level. While the explosion was not a particularly violent one in that it did not damage the mine timber or the workings to any great extent, it was of sufficient force to dislodge the brattice stoppings between the intake and the return airways, and on reaching the mouth of the mine—probably because of the increased supply of oxygen available—the force was so intensified as to demolish the fan, the haulage winch, and the sheds at the mine-mouth.

Workers at a mine situated on the other side of the the valley described how they saw a flame issuing from the mine-mouth. The effects of this flame were seen by us in the scorching of the foliage of trees in line with the mine-entrance. Kaye (jun.), who was the driver of the haulage winch situated at the mine-mouth, was killed by the force of the explosion, and his body was found some distance away from where he was at work. There must, therefore, have been a considerable quantity of gas in the rise heading in which the ignition occurred. It is possible that the gas accumulated suddenly in the working-place between the time of McIntosh's examination and the time when the explosion occurred, but from the evidence of the Inspector of Mines as to the rate of the accumulation of gas on the subsequent days, and from our own examination of the working-place, we are of the opinion that the gas accumulated gradually from the time work ceased on the previous day. The Chief Inspector of Mines estimated the quantity of gas at from 200 to 400 cubic feet. In our opinion, it must have been not less than 400 cubic feet, and probably more, to have caused the effects which were noticed. It is probable that, the face being close to the fault, a shot fired towards knock-off time on the previous day liberated a gas-feeder which continued to discharge into the working-place for the eighteen hours until the actual time of the ignition.

After the explosion, Inspector McArthur and Superintendent Duffy conducted experiments and took measurements, and, according to their evidence, the rate of accumulation of gas on several days was approximately 400 cubic feet per day. As a gas-feeder is usually strongest when it is first liberated the issue of gas into the place during the first few hours was probably more rapid than this, and, in the absence of any ventilating current to remove it, the gas would accumulate against the roof of the place, filling a space roughly wedged-shaped, the thin end of the wedge being farthest from the face. There is only circumstantial evidence of the cause of the ignition of this gas, but that evidence is very strong. It is possible that Williams worked in the place filling coal up to the time of the occurrence, and this is consistent with the fact that after the explosion there was a full box of coal in the face ready to be sent down to the level, but we think it more probable that for the first part of the time, at any rate, Williams worked that morning with Kaye and Colpo in the west level, and that when the coal in that place was filled and sent out and the place made ready for the firing of two shots found there he went to his own place in the rise heading. As he ascended the rise towards the face he would come into contact with the inflammable gas mixture and either because he was smoking as he walked in or because when he was within a few feet of the face he struck a match to commence smoking, he ignited the gas. A tin of tobacco, with cigarette-papers, a box of matches, and the butt of a partially smoked cigarette, were found about 12 ft. back from the face. We are of opinion that no other reasonable conclusion can be drawn as to the manner of the gas ignition.

Throughout the mine there was much evidence of slackness in management and general disregard of safety precautions. Explosives and detonators were found in three places on the floor of the levels. Apart from matches found in the pockets of some of the deceased, matches were found in the mine at two places, one in the rise heading, and one in the main dip. Tobacco and other smoking-material were found on some of the bodies. Boote admitted that he had smoked in the mine prior to the appointment of McIntosh as manager, but denied that he had done so since then, and further stated that he had not seen other men smoking in the mine, nor was he aware that they had been carrying smoking-material and matches while working.

From the evidence before us we are of the opinion that it was common practice for the men to smoke in the mine and to do so just when and where they pleased.

The ignition of gas under circumstances closely approximating those which exist in mine workings has been observed in experimental stations in England, in the United States of America, and in other important coal-mining countries, and there is much literature available which describes how an explosion develops. The first ignition creates a rapid expansion of the gases which radiate outwards from the point of ignition in all directions which are open. In this case there was only one direction open—namely, down the rise place to the west bottom level, and then right and left along the level, up the main dip, and through the other open workings. This rapid expansion, following the ignition creates a partial vacuum at the point of ignition, and is therefore followed by a rush back to fill that partial vacuum. Where there is a considerable volume of gas this creates a further quantity of explosive mixture by bringing more air into contact with the purer gas, which is not by itself inflammable. This occurs a number of times in rapid succession, and so causes a series of ignitions, giving rise to reverberations and rumbling sounds, which are always described by those who have observed an occurrence of this kind. Under these circumstances it is quite possible for workers in the vicinity of the ignition to escape injury during the first few moments as the force of the explosion usually becomes greater as it proceeds until the gaseous mixture becomes exhausted. This explains why Kaye (sen.), Colpo, and Williams were able to proceed some distance from the point of the explosion. Kaye and Colpo who were working at the end of the level, would be alarmed at the first ignition and would immediately make for the main dip. They would therefore be in front of Williams, who was probably somewhat stunned by the first ignition and who had to make his way down the rise to reach the level.

In Dr. Densem's opinion Williams and Kaye were more injured by the actual explosion than were Colpo and McIntosh, who succumbed to carbon-monoxide poisoning. In this opinion there is nothing inconsistent with the facts. The injuries inflicted on both Kaye and Williams were probably caused by one of the secondary ignitions while they were on their way out, and if they were on their