EXPLOSION AT GLYNCORRWG COLLIER Y, GLAMORGANSHIRE

REPORT

On the causes of, and circumstances attending, the Explosion which occurred at Glyncorrwg Colliery, Glamorganshire, on 13th January, 1954.

BY

T. A. JONES, O.B.E.
H.M. Divisional Inspector of Mines

Presented by the Minister of Fuel and Power to Parliament by Command of Her Majesty August 1955

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In pocket at back
Report on the causes of, and circumstances attending, the explosion which occurred at Glyncorrwg Colliery, Glamorganshire, on 13th January, 1954

The Right Honourable Geoffrey Lloyd, M.P.,
Minister of Fuel and Power.

March, 1955.

SIR,

INTRODUCTORY

In accordance with your instructions given under the terms of Section 82 of the Coal Mines Act, 1911, I beg to submit my report on the causes of, and circumstances attending, the explosion which occurred at the Panzer Face in the Six Feet Seam at Glyncorrwg Colliery, Glamorganshire, on 13th January, 1954, when 24 persons were injured. In no case did the injuries prove fatal.

1.—DESCRIPTION OF THE COLLIERY

General

Glyncorrwg Colliery is situated near the village of Glyncorrwg, about 9 miles north-east of Port Talbot, and has been a working mine since 1904. The output is about 800 tons of coal per day and the numbers of persons employed are 633 belowground and 150 on the surface.

The mine is served by two vertical shafts. The South Shaft is the downcast, 18 feet in diameter, and sunk to the Six Feet Seam at a depth of 407 yards. It is the main winding shaft for men and mineral. The North Shaft is the upcast, 16 feet in diameter, sunk to the Red Vein Seam at a depth of 428 yards, and equipped with a Waddle fan producing about 143,000 cubic feet of air per minute at a water gauge of 7·2 inches.

Management

The mine is in the No. 2 Area of the South Western Division of the National Coal Board and the principal officials are as follows:—

Area General Manager ... Mr. A. T. Minhinnick.
Area Production Manager ... Mr. S. B. Bassett.
Sub-Area Production Manager ... Mr. F. Stacey.
Group Agent ... Mr. W. Moore.
Manager ... Mr. E. L. Powell.
Assistant Manager ... Mr. R. J. Evans.
Undermanager ... Mr. G. Thomas.

Seams Worked and Lamps Used

The seams worked, in descending order, are the Six Feet, Nine Feet and Peacock. Safety lamps have always been required to be used throughout the mine but automatic detectors are not required by the Regulations to be provided, there being no electric power in use at any of the longwall faces and no "broken" workings. The lamps in general use throughout the mine are Oldham G.W. electric cap lamps, with E. Thomas and Williams Cambrian No. 9E flame safety lamps for use by workmen as firedamp detectors. Cambrian No. 2A flame safety lamps are used as officials' inspection lamps.

The Six Feet Seam

The seam has an average thickness of about 7 feet 6 inches, including two thin bands of dirt. It has a roof of shale and a floor of weak fireclay. The volatile content of the coal on an ash-free dry basis is 10·2 per cent.
Work in this seam was started about five years ago and the full extent of the workings is shown on Plan 1. The seam was reached by driving two cross-measure drifts from intake roadways in the Nine Feet Seam and another cross-measure drift from a return airway in the Peacock Seam. The development in the seam consisted of a double-unit longwall face advancing north-east with two intakes and a return at the left side. The area proved to be geologically disturbed with faults, patches of barren ground and irregular gradients. Eventually, the development face was stopped at a fault of about 30 feet displacement.

Attempts to win out faces to advance south-east on the right flank of the development face proved unsuccessful due to barren ground until, towards the end of 1952, one such face was set away in normal ground. This face, known as the Panzer Face, and drivages to form a similar face adjacent to it, were the only active workings in the seam at the time of the explosion.

II.—THE PANZER FACE

This was a single-unit conveyor face, about 120 yards long, advancing to the rise at half-course to the full rise of 1 in 12, with the intake loading gate at the right end and the return supply gate at the left. The ventilation was ascensional. Roof rippings were taken in both gates which were supported with steel arches and roadside packs. The gates had been driven narrow for the first 50 yards so as to leave a pillar of coal for the protection of the road leading to the main development face. The Panzer Face started as a normal production unit in December, 1952. It had advanced about 190 yards up to the time of the explosion.

Method of Work and Organisation

The face was equipped with an armoured scraper-chain conveyor on which was mounted a coal-cutting machine fitted with two jibs. The lower jib made a horizontal cut to a depth of about 3 feet, some 15 inches above floor level, and the upper jib was curved upwards so as to make a vertical shear at the back of a horizontal cut of similar depth about 2 feet 9 inches above the floor. Explosives were never used in the coal or in the supply gate rippings and only occasionally in the loading gate rippings. All machinery was driven by compressed-air.

The face was worked on three shifts and the normal advance was one cut every 24 hours. The coal, which fell freely behind the cutting machine, had to be filled away as cutting proceeded and the conveyor had to be snaked forward so that the permanent roof supports could be advanced as soon as practicable after filling had been completed on any part of the face. Conditions were thus nearer to a system of continuous mining than to a set cycle of operations, but the work usually proceeding on each of the three shifts was as follows:

**Morning Shift**
- 7.0 a.m. to 2.30 p.m. ... Coal cutting and filling. Moving forward conveyor. Strip packing.

**Afternoon Shift**
- 3.0 p.m. to 10.30 p.m. ... Ripping of gates and advancing roadside packs. Withdrawal of supports from wastes.

**Night Shift**
- 11.0 p.m. to 6.30 a.m. ... As on morning shift plus water infusion of face.
For the suppression of airborne dust, the face was infused once every 24 hours, all cutting was done wet, and water sprays were used at transfer and loading points in the loading gate. These measures were effective.

There was a deputy in charge of each shift. Except at week-ends, each deputy made the pre-shift inspection for the succeeding shift. An overman was regularly employed on this face on the morning shift.

**Support and Control of the Roof**

Due to the type of machinery used on this face, the roof was supported on the prop-free front method. The roof supports consisted of hydraulic steel props supporting Schlom's light alloy roofing bars linked together in lines at right angles to the face and set at intervals of 2 feet. The length of the bars corresponded to the depth of the cut and a fresh bar was added to each line as filling proceeded. Each fresh bar, acting as a cantilever, was held rigid by means of the steel wedge provided for driving into a slot at the linked ends of the bars until such time as a prop could be set beneath it. The management’s instructions were that these wedges were to be withdrawn as soon as the prop was set, but the evidence suggests that the wedges were usually left in position until the bars were being withdrawn at the waste edge.

Considerable trouble had been experienced due to props sinking into the soft floor under comparatively light loads. In an endeavour to overcome this difficulty, all props were fitted with welded bases one foot square. This reduced the trouble but did not altogether eliminate it.

Strip packs, 6 to 7 yards wide, were built with the stone falling in wastes 5 to 9 yards wide between them. The packs, including the gateside packs, and the wastes were numbered consecutively from right to left: there were nine packs and eight wastes. A row of chocks consisting of steel girders and wood blocks built on steel frame bases was maintained along the edge of each waste.

When the face first started, the depth of cut was about 4 feet and the Schlom bars used were the same length. In November, 1953, the depth of cut was reduced to about 3 feet and a supply of Schlom bars of this length was obtained from another colliery where they were no longer required. These were the bars in use when the explosion occurred.

**Ventilation and the Occurrence of Firedamp**

The face was ventilated by a current of approximately 19,000 cubic feet per minute of fresh intake air which afterwards ventilated the development face, standing at a fault, before returning to the upcast shaft. The seam is known to be gassy but, according to the deputies' reports and the results of air samples taken by the management, it would appear that the only place where inflammable gas was at all troublesome was in the supply gate at the return end of the face. According to the evidence of deputies and other officials, an issue of methane could frequently be detected at the top of the ripping lip in this gate, but by means of a hurdle sheet this could usually be diluted to about one per cent. at the point of issue; it was only on rare occasions that methane was detected at the edges of the wastes and it could always be cleared by the erection of brattice sheets so as to deflect the face air current towards the waste.

With a view to reducing the quantity of methane issuing into the air current, a system of methane drainage from the strata by means of long holes drilled from the return gate into the roof strata overlying the goaf had been started but was not in full operation up to the time of the explosion.
III.—NARRATIVE OF THE EXPLOSION AND SUBSEQUENT EVENTS

The First Explosion

Shortly after 9.30 a.m. the deputy, H. Williams, in the course of his duties, had gone outbye along the supply gate, and all other persons were in the positions shown on Plan 2. The cutting machine had reached the return end of the face and had just been stopped by the operator, and the conveyor had been temporarily stopped by the conveyor attendant. A coal getter, V. Lewis, working near No. 8 pack, required a Schloms bar for setting at the face and went to withdraw one from the back row in front of No. 8 pack. The steel wedge was in position and he used a sledge hammer to drive it out. As he struck the first blow on the end of the wedge, a flame appeared at the wedge; a tongue of flame shot out a few feet towards the face and then receded into No. 7 waste, from which a large volume of flame immediately gushed out onto the face. This sequence of events is corroborated in every detail by two other getters who were watching Lewis from a distance of only a few feet.

The flame of the explosion travelled against the air current down the face as far as No. 3 pack, some 30 yards from the loading gate, and with the air current into the supply gate. Flame barely reached the men at the boring machine about 45 yards back from the face of the supply gate. It would appear that the flame travelled partly on the face and partly inside the waste edge, because several persons who were within the limits of travel were unharmed. Of the 32 persons who were in the path of the explosion, 17 sustained severe burns, seven sustained slight burns and eight were uninjured. It is remarkable that, of the three persons who were close together in front of No. 8 waste, two were severely burned and yet the other was only singed.
Overman G. Thomas, who was examining No. 6 pack, was one who escaped injury. He was between two steel chocks when he heard a thud and then shouting. He saw flame travel past him towards the loading gate and then go back towards the return. Men immediately came running down the face, some with their clothing on fire. When he had seen these men safely off the face, he went to the loading point and telephoned for assistance and for the machinery to be put in motion for summoning rescue and ambulance services. He then organised first-aid treatment for the injured and took steps to ensure that all persons in the district were accounted for. He was assisted by the deputy, who was in the supply gate when the explosion occurred and had come out behind the men who took that road from the face.

Mr. Evans, assistant manager, and overman Thomas explored the face from the intake end. They found articles of clothing on fire, which they extinguished, and reached No. 7 waste, where they were forced to retire on account of intense heat although they saw no signs of active combustion.

The Second Explosion

Before noon another exploration of the face from the intake end was attempted by a party which included the Agent, Manager, H.M. District Inspector of Mines and the Superintendent of the Brynmenin Rescue Station. They found conditions normal until they reached No. 7 waste. Conditions here were now much cooler, but on looking into this waste, which had caved to a height of about 6 feet, they saw the flame of gas burning near the roof thus formed. Whilst they were considering the possibilities of extinguishing this flame, a rumbling noise was heard followed immediately by the issue of flame from Nos. 6 and 7 and possibly other wastes. The flame was of momentary duration and no-one was injured, but it was wisely decided to leave the face forthwith. When the party returned to the surface the decision was made to seal off the district.

The Sealing of the District

The sealing of the district necessitated the building of three stoppings, one in each intake roadway and one in the return. It was decided to build these with sandbags. The sites were chosen and the preliminary work started on the afternoon of 13th January. Although the organisation was excellent and the work carried through without a hitch, it proved a long and arduous task, particularly in the case of the return, or No. 3, stopping for which all materials had to be carried down two ladders in a steep drift and then a further 90 yards to the site.

The Mobile Laboratory of the Scientific Department, South Western Division, National Coal Board, reached the colliery at about noon and was functioning perfectly in the early afternoon on the day of the explosion. It remained at the colliery constantly available for the analysis of air samples until the mine was ready for the full resumption of normal work, and the service rendered proved of the utmost value.

While the work of building the stoppings was proceeding, air samples were taken at hourly intervals at the site of the No. 3 stopping in the main return airway from the workings in the Six Feet Seam. The first sample taken at 4.0 p.m. on 13th January contained 0.009 per cent. carbon-monoxide; by 8.0 p.m. this had dropped to 0.005 per cent. and by midnight to 0.0035 per cent. Thereafter the carbon-monoxide content varied between 0.0008 per cent. and 0.0017 per cent. until it rose to 0.003 per cent. at 5.0 a.m. on 16th January, when the stoppings were nearing completion and the flow of air was considerably reduced.
It was known from the results of analyses of air samples previously taken by the Scientific Department that the atmosphere of this mine normally contained no trace of carbon-monoxide, and it was agreed by all concerned that the samples taken at the site of No. 3 stopping showed conclusively that combustion was still taking place. These sample results could, however, be reasonably interpreted as showing that combustion was confined to the gas jet which had been seen burning in No. 7 waste, and hopes were raised that it might be practicable to extinguish the flame and thus avoid the necessity for sealing off the district.

Without interrupting the work on the stoppings, two explorations were made by a rescue team wearing self-contained breathing apparatus. On the first occasion they saw light which appeared to be reflected from gas burning at the face side of No. 7 waste cavity. On the second occasion they saw the flame of this gas burning as it issued from a bed-separation break about 15 feet above the floor. The team captain gave it as his considered opinion that any attempts to extinguish this flame could only be made by men working inside the fallen waste in considerable danger from falls of ground. It was accordingly decided to abandon the idea of extinguishing the flame and no further exploration was attempted.

The building of the stoppings was completed at 6.0 a.m. on 16th January. Each stopping was about 18 feet long, reinforced with steel rails and girders; two tubes were set in each stopping for the purpose of taking air samples from inside the sealed area. Ventilation doors were re-arranged with a view to balancing the pressure on the stoppings. The sites of the stoppings and the positions of the doors are shown on Plan I. As soon as the stoppings were completed all persons were withdrawn from the mine for twenty-four hours.

The Re-Opening of the District on 22nd January

Shortly after 6.0 a.m. on 17th January, the stoppings were examined and found intact, and samples of the air outside and inside each stopping were collected and analysed. The results showed fresh air inside and outside the No. 2 stopping, where there was a pressure inwards of 0.04 inch water gauge, and no appreciable change at the No. 3 stopping where there was a pressure outwards of 0.8 inch water gauge. In the case of the No. 1 stopping the results were most significant, showing a carbon-monoxide content of 0.0007 per cent. inside the stopping and 0.0008 per cent. outside. Water gauge readings showed pressures of -0.04 inches on a long tube extending 50 feet through the stopping and +0.08 inches on a short tube extending just through the stoppings. The only feasible explanation for the presence of carbon-monoxide at this stopping in the intake was that a further explosion had occurred since the stoppings were completed. This was subsequently confirmed.

All other districts in the mine were examined and found in order, and normal working was resumed in them on the night of the 17th January. Regular sampling of the air inside and outside the stoppings was continued. There was no appreciable change at the No. 2 stopping or at the No. 1 stopping where the carbon-monoxide content remained between 0.006 per cent. and 0.0019 per cent. The samples taken from inside the No. 3 stopping provided confirmation that a further explosion had occurred. The carbon-monoxide content started to rise on the afternoon of 17th January, reached a peak of 0.0293 per cent. at noon on 18th January and then started to fall. This seemed to show that a certain amount of ventilation was continuing to take its normal course inside the sealed area, but there was a steady build up of methane and reduction of the oxygen content inside the No. 3 stopping.
By the afternoon of 18th January, a graph plotted from the sample results showed that the atmosphere inside the No. 3 stopping was approaching the lower explosive limit as defined by “Coward’s triangle”, and at the end of the morning shift the management stopped all further work and withdrew all persons from the mine. A rough calculation showed that if the build up of methane and reduction of the oxygen content continued at about the same rate, the plottings would pass through the triangle into an extincive atmosphere in about 60 hours, and it was decided to re-enter the mine and commence taking further samples at 10.00 p.m. on 20th January. This arrangement was duly carried out. By 10.30 a.m. on the 21st, the atmosphere inside the No. 3 stopping had become extincive with a content of 10.41 per cent. methane and 15.2 per cent. oxygen. It appeared from the graph that the rate of change in the atmosphere had been constant since the afternoon of 18th January.

A meeting of representatives of all interested parties was then held, at which it was agreed that the following conclusions could be drawn:

1. A further explosion had occurred on 16th-17th January as indicated by the results of samples taken at Nos. 1 and 3 stoppings on the 17th.
2. The only igniting medium inside the sealed area at that time was the gas jet burning in No. 7 waste: it was therefore most probable that this third explosion had been similar to the two earlier ones.
3. An explosion on the Panzer Face at a time when the ventilation was checked by the stoppings would leave an inert atmosphere in which methane could not continue to burn.
4. The samples taken from inside No. 3 stopping gave no indication of any disturbance inside the sealed area while the atmosphere was passing through the full range of explosive mixtures.
5. The possibility of there being any combustible material at a sufficiently high temperature to re-ignite when the ventilation was restored was extremely remote.

Based on these conclusions, a decision was made to broach Nos. 2 and 3 stoppings, and this work was completed at about 5.0 a.m. on 22nd January. The ventilation doors were re-arranged so as to restore the ventilation to the Six Feet Seam and all persons were withdrawn from the mine for a period of 12 hours.

The Investigation after Re-Opening

An inspection of the district was made on the evening of the 22nd and a full investigation the following morning. On the first inspection it was found, as expected, that the ventilation doors on the length of road connecting the mouths of the loading and supply gates had been blown open, but when these had been closed the ventilating current took its usual course and atmospheric conditions soon became normal. Air samples taken at various points showed no trace of carbon-monoxide and thus confirmed that there was no combustion of any kind taking place. There was ample evidence that a third explosion had occurred of somewhat greater magnitude than the first two. There was now evidence of the passage of flame throughout the face and for about 150 yards outbye along the supply gate. There was no evidence of the passage of flame in the loading gate but explosion dust had been deposited throughout most of its length. There was no evidence of coal dust having played any part in the explosions, which had been of a very mild character. The face had stood remarkably well. Inspections of all other parts of the mine having revealed satisfactory conditions throughout, normal working of the whole of the mine re-commenced on Sunday, 24th January and continued without further interruption.
IV.—THE CAUSE OF THE EXPLOSION

The Igniting Medium

All the safety lamps, flame and electric, which were in use in the district when the first explosion occurred were sent, in the condition in which they were brought out of the mine, to be tested at the Safety in Mines Research Establishment. Six of the electric cap lamps were in an impaired condition, but in each case this condition was consistent with damage caused during the explosion. In no case was there any suspicion that an electric or flame lamp had been in other than safe condition at the time of the explosion.

All other possible means of ignition were examined and, after due consideration, ruled out with the sole exception of incendive sparking from the roof supports.

Officers of the Safety in Mines Research Establishment took part in the investigation on 23rd January and selected certain of the Schloms bars for testing at Buxton. The steel wedges of all the bars on the face were coated with rust, and the tests carried out at Buxton proved that these rusted wedges when in normal use became smeared with aluminium from the light-alloy bars so as to produce a surface which, when struck by steel, gave off sparks which readily ignited methane.

Any doubt as to the igniting medium was removed when Messrs. Lewis, Griffiths and Owen had recovered sufficiently to give their evidence, which pointed conclusively to sparking at the wedge of the Schlom bar in front of No. 8 pack when Lewis struck it with a sledge hammer. The position of this bar is indicated on Plan 2.

The second and third explosions were undoubtedly initiated by the flame of methane left burning in No. 7 waste after the first explosion.

The Explosive Mixture of Methane and Air

The last deputy's report made prior to the explosion was by E. Griffiths, night shift deputy, on his inspection between 5.15 a.m. and 6.30 a.m. as the pre-shift inspection for the morning shift on 13th January. He had reported a "trace of gas" at the rippings in the supply gate and further outbye in this gate near where the new face was being won out. In amplification of this report after the explosion he stated that, when he first tested at the top of the ripping face, he detected 2 1/2 per cent., but before he continued his inspection this had been reduced to 1 1/2 per cent. by the erection of an additional hurdle sheet. There was not more than 1 1/2 per cent. at any point further outbye along the supply gate. He stated that during this inspection he tested at every waste and found no indication of inflammable gas.

The morning shift deputy, H. Williams, who holds a first-class certificate of competency, states that he made an inspection of the face commencing at the intake end at about 7.45 a.m., and reaching No. 8 pack at about 8.15 a.m. He examined at every waste and found no indication of methane. At the top of the ripping face in the supply gate he detected about 2 per cent., which was reduced by adjusting the hurdle sheet.

Statements were taken from all the persons who were employed on the face on this shift. Most of the men stated that they had not seen the deputy make any test for gas, and some went as far as to state positively that he had not done so. But the conveyor attendant, who was at the conveyor engine near the supply gate, states that he was looking down the face and saw Deputy Williams take his flame lamp to the waste edges as he travelled up the face on his inspection.
The fact that gas was ignited on the face side of No. 8 pack just over an hour after he had inspected there does not necessarily conflict with the deputy's evidence. The unventilated wastes behind the face in this gassy seam must have contained a high concentration of methane, and a sharp fall in barometric pressure, such as occurred over this period, might well have had the effect of causing the fringe of this body of gas to extend from the waste into the face working.

All the evidence concerning the first explosion tends to show that this inflammable fringe was ignited in front of No. 8 pack and the flame spread back into Nos. 7 and 8 wastes until it reached a mixture rich enough to explode. The projection on to the face of flame propagated mainly inside the waste edges would account for the fact that some of the men on the affected length of face were badly burned whilst others escaped uninjured. At the time when the third explosion was initiated, the explosive mixture probably extended nearer to the coal face due to the interruption of the ventilation by the stoppings.

V.—MATTERS ARISING FROM THE EXPLOSION

Frictional Sparking from Light-Alloy Roof Bars

From the evidence taken during the investigation, it seems clear that sparking at the wedges of the Schloms bars was by no means uncommon, particularly with the shorter bars, of which many of the wedges had been burred and somewhat distorted during their previous use at another colliery so that it was often difficult to drive them out. This sparking had been observed by workmen, deputies and the overman, none of whom had considered it dangerous or attached much importance to it because they had always been accustomed to seeing similar sparks when steel struck steel or hard stone. No report of this sparking had been made to any of the higher officials, all of whom say they were entirely unaware of this sparking until after the explosion. On 8th February, what is described as a “flash about 4 inches long” occurred when a wedge was driven out on the Panzer Face. This was seen by Mr. R. D. Evans, assistant manager, and steps were immediately taken to withdraw all the Schloms bars from use and replace them with all-steel supports.

The tests carried out at the Safety in Mines Research Establishment on light-alloy bars from the Panzer Face showed that the sparking hazard was not confined to the friction of the wedge in the slot of the bar. Incendive sparks could be produced by striking the edge of a bar against a piece of rusted steel; by striking the edges or flat sides of a bar with a piece of rusted steel; and by striking a glancing blow with a light hammer on a rusted steel surface smeared with aluminium from previous contact with a bar.

It may be of interest to record that the alloy used in the construction of these bars was found to contain:

<table>
<thead>
<tr>
<th>Element</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al</td>
<td>93.64</td>
</tr>
<tr>
<td>Si</td>
<td>0.61</td>
</tr>
<tr>
<td>Mg</td>
<td>0.59</td>
</tr>
</tbody>
</table>

Firedamp Detectors

This is yet another case where the investigation of the circumstances attending an explosion has revealed that there was not a sufficient number of detectors on the face for compliance with the Coal Mines General Regulations (Firedamp Detectors), 1939. Flame safety lamps were provided as

detectors and only three of the face workers carried such lamps on the shift of the explosion, whereas five was the minimum number necessary for compliance with the Regulations.

A point worth stressing is that two of the three flame lamps were used by coal getters and only one by a person whose work was performed at or near the waste edge. One of the getters who had a flame lamp worked at the extreme return end of the face and says that he made careful tests for gas at about 8.45 a.m. and found none. Had this detector been used at the waste edge near the return end of the face the sequence of events might well have been very different.

It is the duty of the manager to ensure to the best of his power that these Regulations are fully complied with and that each of the detectors provided is properly used by a competent workman.

**Firedamp in Wastes behind Longwall Faces**

This explosion provides further evidence that, if there is any possibility of firedamp accumulating in wastes behind longwall faces, steps must be taken to prevent the inflammable or explosive fringe of the accumulation from extending into the face working. The most certain way of achieving this is by solid stowing of the goaf; where this is not practicable, other methods, such as ventilation of the wastes or gas drainage, must be adopted.

A system of drainage from the wastes behind the Panzer Face by means of pipes through the No. 9 pack was adopted when work was resumed, and a measure of success was achieved.

**VI.—FIRST-AID AND SUBSEQUENT TREATMENT OF THE INJURED PERSONS**

In several cases the burns sustained were extensive and of great severity, yet all the persons injured in the explosion are well on the way to recovery, thanks to the excellence of the first-aid treatment they were given below ground and at the surface of the mine and of their subsequent treatment in hospital.

The foundations for their eventual recovery were laid by Mr. Glyn Thomas, the overman, and Mr. C. J. Curnick, one of the qualified first-aid men carrying first-aid boxes in the district.

Most of the injured persons were quite able to walk and were intent on going straight out to the shaft. They would thus have exposed their injuries to the intake air current had not overman Thomas insisted on their remaining near the loading point until they had been attended to by Mr. Curnick and other first-aid men who assisted him. Those who were only slightly injured were then allowed to walk to the terminus of the man-riding haulage and the others were carried on stretchers. There were ample supplies of first-aid equipment and dressings available in tubular containers, which also contained supplies of morphia.

Very good work was also done by Mr. G. G. Davies, who was in charge of the surface first-aid room when overman Thomas's telephone message was received at 9.40 a.m. Mr. Davies immediately telephoned the local doctors and the motor ambulance service, arranged for first-aid men and equipment to be sent to the Panzer district from other parts of the mine, and had additional blankets, hot water bottles and cans of hot tea sent from the surface. At about 10.0 a.m. he went below ground, set up a temporary dressing station in a cabin near the inbye end of the man-riding plane, and arranged for all the injured to be given hot tea and kept warm in this cabin.
until they could be conveyed outbye. He then proceeded inbye and reached the Panzer loading station in time to assist with the treatment of the last of the cases. Dr. Kinsey of Glyncorrwg reached the loading station at about the same time.

On their arrival at the surface, the casualties were examined by Doctors Davies and Phillips of Cymmer and Dr. Stewart of Glyncorrwg, who expressed satisfaction at the treatment which had been given below ground.

Twelve of the cases were sent to Neath General Hospital, seven to Maesteg Hospital and five to their respective homes.

After consultation with Mr. Emlyn Lewis, Surgeon in Charge of the Plastic Unit at St. Lawrence Hospital, Chepstow, it was decided to transfer eleven of the Neath cases and six of the Maesteg cases to his charge. The transfers were effected without delay, and at 5.0 p.m. the first case reached St. Lawrence Hospital where all preparations for their treatment with plasma infusions and oxygen had been made. Nurses travelled in the motor ambulances with the patients and maintained plasma infusions throughout the journey.

This is the second case in my Division where the restoration to health of persons severely injured in an explosion represents a truly remarkable feat of first-aid, medical attention and plastic surgery, and reflects great credit on all concerned with their treatment and with the organisation which made it possible for such effective treatment to be given in time. The other case was the explosion at Bedwas Colliery in October, 1952.

VII.—RECOMMENDATIONS
The recommendations called for as a result of my investigations are:—

(1) The use of light-alloy bars should be prohibited on all longwall faces where there are open wastes unless it is known that there is no likelihood of inflammable gas occurring in the wastes.

(2) In all longwall workings effective steps should be taken either to prevent the accumulation of firedamp in wastes behind the face or to prevent dangerous emissions therefrom.

The second recommendation is dealt with in the Mines and Quarries Act, 1954, which, after the operative date, will require either the constant ventilation of such wastes so as to dilute and render harmless all inflammable and noxious gases therein, or the taking of appropriate steps for the purpose of minimising dangerous emissions from the waste.

I would strongly recommend that steps to ensure compliance with these requirements should be taken with the least possible delay by all managements concerned.

VIII.—ACKNOWLEDGMENTS
I wish to record my grateful appreciation of the helpful co-operation of all who took part in the investigation of this occurrence on behalf of the National Coal Board, the National Union of Mineworkers, the British Association of Colliery Management and the National Association of Colliery Overmen, Deputies and Shot Firers; and to express my thanks to the officers of the Safety in Mines Research Establishment who took part in the investigation and carried out the tests, and to Mr. W. Daniel, Group Surveyor, National Coal Board, who prepared the plans which accompany this report.

I have the honour to be, Sir,
Your obedient Servant.

T. A. JONES.
# APPENDIX

## LIST OF CASUALTIES

### Seriously Injured

<table>
<thead>
<tr>
<th>B. Baker</th>
<th>C. Bowen</th>
</tr>
</thead>
<tbody>
<tr>
<td>D. Bowen</td>
<td>R. Busher</td>
</tr>
<tr>
<td>V. Casey</td>
<td>I. Davies</td>
</tr>
<tr>
<td>R. Griffiths</td>
<td>T. Griffiths</td>
</tr>
<tr>
<td>V. Grinvalds</td>
<td>G. Howells</td>
</tr>
<tr>
<td>V. Lewis</td>
<td>D. McGluskie</td>
</tr>
<tr>
<td>W. J. Owen</td>
<td>W. Pinkham</td>
</tr>
<tr>
<td>R. Sutton</td>
<td>E. Thomas</td>
</tr>
<tr>
<td>A. Waite</td>
<td></td>
</tr>
</tbody>
</table>

### Slightly Injured

<table>
<thead>
<tr>
<th>W. G. Davies</th>
<th>W. D. Evans</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Grant</td>
<td>R. Hill</td>
</tr>
<tr>
<td>C. James</td>
<td>B. Thomas</td>
</tr>
<tr>
<td>P. Williams</td>
<td></td>
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</tbody>
</table>