roads were driven by arctwall machines. The coal was blasted down and filled into tubs. The First South places were then driven, using duckbill loaders, into the reserved area. Pillars were formed but faulted ground stopped further development. Full extraction was the attempted in the unreserved part, first by lifts off the pillars, and then by a modified form of longwall retreating using the duckbill loaders. as neither method was completely successful, it was decided to use duckbill machines for winning out retreating longwall faces to be worked by conventional machine cutting, blasting and hand-filling on to conveyors. The Second and Third South headings were driven by this method. The Second South headings, having been driven for their full distance in readiness for the opening of a longwall face, were temporarily idle at the time of the disaster.

The Third South retreating face had been won by two headings driven southwards off the First Main West Materials Road. Originally the headings had been set 140 yards apart and the intention was to keep them parallel to form a face of that length, but the heading which afterwards became the return, struck a fault and was turned inwards to avoid crossing it and as a result the two headings converged slightly. The heading joining them to form the longwall face was 90 yards long. On the 12th. April, the longwall face then began to retreat by means of machine cuts four feet six inches deep. It had been decided to 'cave' the roof in the waste so no packs were built but at the waste edge, a line of steel frame chocks, with mechanical releases, supplemented by wooden bars and props. By the time of the explosion the face had travelled 37 yards.

The only other coal producing workings in the district at the end of May were three duckbill headings, Nos. 21, 22 and 24 which were being driven to open out a longwall face to the north of the First West return airway. a road conveyor system of 30 inch belts delivered coal to the central loading point on the West Level and the Main Coal Seam. The No.1 trunk conveyor extended up the intake drift to the junction with the First West Belt road where it was fed by a No.2 trunk conveyor, which extended the full length of the First West Belt Road. The conveyor was fed from the Second South and Third South belt conveyors and a belt conveyor in No.22 heading and scraper chain conveyors in Nos. 21 and 24 headings. All were linked by a system of sequence control. The district was highly mechanised and the whole of the cutting and part of the loading were done mechanically with all the plant being driven by electricity. Part of the north district was under the supervision of Mr. Emery and he was assisted in this district by a fore-overman, a back-overman and a master shifter in addition to deputies and shotfirers.

The ventilation was produced by a steam driven Walker 'Indestructible' fan 22 feet in diameter which was designed to pass 500,000 cubic feet of air per minute at six inch

water gauge. At the time of the disaster it was producing 423,000 cubic feet per minute at 5.5 inch water gauge. An electrically driven Sirocco fan, 133 inches in diameter acted as a standby. Both fans were on the surface and connected by fan drifts to both the South and the West shafts.

The ventilation system of the mine was complicated by a very long leg, extending seawards in the Hutton Seam and going through a fault into the Low Main Seam for a distance of four miles from the shaft. This had to be balanced against the nearer districts in the upper seams. As a consequence the air flow in these latter districts had to be closely regulated to ensure that enough ventilation reached the workings under the sea.

The ventilation in the Duckbill District was measured on the 16th. May at 23,200 cubic feet per minute were reaching the top of the intake drift. Of this 7,700 cubic feet travelled to the idle places in the Third West District. 11,000 cubic feet per minute and 3,900 cubic feet passed along the First West Materials and Belt Roads respectively. 5,500 cubic feet per minute was taken from these currents to ventilate the standing places in the First South District and this passed through the air crossings direct to the First West Return. the Second South places were ventilated by a current of 4,300 cubic feet per minute passing inbye on the main Materials Road and through two fans in parallel to the heading faces. This current then returned to the West Materials Road and most of it passed along the third South Materials and Belt Roads to the long wall face and outbye along the return. Some of the air may have reached the Third South intakes and the longwall face by passing along the West Materials Road and the extension of the Second South Materials Road to the West Belt Road.

On the 16th. May, the quantity of air passing along the longwall face where the ventilation was restricted by a fall, was 3,200 cubic feet per minute. At the time the Nos. 21 and 22 headings were ventilated through breeches tube by an auxiliary fan situated on the Belt Road. Alongside this fan there was canvas door. Between the 16th. May and the time of the disaster important changes occurred. The fall in the longwall face was cleared and the fan ventilating Nos. 21 and 22 headings was transferred to No.21 stenton. The door to the Belt Road was removed. Further along the Belt Road, another fan was installed to ventilate the No.24 heading and up to the time of the disaster this had run only intermittently. On the 28th. May a second fan was installed in No.21 stenton, so that Nos. 21 and 22 were ventilated separately.

Oldham Type G.W. Electric Cap Lamps were used throughout the mine. The flame safety lamps in general use by the workmen as gas detectors were the Patterson A.1. (magnetic lock) and Patterson A.3 (lead rivet lock), the latter being in the process of conversion to the first type by the lamproom staff as and when the necessary parts were available. The officials were provided with either Wolf Patterson (internal relighting) 7 R or Baby Wolf 7 R.M.B.S. flame safety lamps for gas testing.

The only means of dust suppression in the district were sprays, not enclosed, at the loading point and at the three transfer points. it was said that the sprays delivered about six gallons of water per hour. This method of keeping down the dust had been used in other parts of the mine with success but had not proceeded beyond the experimental stage in the Duckbill District. The cleaning up of coal dust and the spreading of stone dust was done partly by a stone dust team which visited all the districts of the mine and partly by the men regularly employed in the district. The team, under the charge of an official, the 'stone dust man', was made up of seven men and their duty was to clean the floor and sweep the girders and sides, filling the dust into sacks or tubs and then apply stone dust. On the fore shift, a man was employed to clean the conveyor structures and to spread stone dust, and on the back shift a man dusted the roads near the face. On the stone-shift, eight men were wholly employed and others spent part of their time in clearing the spillage and stone dusting. They began at the loading point and at several transfer points and worked towards each other. Spillage was cleared by the men at the loading point. Forty tons of stone dust a month was used in the mine and a man was engaged to take samples. He took 102 samples every week.

The explosion occurred at 4.35 a.m. on Tuesday the 29th. May and by a tragic trick of fate this was the time that there were two shifts in the explosion district, 38 belonging to the stone shift and 43 to the fore shift. Only one of these men was rescued alive and he died a few hours later from his injuries. According to the medical evidence, all the others died almost immediately. Two members of the rescue teams also lost their lives in the recovery operations and the final death toll was 83. None of the 895 people at work in other parts of the mine was seriously affected.

There was no direct evidence as to what happened on that shift before the disaster. The men on the stone-shift, who were due to leave the district about 5 a.m., had been cutting coal on the retreating longwall face, erecting permanent supports in the duckbill headings, building and air crossing at No.22 stenton and in stone dusting. The fore-shift went underground at 3.30 a.m. and in the ordinary course of events, the fillers would have arrived at the face before the explosion but the fact that none had done so suggested that they were kept back because of the condition of the Third South longwall face, a condition which did not seem to have caused great alarm for those who knew about it since those outside the district received no appeal for help. The first intimation of the disaster was a loud bang followed by a cloud of dust.

Frank Leadbitter, a shaft wagon-way shifter, was just outside the shaft-bottom stables and he acted promptly, even though the place was filled with dust and he could not see. He led workmen with him to the shaft bottom and within a few minutes had telephoned a report to the undermanager, Mr. Emery at his home. Leadbitter then went inbye to the West Main curve and tried to get in touch with the Duckbill District by 'phone and getting no response, telephoned a warning to the men at the South haulage junctions. Soon after he was joined by William Cook, fore-overman in the Seven Quarter and Old Five Quarter Districts, who had heard a sound like a heavy fall when he was at the Seven Quarter engine house and had come 500 yards through a thick cloud of dust to investigate. After hearing Leadbitter's story Cook telephoned Mr. Hopkins, them manager, and arranged the withdrawl of the men from the rest of the mine.

The with courage, Cook and a head wagon-way man, D. Smith, went along the Main Coal West Haulage Road in an attempt to get into the Duckbill district. About half way to the main loading point they heard what they thought was another explosion and felt the air current reverse. They started to go back but as soon as the ventilation resumed it's normal course, they turned inbye again. The investigation pointed to what they had thought to be a second explosion was in fact a fall that they found shortly afterwards about 150 yards from the loading point and decided that it would be foolhardy to attempt to get over the fall. They returned to report and near the West Curve they met the undermanager Mr, Emery.

At the surface emergency measures had been taken. A call was made to the Rescue Station at Houghton-le-Spring and at 5.30 a.m. the first rescue team arrived at the colliery. They went underground almost immediately to inspect the fall which they found it impassable and they returned and were sent to explore the West Main Coal Return. It was thought that operations by this route would not be possible and when Mr. Fry, the Area General Manager, arrived it was decided to employ the colliery workmen to make a road through the fall with the upmost speed and explore the airway from the Seven Quarter Second South District which connected with the Duckbill return drift. This road proved to be passable even though some props and doors had been blown out, and Fry, Emery and Station Officer Anderson reached the Duckbill Drifts without difficulty. The air was quite still which indicated that the air crossing at the foot of the intake drift had been damaged. The separation doors in the stenton connecting intake and return had been destroyed and the air was so foul with afterdamp that the canaries carried by the party were overcome almost immediately.

Rescue operations had to be made immediately to deal with a disaster of this magnitude and a fresh air base was established in the Second South Seven Quarter airway about 100 yards back from the Duckbill District return drift. this was by no means

an ideal sight as the materials had to be manhandled for considerable distance but there was no alternative until a passable road could be made over the fall on the West Main Coal Level. In spite of these difficulties, the first team left the base just after 8 a.m. to go along the intake drift. Near the loading point they found a fatal hand, Matthew Williams, alive but so badly injured that he died in a few hours. They saw the bodies of several other men and found that the air crossing had been destroyed.

This team and others that followed, reported that the stoppings between the intake and the return had been destroyed over a large area and it was decided to arrange two teams to operate simultaneously, one sealing off at selected points to re-establish the ventilation and the other to search for possible survivors. This worked well for a time and one of the teams penetrated to the end of the Straight North Headings, a distance of about 1,100 yards but tragically, J.Y. Wallace, the captain of a colliery rescue team lost his life in exploring the First West roads and it was decided that the brigades were penetrating too far into the poisonous atmosphere and both teams were then used to restore the ventilation.

Up to then all the operations had taken place from the first fresh air base but by noon the following day, the ventilation had been established in the drifts up to the No.2 stenton, the Training Section in the Main Coal Seam sealed off and a road made over the fall on the West Main Coal level so the fresh air base was advanced to a point just inbye of the No.2 stenton. By midnight the fresh air base had advanced to the No.14 stenton on the First West Materials Road. Travelling on this road was easier than on the Belt Road.

No survivors had been found and since the atmospheric samples brought back by the teams were highly lethal, it was agreed by all parties that there was no longer any hope of finding anyone left alive. Before they could go any further, it was necessary to increase the quantity of fresh air reaching the fresh air base. The foul air in the First South District was sealed off and air crossings were erected to carry any seepage direct into the return. At this time a cover base was set up in the First West Materials Road junction. This meant that fresh supplies could be kept close to the fresh air base and allowed oncoming brigades to rest before going forward to action. At about 7.45 a.m. on 1st. June, the fresh air base was moved to the No.16 stenton and exploration along both belt and return roads reached the No. 25 stenton.

Some hours later H. Burdess, a member of the rescue brigade exploring the inbye end of the First West Roads, collapsed and died. At the time it was thought he might have been affected by having to pass a number of dead men and, although it slowed down the rate of advance, arrangements were made to bring out all the bodies on the line of travel. Further difficulty was encountered when it was found that the West Materials Road was blocked by a large fall of rock ahead of the No.20 stenton. To bypass this the fresh air base was moved to the Belt Road.

On 2nd. June the base was advanced to the junction of the Belt Road and the Third South Materials Road. Rescue brigades erected stoppings at the entrance to the Second South Headings and built a tube air crossing over the Third South Materials Road so as to convey any afterdamp seeping from this area into the return airway at No.26 stenton.

On the 4th, June the base was advanced to the No.27 stenton and more bodies were recovered. Both Nos. 27 and 28 stentons were closed and although an attempt was made to clear a road through, it was soon apparent that little further progress could be made by men wearing breathing apparatus. Colliery workmen were brought in, but when the afterdamp began to leak into the Material Road it was decided to withdraw everybody and clear the afterdamp from the First and Second South Areas. By 8 p.m. the ventilation had been established and the rescue teams inspected the South North and First West Materials headings and found them clear. At 9.45 p.m. on the 8th. June their task was completed and they withdrew from the mine.

The rescue operations covered a period of 257 hours and during that time 11 officers, 48 permanent corps men and 291 trained colliery rescue workers were employed in the grim task.

Those who died were-

John Anson aged 64 years, shifter.
William Armstrong aged 55 years, datal.
Mark Smart Bedding aged 38 years, filler.
Matthew Blevins aged 27 years, filler.
George Brenkley aged 20 years, filler.
Thomas Brenkley aged 32 years, filler.
Louis Brennan aged 49 years, stoneman.
George Miller Brown aged 50 years, datal.
Bertram Burn aged 25 years, filler.
Emmerson Cain aged 63 years, stoneman.
Frederick Cairns aged 23 years, filler.
George Calvert aged 50 years, stoneman.
James Calvin aged 51 years, conveyor maintenance man.
Frederick Carr aged 50 years, electrician.
George William Carr aged 45 years, timber drawer.
James Carr aged 38 years, timber drawer.
John Edwin Challoner aged 53 years, deputy.
Richard Champley aged 43 years, cutter.
Albert Kerr Chapman aged 44 years, stoneman.
Joseph Charlton aged 42 years, master shifter.
John Clough aged 57 years, shifter.
William Arthur Dryden aged 27 years, filler.
John Ellison aged 19 years, datal.
Charles Fishburn aged 54 years, shifter.
Henry Fishburn aged 32 years, filler.
Thomas Garside aged 20 years, datal.
Joseph Godsman aged 41 years, cutter.
George Gouldburn aged 57 years, mason's labourer.
Albert Gowland aged 51 years, deputy.
Ernest Goyns aged 60 years, stoneman.
Herbert Goyns aged 56 years, stoneman.
John Harker aged 53 years, shifter.
John William Henderson aged 56 years, shifter.
Thomas Heppell aged 31 years, filler.
Daniel Hunt aged 54 years, datal.
Stephen Hunt aged 24 years, filler.
William Hunt aged 43 years, datal.
Arthur Chambers Hutton aged 42 years, filler.
Frederick Ernest Jepson aged 68 years, shifter.
Lawrence Jones aged 36 years, filler.
Thomas Edward Jones aged 35 years, deputy.
Herbert Jeffrey Jopling aged 57 years, shifter.
John Kelly aged 57 years, datal.
William Kelly aged 28 years, filler.
John Edward Armstrong Lamb aged 43 years, datal.
Jesse Stephenson Link aged 44 years, datal.
Joseph Fairless Lippeatt aged 37 years, filler.
Peter Lynch aged 20 years, filler.
Denis McRoy aged 23 years, filler.

William James McRoy aged 31 years, filler.
Robert William Milburn aged 26 years, filler.
Harold Nelson aged 49 years, stoneman.
Albert Newcombe aged 67 years, stoneman.
Norman Nicholson aged 29 years, filler.
Robert Noble aged 45 years, shifter.
William Parkin aged 24 years, filler.
William Edward Forbes Parks aged 62 years, shifter.
Robert Pase aged 63 years, shifter.
Stanley Peaceful aged 37 years, stoneman.
Alexander Penman aged 42 years, cutter.
James Porter aged 32 years, filler.
John Thomas Porter aged 32 years, filler.
Thomas Valantine Rice aged 53 years, shifter.
John Robinson aged 50 years, stoneman.
John George Robinson aged 25 years, filler.
George Scott aged 53 years, datal.
Albert Seymore aged 52 years, shifter
Frederick Sillito aged 52 years, shifter.
George Henry Stubbs aged 60 years, shifter.
Hugh Bell Surtees aged 36 years, datal.
Matthew White Surtees aged 61 years, shifter.
Lawrence Thompson aged 54 years, datal.
Thomas Thompson aged 28 years, underground bricklayer.
Thomas Trisnan aged 43 years, stoneman.
Robert Turnbull aged 64 years, master wasteman.
George Wilkie aged 63 years, shifter.
Reginald Wilkinson aged 40 years, stoneman.
Robert Willins aged 45 years, fore overman.
John Wilson aged 62 years, hauling engineman.
Stephen Wilson aged 60 years, shifter.
Matthew Williams aged 18 years, datal who was injured who died the same day.
John Wallace Young aged 26 years, back overman and rescue worker who was overcome by noxious gases and died the same day.
Henry Burdess aged 43 years, a deputy and rescue worker who was overcome by gas and died 1st. June 1951.

The inquiry into the causes of, and circumstances attending the explosion which occurred at Easington Colliery, County Durham on the 29th. May 1951 was conducted by H.C.W. Roberts, C.B.E., M.C., H.M. Chief Inspector of Mines at the Easington Colliery Welfare Hall, Easington, on 30th. October and finished on the 15th. November. The final report was presented to the Minister of Fuel and Power, the Right Honourable Geoffrey Lloyd on the 31st. July 1952.

The investigation and inspection of the mine went on as the rescue workers were in the mine and made their reports but it was not until the 9th. June that an full inspection of the Five Quarter Seam could be made. The Training Section in the Main Coal Seam remained closed until August. A detailed inspection for aspects of the passage of the flame and sign of coking in the residual dust was made by Dr. Tideswell, Dr. Woodhead and Messrs. Shaw and Bradshaw of the Safety in Mines Research Establishment. dust samples were collected by the Inspectors of Mines and all the electrical plant examined when they had been taken to the surface.

The inquiry also heard details of the deaths of the two rescue men. John Young Wallace was a fully trained rescue man aged 26 years. He was an overman at the Easington Colliery and was acting as captain of the team when he met his death. Half an

hour after leaving the fresh air base with a team exploring the West Materials Road, he suddenly sank to his knees, said a few words from the side of his mouth about sweating and fell over unconscious. It was thought that he died almost immediately as his jaw sagged and the mouthpiece fell out letting the poisonous gasses pass. The team had been walking rather more quickly than usual but they had travelled about 700 yards from the base and no other member of the team became distressed. His apparatus was tested afterwards and found to be in perfect order.

Three days later, Burdess died in similar circumstances. Thirty five minutes after leaving the fresh air base, Burdess signalled to his captain that he was in distress. His breathing bag was inflated and working normally and his nose clip and mouth piece were in place. The other team members were comfortable but he was sweating heavily. His captain and another man tried to help him out but after going only twelve yards he collapsed. Eventually he was carried out on a stretcher and on arrival at the fresh air base, was found to be dead. Examination of his apparatus showed that the automatic relief valve was set to 2.6 inches water gauge and not to 3.5 inches water gauge and that one of the teeth grips in the mouth piece was torn. Otherwise the apparatus was in good order.

There was general agreement as to the direction of the blast. It was outbye an all roads in the First West area east of No.21 stenton and down the West Level. In the light of the evidence presented at the Inquiry it was agreed by all parties that the point of origin of the explosion was at the retreating longwall face. Electricity was not accepted as a source of ignition and no contraband was found. All mechanical apparatus was examined and ruled out as a source of ignition. There was no shot firing at the time and the maintenance of the lamps was very high at the colliery.

There was possibility of sparks being caused by a fall of roof but at the time coal cutter picks were moving at the time of the explosion and they were cutting through pyrites. Mr. Roberts said:-

"I have no hesitation in finding that the ignition was due to sparks caused either by the cutter picks striking pyrites."

As to the origin of the firedamp it was probable that the movements and collapses in the waste would create channels through which the gas could pass from the thin seams 136 to 185 feet above. The Inspector rejected the thesis that a large outburst of gas suddenly occurred.

After a full and searching inquiry the report came to the following conclusions-

- “1). The initial cause of the explosion was a ignition of the Third South longwall face caused by the friction of coal cutter picks on pyrites.
- 2).The main issue of firedamp was from an accumulation in large cavities in the waste behind the longwall face and that it was forced out during a roof weighting.
- 3).The firedamp accumulated because the cavities were left when the roof in the waste failed to cave satisfactorily, and as the face was retreating and had solid sides, there was not the ventilating pressure difference across the waste which, with leakage through the packs into the return, leads to the gradual drainage of firedamp from the waste of an advancing face.
- 4).In the existing conditions adequate caving was unlikely to occur in the early stages of a face opening from a narrow heading and strip packs should have been built until the roof was caving satisfactorily.
- 5).Due consideration was not given to the risk of firedamp accumulation and of roof weighting when deciding on the method of work.
- 6).Whilst the explosion was of firedamp up to the point at which it blew through the intakes at the connections with the First West Materials and Belt Roads, it was thereafter continued by coal dust.
- 7).The coal dust was mainly derived from the conveyor belt and structures, from the vicinity of the transfer points and from the stentons.

8). There were defects in the system of dust sampling and in the measures taken to prevent, suppress and treat coal dust.

9). Insufficient consideration had been given to the system of ventilation, particularly in regard to the use of the auxiliary fans.

10). As a result of weakness in the organisation, there was a lack of effective supervision and control."

The Inspector made the following recommendations-

"1). Caving should not be practised unless the natural conditions and the method of waste edge support are such that the roof in the waste falls regularly to a sufficient height and in a suitably fragmented state.

2). All existing systems of ventilation employing multiple fans should be reviewed and new systems studied to ensure that-

a) The volume of air circulating is large enough not only to avoid the possibility of re-circulating in any place ventilated by an ordinary fan, but also to provide for the adequate ventilation of all other working places:

b) No fan is stopped unless there is alternative means of providing adequate means of ventilation and

c). If it is necessary to regulate a fan it shall be done in such a way as to prevent unauthorised or inadvertent alteration.

3). The emission of firedamp from wastes of retreating faces and means of draining firedamp there from should be investigated.

4). All parties concerned should co-operate to ensure the proper use of firedamp detectors. Also an attempt should be made to develop a combined cap lamp and gas detector that is reliable, gives a good light and is easy to wear.

5). Pending the findings of the Working Party the following precautions should be taken:-

" a). Wherever coal cutters are in use to be used, a survey should be made for the purpose of selecting a cutting horizon, as far as is practicable, clear of any material from which sparks may be struck

b). The general policy in gassy seams with no clear horizon should be to adopt one of the alternatives to cutting or to adopt measures such as stowage or drainage of the wastes to prevent accumulation of firedamp at the waste edge.

c). Steps should be taken to ensure that only sharp picks are used.

d). Water hose with an ample supply of water should be provided within easy reach.

e). Having regard to the dust and sparking dangers, it should be the general policy to avoid dry cutting.

6). Everything possible should be done to accelerate the progress in the direction of preventing the formation of dust and of suppressing such dust as is unavoidable produced as close to the point of production as is practicable. In particular investigations should be undertaken a) with a view to extending the applicability of water infusion and to developing its possibilities for working coal and b) to hasten the development of coal getting and loading machines operated by slow moving forces.

7). A Committee representing the various interests should be appointed to investigate the use of roadway conveyors with a view to determining the limits within which they may be safely and advantageously employed.

8). Research should be expedited on the use and development of improved types of dust barriers and water barriers. In the meantime shelf type dust barriers should be installed on conveyor roads.

9). Test should be made to determine the deposition of dust deposits in roadways, and experiments should be carried out for the purpose of evolving an improved sampling technique.

10). Colliery managements should consult with scientific staff about the organisation of their sampling and stone dusting arrangements colliery dust samplers and men in charge of stone dusting should be given a course of training under supervision of the scientific staff, and should work as a team and to a plan under responsible supervision. From time to time, the management should call upon the scientific service to make check surveys and to advise in precautions desirable at special points.

11). The assessment of dust samples should be speeded up by the more widespread introduction of optical methods.

12). The requirements regarding the medical examination of rescue workers should be reviewed.”

The report concluded-

“Those recommendations on which prompt action is possible have been discussed with the National Coal Board, and I am glad to report that appropriate action has been initiated.”

EPPLETON. Hetton-le-Hole, Durham. 6th. July, 1951.

The colliery was sunk in 1825 and was an extensively worked mine. It was situated near the village of Hetton-le-Hole in East Durham about six miles north west of Durham and south of Sunderland. It was in the Group ‘C’ of the No. 2 Area, Durham Division of the National Coal Board. The seams that were worked at the colliery were the Five Quarter, Main Coal, Maudlin, Low Main and Busty. The Hutton Seam which lay between the two last named had been worked out.

The mine had three winding shafts. The Jane Pit was 12 feet in diameter and went to the Busty Seam at 434 yards. The Caroline Pit was 11 feet in diameter and went to the Hutton Seam and the Lindsay or New Pit was 16 feet in diameter to and 10 feet diameter from, the Hutton seam down to the Busty Seam. The Jane and Caroline shafts were downcasts and the Lindsay was the upcast shaft. The coal from the Busty Seam, in which the explosion took place, was wound up the Jane shaft. The ventilation was by an electrically driven double inlet Sirocco fan, 154 inches in diameter with a capacity of 287,000 cubic feet per minute at a water gauge of 2.3 inches.

During 1939 in order to develop the Busty Seam and to balance the relatively high water gauge required to overcome the extra resistance due to the small shaft area and the extensive workings, a large booster fan was installed in the seam near the upcast shaft. This was an electrically driven Sirocco fan, 120 inches in diameter with a capacity of 130,000 cubic feet at a water gauge of four inches. This was kept running constantly to serve the whole of the Busty workings.

A total of 1,689 persons were employed underground and 403 at the surface and the daily average output of the mine was 2,300 tons, half of which was obtained from the Busty Seam. The Area General Manger was Mr. A.H. Kellett with Mr. J.N.O. Rogers as the Area Production Manager. The Group Agent was Mr. W. Stokoe. The Manager of the colliery was Mr. W.C. Elliott and the Undermanager of the Busty Seam, Mr. S.B. Martyn. The Undermanagers on the other seams were Messrs. T.W. Stout and Mr A.K. Nutman.

The seams were not particularly gassy but firedamp was a hazard in all of them and safety lamps had been used throughout the mine for many years. The lamps in general use for the workmen and deputies were the Oldham G.W. electric cap lamps (self servicing) and Patterson h.c.p. flame lamps. The deputies also carried Patterson G.T.L.9 flame lamps and senior officials Patterson G.T. re-lighter lamps for gas testing purposes. Automatic firedamp detectors were not required by the regulations but they were available if they were required. Selected workmen carried the Patterson Type A.1 flame lamps as gas detectors.

The Busty seam at the colliery ranged between 5 feet and 6 feet thick in a full section with a varying middle band of stone which was very thick in some places. The seam was overlaid with a strong sandstone about 30 feet thick and in some areas this formed the roof. The floor was of dark shale 6 to 15 inches thick underlain by grey metal. The coal had a volatile content of 36 per cent. and gave a good gas coal. The some had been extensively worked for 25 years, mainly by bord and pillar mining using pneumatic picks and loaded into tubs but in an area that had recently been acquired of the defunct Hetton Colliery, which lay to the south of the Eppleton shafts and below a 48 feet drop fault, it was decided in 1945 to adopt American machinery and British arcwall machines to form pillars for later extraction where the question of surface support permitted. The district was developed in 1946 from the South Main Plane to work the seam in a trough area, 200 yards wide, lying between two large faults running in a westerly direction, by forming pillars 37 yards by 17 yards with headings five yards wide to give 33 per cent extraction.

From the beginning, the district was worked by arcwall cutters, Joy loaders and shuttle cars which transported the coal to the No.4 main Board where they discharged on to a Huwood 30-inch belt conveyor feeding a short scraper-chain conveyor loading into tubs which were hauled in sets of 30 by main and tail haulage to the pit bottom. The district was advanced to the working boundary, a distance of about 1,300 yards from the Main South Plane. Support had to be left for surface property on the inbye length and the workings were stepped back for extraction of the pillars, by "brokens" working which commenced in September 1950. At the time of the explosion about 300 yards had been retreated and some 12 acres of goaf laid down. The loading point was stationed about 350 yards from the main line of extraction at the time of the explosion and about 400 yards from the Main South Plane or half a mile from the Jane shaft.

At the face of the section of the seam included a top coal 1 foot 8 inches, a dirt band and coal 1 foot 1 inch and a bottom coal of 2 feet 6 inches, totalling 5 feet 3 inches working height with a bedded sandstone roof. The arcwall machine normally cut in the dirt band to a depth of 7 feet. The band was then loaded by a Joy loader into a shuttle car which discharged into stowbords which were completed or disused headings, but this practice was rather difficult during extraction working and the dirt occasionally was loaded out on to the conveyor belt. The holed faces were broken down by separate rounds each of four shots in the top and the bottom coal, and the coal was then loaded out and conveyed mechanically.

At the time of the explosion the electric machinery installed at the face consisted of one A.B. Universal arcwall coal-cutter, two Joy loaders, two shuttlecars and two portable drilling machines. Electric power was supplied from a sub-station in the district transforming from 5,500 to 500 volts A.C. and a battery-operated shuttle cars were served by an outbye charging station by two 7.5 K.V.A. rectifiers. All the electrical equipment was to British flameproof standards except the Joy loader and the shuttle cars which carried the overall Permissible Certificate' of the U.S.A. Bureau of Mines.

The mine produced about 150 tons per day and the work was organised on three shifts. The first or fore shift descended at 12.22 a.m. and came up at 8 a.m., the second or Back shift descended at 8 a.m. and came up at 3.34 p.m. and the Third shift descended at 3.34 p.m. and came up at 11.24 p.m. Each shift was in the charge of a deputy, under the general supervision of an overman for the whole of the South Side of the Busty. The deputy in charge at the time of the explosion was N. Holmes and those on the second and third shifts were J. Burrows and G., Lumley. The overman on duty at the time was M. Brown. The normal complement of persons employed in the district on each of the three shifts was 12 and a deputy, which included one shotfirer, one driller, two cutter-men, two Joy loader operators, two shuttle car drivers and one machinery maintenance man, with one conveyor loader attendant and two haulage hands outbye.

The deputy on the for shift made his own pre-shift inspection before passing his men inbye the meeting station, which he could carry out in half an hour, but those for the

other two shifts were made by the deputy of the previous shift. The deputy of the third shift, the one prior to the explosion, G. Lumley, made his second and last inspection between 9 and 10 p.m. before his shift finished at 11.10 p.m. The various canvas sheets and brattices were then in position and the ventilation was taking its proper course. During his shift he made frequent tests for gas at the goaf edges and in the working places but found none. Both the lift in the No.8 Left and the 'jenkin' (bord lift) in No.8 Right had been cut during the latter part of the shift but in neither face had the band been cleaned of the coal drilled. The arcwall coal-cutter had been brought back to the outbye side of the No.8 Right turn, one Joy loader was back from the face of the No.5 Skirting. Both shuttle cars were back at the charging station ready for the batteries to be charged.

Lumley met his successor, the deceased deputy, N. Holmes at the surface at 12 midnight and informed him of the position in the 69A District. Holmes went underground at 12.22 a.m. with his shift and probably started his inspection about 12.45 a.m. The last few pages of the Deputies report book, which were blown out from the meeting station, were found torn and illegible and showed signs of burning. There was no legible entry for the last per-shift inspection by deputy Holmes but his inspection of the previous day, the 5th. June, was timed to commence at 12.45 a.m. and was completed by 1.30 a.m.

The amount of work done by the new shift certainly pointed to one of two things. First that Holmes completed his per-shift inspection well before 1.30 a.m. or that he admitted his men piece-meal prior to a full inspection being completed. There was visual evidence in the form of chalked initials and date to indicate that he had inspected all the working places. According to R.W. Evans, the haulage engineman, two shuttle car loads of stone and coal had been discharged to the conveyor belt, one loaded by 1.25 a.m. and it could be assumed these loads came from the No.8 Right face which was found cleaned ready for drilling and charging shot holes. A third shuttle car load was being obtained in No.8 Left face at the time of the explosion. This meant that the Joy loader had first been taken into the No.8 Right face and then to the No.8 Left face and that both the shuttlecars had been moved from the charging stations to these places. No loading had been done with the other Joy loader in the No.6 Skirting but the coal cutting machine had been moved during this shift from outbye of the No.8 Right turn to the junction of the No.6 Bord with No.6 Right Cross-cut. The moving of the machinery would entail passing through the canvas sheets and may have cause an undetected interruption in the ventilation.

The explosion occurred at 1.50 a.m. on Friday 6th. July 1951 during the second hour of the first shift while the full compliment of 13 men were at work. All the nine men on the working face were killed. Seven of them died in the explosion and two died later from their injuries but four others who were outbye at the time escaped without injury. None of the 348 persons at work in other parts of the mine including 39 in the other South Busty workings were affected.

The alarm was raised by the engineman, Evans, who was on the landing at the tub loading point when he felt a sudden rush of air outbye followed by a thick cloud of dust. he telephoned the shaft bottom and the shift overman, M. Brown, who was in the adjoining district at the time. On reaching the district, he went inbye after testing the ventilation. He found the conveyor belt dislodged and lying across N. Holmes, the deputy and near him was Hicks, the shuttlecar driver. Both men were alive but badly injured and he arranged to get them to the surface.

Shortly before 3 a.m. the first rescue team arrived on the scene and explored most of the district before turning back in the return airway owing to thick smoke and fumes. about this time, the undermanager, Mr. Martyn, discovered that the two doors leading to the main return airway for the South Side had been blown open by the blast. This was completely short circuiting the air in the district but the doors were not damaged and they were quickly restored. The rescue teams replaced the canvas sheets inbye which had been destroyed by the explosion and by 3.30 a.m. the ventilation began to take its

normal course. All the bodies were out of the mine by 6.30 a.m. and it was possible by 7 a.m. to explore the whole district without breathing apparatus.

At the face of the No.8 Left, the body of T. Box, the operator was found lying alongside his Joy loader and R. Foster, the driver was in a sitting position facing outbye in the driving seat of the shuttle car. R. Parker, shotfirer and A. Patterson, driller, were found on the No.4 Main Bord between Nos. 7 and 8 Right Cross-cuts. J. Walker and A. Hunter, cuttermen were found at their arcwall machine at the junction of the return airway with No.6 Right Cross-cut. R. Tait, the other Joy loader operator was found on the main bord between Nos. 5 and 6 Right Cross-cuts.

The men who lost their lives were-

Thomas Laverick Box aged 54 years, joy loader attendant. Died from a fractured skull.

Ronald Foster aged 25 years, shuttle car driver. Died from carbon monoxide poisoning and burns.

Richard Parkin aged 32 years, shotfirer. Died from carbon monoxide poisoning.

Albert Patterson aged 40 years, driller. Died from carbon monoxide poisoning.

James Walker aged 44 years, cutterman. Died from carbon monoxide poisoning and extensive burns.

Allan Hunter aged 38 years, cutterman. Died from carbon monoxide poisoning and extensive burns.

Robert Tait aged 38 years, cutterman. Died from carbon monoxide poisoning and extensive burns.

Norman Holmes aged 38 years, deputy. Died later from extensive burns.

William George Hicks aged 32 years, shuttle car driver. Died later from extensive burns.

The explosion district was examined within five hours of the disaster by representatives of the National Coal Board, the workmen and the Mines Inspectorate and they reported on the state of the area, the course and travel of the explosion and the source of the firedamp.

The inquest into the deaths of the seven men killed in the explosion was held at the Miner's Welfare Hall, Hetton-le-Hole before Mr T.V. Devany, the Coroner for the Easington Ward County Durham on the 5th. and 6th. December 1951. He recorded the following verdict-

"These men died as a result of an explosion caused by some fault in the electrical equipment of the Joy loader."

The jury added the following rider-

"The lack of supervision with regard to maintenance and repair of these machines was most alarming and should be immediately rectified."

At a second inquest on the two men who died later was held on the 11th. February 1952 by Mr. C. Morton, Coroner for Sunderland and a verdict of 'Accidental death' was recorded with the following rider-

"The jury considered there had been some negligence in the maintenance of a pit machine and also lack of care in steps taken to discover the presence of gas."

The inquiry into the disaster was held by R. Yates, C.B.E., D.S.O, M.C., H.M. Deputy Chief Inspector of Mines and presented to the Minister of Fuel and Power, the Right Honourable Geoffrey Lloyd, M.P. in April 1952 and the causes of the disaster were examined.

No contraband was found in the workings or in the clothing of any of the victims and smoking in the mine was ruled out as a source of ignition. No shots had been fired during the shift but shotholes in the No.8 Right were being charged at the time of the explosion. All the lamps in the district that were recovered were examined at the Mines Research establishment and passed as safe with the exception of two electric cap lamps. These had damage which was caused before the explosion and it was possible that they could have ignited firedamp in this state but the inquiry dismissed this as being

very unlikely. There was no indication of any frictional heating of any kind. All the fixed electrical equipment was found to be in flameproof condition and of the portable apparatus, the only ones that were in use at the time was the Joy loader and the shuttle car at the face of the No.8 Left and the arcwall machine in the return airway at its junction with the No.6 Right.

The direction of travel of the explosion indicated that the place of ignition had probably occurred in the No.8 Left and this was supported by the fact that the cable adopter box was found separate from the master control box of the Joy loader. The box had been mounted to the control box by means of a flange and spigot machined joint held by four fixing screws and a strengthening bracket, but none of the studs were found in position. Two of them had been broken for some time and the spigot joint was opened to create a crescent shaped gap in the side of the control unit. The interior of the control box was in a very dry condition and contained a quantity of coal dust and many small pieces of coal. This indicated that there had been open access to the inside switch contacts for some time before the explosion. Tests were carried out and showed that this gap could pass the flame to an inflammable mixture.

An assistant electrician, who had started work at the colliery when he was 14 years of age, Gordon Squires, gave evidence to the repairs carried out on the Joy loader machines as did the Shift Foreman Electrical, J.R. Avery.

The inquiry concluded that-

“The explosion had travelled all the working places and roads which were near the faces b) it was principally one of firedamp and there was little if any propagation of coal dust and c) a falling barometer had probably brought about some encroachment of firedamp back in the goaf, and some disturbance of a ventilation brattice or canvas sheet was sufficient to enable firedamp to enter No.8 Left where it was ignited at the master control box of the Joy loader and burned back into the goaf until it reached explosive range and there developed violence which swept from the goaf into the return airway.”

The official Report finished with the following conclusion-

“It is proper to record here that, following this explosion the National Coal Board have reverted to hand hewing and loading at the face of the ‘brokens’ workings for the time being. They have decided to veto the use of shuttle cars in ‘brokens’ or retreating longwall faces in future and to accept a broad interpretation of the General Regulation 132 until such time as amending electrical regulations come into force.

Meanwhile they will adopt as a long-term policy the modification of the foreign apparatus now installed in their mines to our flameproof standards. They have also effected a considerable improved design of adopter for the main entry cable on Joy loader machines and a raised standard of supervision of the electrical apparatus, especially that employed on the coal face.”

WEETSLADE COLLIERY. Northumberland, 1st. October, 1951.

The manager of the colliery was Mr. Alexander Walton with Mr. William Milne as the undermanager. The seams that were worked at the colliery in descending order were, the Five Quarter, High Main, Yard, Bensham and Low Main. The first three had not been worked for many years. Until a week before the explosion, when the output was reduced, the mine had been producing an average daily output of 700 tons. 450 tons from the Low Main Seam and 250 tons from the Bensham Seam. The colliery employed 408 persons underground and 183 on the surface. The explosion occurred in the Bensham Seam and claimed the lives of five men.

At the time of the disaster the colliery was one of three which formed the ‘C’ group of the No.1 Area of the Northern (N&C) Division of the National Coal Board. The Area Manager was Mr. A.R. Lawson, the Area production Manager, Mr. J.M. Pumphrey, the

Group Agent, Mr. A. Lewin, the manager Mr. A. Walton and the undermanager Mr. W. White. There were six overmen and 32 deputies for supervision underground.

There was no history of an explosion at the colliery but inflammable gas had been considered a hazard and safety lamps had always been used. Those in general use were the Oldham-Wheat Electric Cap Lamps. Patterson A.1 Flame Safety Lamps and Patterson G.T.L.9 Relighter safety Lamps were used by workmen and officials respectively.

The Bensham Seam had a general dip of 1 in 22 to the south east and consisted of 3 feet of top coal and 2 feet of bottom coal separated by a stone band which varied from 5 inches to 3 feet 6 inches in thickness throughout the mine. The roof was of blue shale and the floor a thick seggar. The coal was worked by bord and pillar system in which places are worked by an arcwaller 14 feet wide to leave pillars 86 feet square and so gave a 30 percent extraction. In 1944 the conditions were considered suitable for complete mechanisation and caterpillar mounted Universal arcwall coalcutting machines, Joy loaders, shuttle cars and trunk belt conveyor system were introduced. All the equipment was driven by electricity.

With mechanisation, the working places were more concentrated and more intensively worked. About six places formed the Deputy's District of 'Flat' which was the local term. The cycle of operations in each place was that an arcwall machine cut out the stone band, which was then loaded by the Joy loader on to the shuttle cars and dumped in an old stenton where it was loosely stowed, the straight girder and prop supports in the latter being systematically withdrawn. The coal was then blasted out and loaded by Joy loader onto the shuttle cars, from which it was discharged onto the conveyor belt system and so transported to the permanent loading station, known as the Hopper, which was at the inbye end of the South endless rope system, about 1,700 yards from the shaft.

The arcwall machines and the Joy loaders, being portable, were supplied with power through flexible cables from a power supply. The shuttle cars, of 7 tons 16 cwt. tare and 4 tons carrying capacity were vehicles with pneumatic tyres supplied with power from two lead-acid storage batteries coupled in series and carried, one on either side of the car, in fixed steel containers with wood-lined loose-fitting steel lids. Each battery weighed a ton and comprised 24 two-volt cells giving 96 volts to the motors. They had a capacity of 385 ampere-hours with a 6-hour period of discharge. Duplicate sets of batteries, which were charged at the end of the working shift, were provided for each shuttle car, so that while one set was in use, the other was being charged at a conveniently placed charging station appointed by the manager, in accordance with the Special Regulations which were in force with regard to the use of shuttle cars at the mine.

From 1944, the Bensham Seam workings advanced slowly to the south as succeeding easterly offshoots were worked and the abandoned until the 3rd. East District was gained. Here, further progress to the south was halted because of the deterioration of the seam in that direction and the 3rd East then became the main winning. Progress was held up for a year, after it had advanced about 840 yards from the 3rd. East junction while the rise side of flooded workings in the Yard Seam, 50 feet above which was proved by boreholes from a rise drift and so the water pressure head was found. This did not, and could not drain the water from the main portion of the old workings, which lay to the dip side of the point of contact.

Following this, work was resumed in the Bensham Seam and just before the disaster, two working districts known as the 3rd. East and 3rd. North Flats respectively and had a common ventilation system, were in production. The 3rd East had three working places and extended for a distance of six pillars east of the terminus of the 3rd. East Conveyor. The 3rd. North Flat had five places in production and had advanced for eight pillars to the north of the conveyor road. An attempt to develop the places to the north of the conveyor road had to be abandoned because the gradients proved too steep and were

above the maximum on which shuttle cars could legally be operated. The coal from the 3rd. East Flat was discharged from the shuttle cars on to the end of the conveyor and that from the 3rd. North Flat side-loaded at the junction of the 3rd, North road with the conveyor.

On the opposite side of this point there was a battery charging station which was used by both Flats. This was constructed of brick sided walls on which rested 'H' section girders which supported the roof. At the entrance to the charging station from the conveyor road, there were two motor generators and beyond the, through a steel ventilation regulator, two charging racks, one on either side. To charge the batteries, shuttle cars had to enter and leave the charging station at the bottom end which connected with the district return airway. The shuttle cars from the 3rd. North Flat reached the return airway by crossing the conveyor road at the next stenton inbye of the end of the conveyor.

As has been said, the stentons were loosely stored and were unlikely to be airtight unless finished off by stoppings. the workings in the shaft area had been ventilated by one main intake airway, which was also the haulage road and by one main return airway. When development first started in the Bensham Seam, it was realised that the capacity of the surface fan would have to be increased and a booster fan capable of delivering 61,800 cubic feet per minute at a water gauge of 4.2 inches was installed in the main return airway, 700 yards from the shaft and just outbye of the junction of the Bensham and Low Main Seams main return airways. This fan was in operation at the time of the disaster and approximately half the quantity of air was passing was drawn from the Bensham seam.

As development proceeded beyond the faults, the system was changed to dual intakes and one return which was to the west of and parallel to the intakes. The second intake was halted to the south when work stopped there and so the 3rd. East District was ventilated by a single intake.

The electrical supply to the 3rd. East Flat was by a double armoured cable to a bank of four gatend switches controlling, the auxiliary fans, a coalcutting machine, a Joy loader and a small pump. Similarly the supply to the 3rd. North Flat was carried by a double wire armoured cable to the 3rd. North road to a bank of five gatend switches two pillars to the right of the seventh level. These switches controlled two auxiliary fans, two Joy loaders and a coalcutting machine. A drilling panel was supplied by a double wire armoured cable from the busbars of these switches. The only other electrical apparatus in the district were four shuttle cars.

In December, 1950, water appeared in a place to the south of the 3rd. East Flat. A small pump was installed, but later withdrawn when all the workings south of the return were abandoned. There was no doubt that the water had come from the waterlogged Yard Seam above, through the fault planes. Within four months the water filled the abandoned south workings and, when it approached the return airway, an 80 gallons per minute pump was installed but this was not large enough to deal with the water and a similar pump had to be brought in. The water was kept in check until August 1951, when it began to rise again and a 350 gallons per minute turbine pump was installed. By bad luck, the suction end was laid in sludge and it had to be dismantled and re-sited, but before this could be completed, in early September the water level reached the return airway where it had a disastrous effect on the fireclay floor, which heaved, breaking props and letting down the girder supports. The resulting falls were small, but reduced the flow of air in the return airway and the ventilation to the first working places was restricted. The falls also prevented the shuttle cars from getting to the charging station and production was brought to a standstill in the 3rd. East Flat. The men employed there were placed on repair work which now became urgent.

The 3rd. North Flat was kept in production and the shuttle cars serving this district were brought to the bottom of the 3rd. North road where the batteries were charged by

a makeshift and illegal arrangement which used cables laid from the charging station across the conveyor road.

On Tuesday, 25th. September, a large fall occurred in the return airway between Nos. 29 and 30 stentons which completely blocked the road and cut off the second means of egress. The number of men working in the 3rd. North Flat was reduced to eight to comply with section 36 (3) of the Coal Mines Act, 1911, and the remainder were sent to work to clear the fall. On the back shift of that same day, the manager inspected the district and decided on the spot, that further restriction of the quantity of ventilation made it necessary to short circuit all available air directly through the turbine pumphouse so that the pump could be kept running. He did this by opening the door and screen which was just inbye of the charging station.

This action achieved its desired objective but the ventilation to the two flats was stopped and there was no doubt that firedamp began to accumulate. There was an examination on the instructions of the manager by the overman and a deputy, T. Whitney, who was killed in the disaster. They checked the switches on the shuttle car parked at the top of the No.3 North were open and stopped all the auxiliary fans and isolated all cables and apparatus fed from either of the two banks of gate-end switches but the cables could not be isolated. This examination followed immediately after the short circuiting of the ventilation and it came as no surprise that gas was detected.

The following day a deputy inspected the workings and found inflammable gas. He fenced then off at points three pillars up the 3rd. North road and in the stentons to the left of the conveyor road inbye of the charging station. the next day, the accumulation was found to have extended down the 3rd. North road and a fence was erected from the second pillar up. No further extension of the accumulation occurred and from this time, to the shift in which the explosion occurred, both Flats remained gassed out, with no person passing beyond the fences during this period. A passage was made over the fall on Friday 28th. September and the circulation of air increased but the quantity was not known as it was not measured.

The work week finished with the Friday nightshift and during the weekend, the pump was kept running under the supervision of deputies who worked six-hour shifts, the last of which ended at midnight on Sunday, 30th. September at which time Whitney arrived at the mine, to make a pre-shift inspection to admit his men who were due about an hour later. He was a regular deputy on the district and was aware of the problems. Before he went down he was told by the fore-overman, Thomas Short, that his shift would be of five men until further notice and they were to be employed in pumping and repair work in the district. He was instructed to report by telephone to Short at 3 a.m. Down the pit, Whitney admitted a pumpman and three other workmen, The fifth and, Vincent Love, was left in charge of the conveyor delivery point at the 3rd. East Junction.

Whitney telephoned the overman at 3 a.m. and reported that everything was in order. Short instructed Whitney to send out a coalcutter trailing cable which was urgently required for the new face which was due to start production that day. Shortly after 4 a.m. Whitney arrived at the 3rd. East Junction with the cable which was to be transported on the conveyor. Vincent Love helped him to coil it up on the conveyor. Whitney then returned inbye. Just a few minutes before, Love had received a telephone call from Charlton, one of the men subsequently killed, as to the whereabouts of Whitney. From that time onwards no one spoke to or saw any of the five men alive.

At 6.45 a.m. Vincent Love felt a temporary reversal of the ventilation which raised some dust at the 3rd. East intake. He did not understand what had happened and wisely went to the new longwall face and reported the incident to the overman, Short, and told him that he thought there had been a fall inbye. Short went about halfway down the 3rd. East intake to investigate but did not find anything unusual. He went back and went along the return airway as far as the compressor stenton, into the intake and back to the 3rd. East Junction and saw nothing untoward. Satisfied in his own mind that there

was no cause for alarm, he went outbye to the Hopper to arrange the work for the oncoming shift.

At 8 a.m, George Williams, a shotfirer on the new longwall face, spoke to Love at the 3rd. East Junction and commented on the peculiar smell in the air when he reached the face. Love told him what had happened and that Whitney and the four men had not appeared. Williams spoke to Short on the telephone and was told to investigate. Accompanied by a workman, he travelled the intake to the overcast, three stentons back from the charging station which he found severely damaged and beyond that he saw a heavy fall. They went back to the compressor stenton and entered the return airway and went inbye for 170 yards when they were driven back by foul air.

They were joined at the Compressor stenton by Short who came with some deputies from the incoming shift. They tried to explore the return airway but were driven back by the foul atmosphere. They confirmed that the overcast was wrecked and Short telephoned the surface that apparently the five men in the district had been overcome behind a large fall which blocked the intake airway.

When the manager learned of this, he descended the mine with the undermanager and travelled inbye by the intake. When they reached the booster fan they went into the return to see what conditions were like and realised by the state of the air that something more serious than a fall had taken place. The manager sent a message to the surface to call the Rescue Service and he went along the intake to the damaged air crossing where they found that repair work had already started to try to restore the ventilation inbye. These repairs were almost complete when the Rescue Brigade arrived at 11.12 a.m. and it was only then that the true nature of the disaster was revealed to those on the surface.

The first rescue team soon discovered that water in the return airway, outbye of the charging station had risen to within two feet of the roof as the pump had been out of action for several hours. Progress on the intake side was prevented by a large fall but this was bypassed by means of the charging station and the return airway to the pumphouse where the body of the pump attendant was found.

The four men who were missing had been carrying out repairs, either to the conveyor road or the return airway and to reach them, falls would have to be cleared and the ventilation restored. Before any such work could start, it was discovered that the water was rising at such a rate that the return would be blocked and all energies were directed to installing a pump in the main intake at the charging station. Before suitable pumps could be transported into the district, which took some hours, the water reached the roof of the return roadway and cut off all ventilation which made the site of the pump untenable.

A new site was selected, two stentons further outbye and by superhuman effort by all concerned, the pump was installed but it could do little but hold the water at the level it had reached. A larger pump was required and this could not be installed until 9 days after the explosion. On 9th. October, it was started and lowered the water to one foot below the roof of the return and air started to flow again into the explosion area. The rescue brigades had established that the air in the explosion was unbreathable and all hope of finding the missing men alive was abandoned. By the 11th. October the ventilation was restored and rescue teams were sent in. They discovered that the entrances to the charging station had collapsed and falling girders had broken open batteries whose acid had spilled. They also found that the charging batteries on the other side were undamaged and that the terminals were dangerously close to steel girders. Air samples were taken and found to contain firedamp so, confronted with an alarming situation, in which 70 or so men were facing imminent danger, it was decided to withdraw all from the mine until the situation could be properly assessed.

It was decided that the only permanent safeguard was to allow the water to rise. This would dilute the acid and hopefully, discharge the undamaged batteries. It was estimated that 10 days would be required for this and an extra two days were allowed as

a safety margin. Plans were made to re-enter the district on the 23rd. October. On that date, the sandbag stoppings were breached and through ventilation was established as far as the compressor stenton. The first stage of the recovery operations were now finished and the Rescue Service withdrew.

In the second stage of the recovery work, the roadways were repaired and experiments were conducted to found out who immersion in water would affect the shuttle cars. The bodies were recovered between the 19th. and the 29th. November and the pump, fans shuttle car and bank of gate end switches in the 3rd. North Flat inspected. On 18th. April 1953 operations were brought to an end and they were the most protracted and expensive operations ever undertaken to recover the bodies of the victims and gather evidence as to the cause of the disaster.

Those who lost their lives were-
Thomas Whitney aged 56 years, deputy,
Thomas Patterson aged 54 years, timberman,
Matthew Charlton aged 30 years, loader operator,
John Fisher aged 33 years, driller and
John Davison aged 58 years, pumpman.

There was a full and exhaustive inquiry into the disaster and it was found that no electrical equipment could be faulted. There was no contraband found in the clothing of the victims and there was no evidence of spontaneous combustion. An open verdict was returned on those who lost their lives .

At the end of the Report. Mr. W. Brown, said-

“I welcome the opportunity if recording in some detail my sincere appreciation of the assistance so willingly and ably given by the Weetslade miners who courageously and tenaciously performed miracles of work in some of the most trying conditions, even for a pit their representatives who displayed great consideration and forbearance especially during moments of stress and strain from those directing the operations the Rescue Brigades, comprising 199 teams of Permanent Corps men and colliery trained men from Northumberland and Durham, who gave full cover underground during the emergency, frequently being the spearhead of the operations, during which 7,678lbs. of liquid air were used in 50 sets of self-contained breathing apparatus.”