

XIII

The Elemore Colliery Disaster, 1886, and its Part in the Debate on Colliery Explosions

David Ridley

The Hetton Coal Company was one of the largest concerns in the coal trade of north-east England, and its Elemore Colliery was regarded as one of the most advanced in the world. Already, in the 1880s, parts of the mine were lit by incandescent electric lamps. Since it began working in 1825, it had never known a serious, large-scale accident. The manager, Thomas Lishman, commanded the highest respect as a leading mining engineer. Yet, in the early hours of Thursday, 2 December 1886, the colliery was hit by a devastating explosion, as one newspaper reported:

... at three minutes to three o'clock yesterday morning a large section of the workings was swept by a flame of fire which bore all before it ... the Elemore pit is situated close to the village of Easington Lane, whilst Hetton is about one mile distant.

... The cause of the explosion is enveloped in mystery. There were no reports of gas having been observed in the mine and on Wednesday the ventilation was at its maximum ...

... So far as the official information imparted extends, the explosion at the Elemore Colliery is the profoundest of mysteries.¹

One authoritative source described the devastation caused by the blast:

... the blast travelled inbye and outbye. Inbye, it followed the course of the air nearly all through the workings. ... A flame, described as being like lightning, was seen coming out of the shaft by a man in the engine-house on the bank. This man noticed the time as being 2.55, and this fixes the time of the explosion. He was covered with dust, and the dust fell in considerable quantities on the snow, which was then lying on the ground ...²

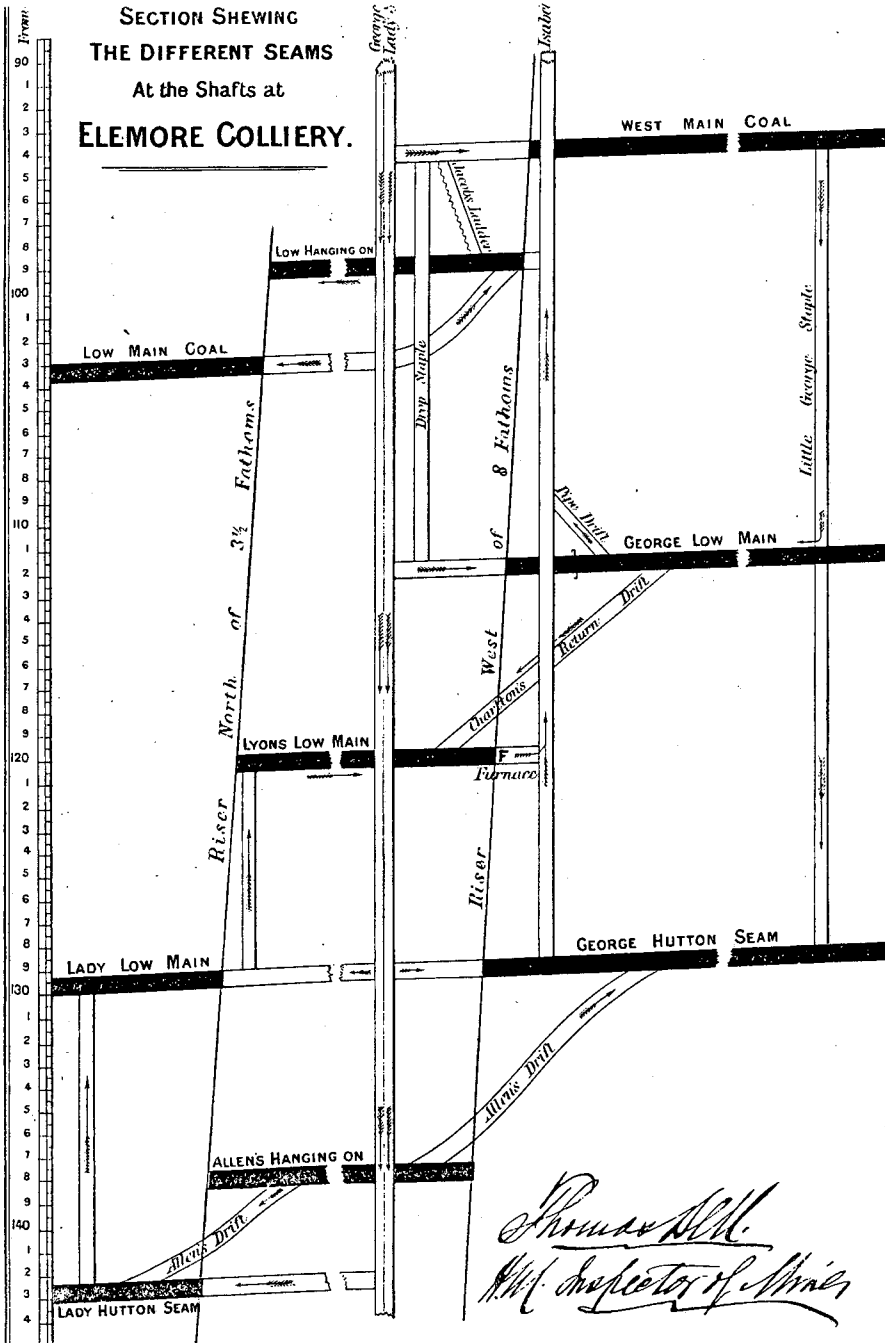
Forty-one men were underground at the

time of the explosion, which was so violent it was felt by the village policeman in Pittington, 1½ miles away. Apart from the banksmen, the first on the scene were pit deputies who had been on their way to start work, followed by "half-dressed" miners and "screaming women"³ from nearby cottages. The pit-head winding gear had been damaged and the down-cast shaft was "completely blocked."⁴ It was two hours before the pit manager, Lishman, and underviewers from the other Hetton collieries, could descend the up-cast shaft in a kibble, a large iron cauldron. They found two bodies and four survivors, one of whom died shortly afterwards, but were forced back by foul air 100 yards into the Lady Low Main seam, and returned to the surface. Newspaper reports captured the mood vividly:

By this time it was daylight, and the crowd of people assembled round the mouth of the shaft had increased considerably. ... the ever-increasing multitude stood on the pit-heaps hour after hour, silently waiting ... ingress into the working was obtained by means of a "loop", which is merely a small wooden platform swung on to a rope. Explorers descended by this means, and the result of their operations was that men were found alive in the Low Main coal seam and the Lady Low Main. The number eventually brought up alive was 15, which, with 3 men found dead, brought the total accounted for up to 18.⁵

Rescue attempts continued throughout the day, but only one more body was found. Efforts were obstructed by foul air, and it was apparent that progress would only be possible by means of the restoration of the air supply: otherwise, it would be impossible to penetrate deep into the workings. To this end, work went ahead around the clock to clear roof-falls and

SECTION SHEWING
THE DIFFERENT SEAMS
At the Shafts at
ELEMORE COLLIERY.



repair the roadways and ventilation doors damaged by the explosion. The crowds remained at the pit mouth until late in the evening: "It was not until after 11 o'clock that the group of people began to diminish, and then it was only when it became generally known that there was little hope of the men being got out alive."⁶ At the end of the first day, it was believed that 22 men remained unaccounted for.

Shifts of volunteers followed one another into the pit, but progress remained painfully slow. "It was mournfully suggestive that, instead of speaking of 'the men' in the mine, the people in the neighbourhood began to wonder when 'the bodies' would be reached..."⁷ Telegrams arrived from the Home Secretary and Lord Londonderry, which were displayed at the colliery office, "and were eagerly scanned by the waiting multitude."⁸

The dead pit ponies were brought to the surface in tubs, and buried in a trench in the side of the pit heap. Of the 74 horses and ponies in the pit, 54 were killed, including some which had to be put out of their suffering by the rescue parties.⁹

On Friday, 3 December, the inquest was opened at the Three Tuns public house, Elemore Vale, attended by the coroner, Crofton Maynard, officials from the Durham Miners Association, and Mr. Willis, a government Inspector of Mines. The first of the bodies were identified, after which the inquest was adjourned until 20 December, pending the recovery of the remaining bodies.

On 5 December, the first 6 funerals took place. The frost of the previous night had given way to morning rain, but the afternoon was bright and clear.

Nearly the whole of the inhabitants in the neighbourhood of the Hetton collieries went into mourning . . . the one long street of houses which forms Easington Lane was filled by a dense mass of people . . . There could not have been fewer than ten thousand people present, and these masses ranged themselves on both sides of the street, and crowded densely in front of the churchyard gates . . . During the burials the cemetery was packed with people, and many affecting scenes were witnessed . . .¹⁰

The last body remaining in the mine, that of the old man, James Carr, was recovered on 7 December. And remarkably, a pit pony was found alive, having been trapped since the blast. With all the bodies recovered from the mine, the death toll was 25, with 16 survivors.

However, the number of deaths was to increase, as some of the survivors died from their injuries. The first to die was Frank Straughan, on Wednesday, 8 December, followed by Henry Buckingham on Saturday, 11 December, and John Luke on Monday, December 20th.

The death toll was finally established at 28, with 13 survivors. But still the cause of the explosion remained a mystery, for which the colliery officials and chief Mines Inspectors could find no immediate explanation, not even from the testimony of the survivors.

. . . the evidence of the survivors reveal no unusual source of danger. The victims of the explosion appear to have been employed up to the last moment of their ordinary work. Those who were killed by the force or flame of the explosion were found at their working places. Those who had been beyond the limit to which the explosion extended, had left their working places, taking their lamps and clothing with them; they had been killed by the after-damp, some time after the explosion . . .¹¹

However, there were a number of individuals willing to put forward a new theory which had not yet been acknowledged as feasible by contemporary scientific opinion; and this theory was to dominate public debate, and the explosion inquest.

RELIEF OF VICTIMS AND DEPENDANTS

The victims of the explosion left 21 widows and an unknown number of children in need of support. Sympathy manifested itself in varying ways.

Mrs. Lindsay Wood [wife of the Hetton Coal Co. agent] . . . visited many of the bereaved at Easington Lane. She also visited the injured, and

cheered them in their pain. Lady Baker, of Elemore Hall . . . sent a present of a couple of rabbits to the homes of each of the injured, and also to those of the bereaved.¹²

Had the negligence of the Hetton Coal Co. been responsible for the explosion, the company would have been liable to pay compensation to the sufferers, under the terms of the Employers Liability Act of 1880: but this was not the case. However, a means of state provision for financial assistance existed in the form of the Poor Law Relief system. This means-tested benefit would most certainly have been paid to any widow applying for it, as their case was so just and clear, but any award would take into account the payments received from miners' relief funds.

The Northumberland and Durham Miners Permanent Relief Fund had been in existence since the Hartley disaster of 1862, and in 1886 had 88,000 members paying sevenpence per fortnight. The benefit paid to the guardians or next-of-kin of single men killed at work, was a single lump sum of £23. For married men leaving dependants a lump sum of £5 was paid, plus 5 shillings per week for the maintenance of the widow ("while she remains a chaste widow"), and 2 shillings per week for boys aged under 13, and girls under 14.¹³

Of those killed, seven were single, and twenty-one married. We know that the married men left twenty-one widows, but the exact number of children left is not revealed in records. (See footnote 15.) However, the Permanent Relief Fund paid out more than £300 before the end of December 1886, and it was estimated that the disaster would probably cost the Fund £4,800 in total benefits paid.¹⁴ The monies paid to widows and children in ensuing years amounted to over £627 in 1887, £587 in 1888, and £486 in 1891. Ten years after the disaster, in 1896, payments of £327 were made, and twenty years after the disaster, in 1906, over £204 was paid out.¹⁵

But in addition to the Miners Permanent Relief Fund, a more specific Elemore Relief Fund was set up. At a meeting on 8 December 1886 at the Miners Hall in Easington Lane,¹⁶ it

was unanimously decided to establish a public relief fund for the widows and orphans of the disaster.

The total received by Saturday, 1 January amounted to £158/4/0d., and the first payments, 10 shillings to each widow and 5 shillings to each orphan, were made that night.¹⁷ By 17 January 1887, £222/17/8d. had been collected, and the payments were repeated, plus 20 shillings to each parent or guardian of the single men killed.¹⁸ These occasional payments were in addition to the regular payments of the Permanent Relief Fund, and whatever Poor Law Relief might have been paid.

The Hetton Coal Company declined to make a direct financial donation, as they paid a percentage subscription¹⁹ into the Permanent Relief Fund, which amounted to £385 in 1886. However, what the company did do was to canvass its well-heeled friends, and a substantial sum was quickly collected.

In total, the Hetton Coal Company had, by 19 January when the inquest was concluded, collected subscriptions amounting to £965/16/8d. which, when added to the monies collected by the elected fund committee, made a total of £1188/14/4d. This is proportionately comparable to the example of the Seaham Colliery explosion of 1880. 164 were killed, yet in 1887 the public appeal fund still stood at over £6,100,²⁰ of which £4,100 was gifted to the Miners Permanent Relief Fund.²¹ If this instance is anything to go by, the £1200 or so collected by the Elemore appeal was more than enough to supplement the other payments the bereaved were receiving. So it seems fair to conclude that (though exactly what payments they received are not known), the needs of the widows, guardians, and children of the victims of the Elemore explosion were well catered for.

It also seems fair to conclude that at least some of the proceeds of the public appeal fund were used to help pay for the erection of the impressive marble memorial stone in Easington Lane churchyard. The memorial, flanked by the graves of the dead miners, carries their names along with simple inscriptions. But perhaps the greatest memorial of the impact of

the explosion on the Easington Lane community lies in what is absent from the churchyard: the disaster victims were the first to be buried in front of the new church, and it seems they were also the last—the church lawns are devoid of other headstones (with one exception). Easington Lane churchyard was reserved exclusively for the miners killed in the Elemore explosion, and is dominated by the memorial to their loss.

FINDING THE CAUSE

The cause of the explosion remained a mystery, and experts on mining engineering were faced with apparently contradictory circumstances. R. A. S. Redmayne, who in 1908 became the first Chief Inspector of Mines, later explained their dilemma:

... whereas the average loss of life during the ten years ending 1860 was only 2.98 persons per explosion, the figures steadily increased, until, for the ten years ending 1880, it reached 6.33 persons per explosion, an increase both strange and alarming in view of the stringent regulations which had been introduced for the enhancement of the health and safety of those engaged in coal mining, the great improvement in the ventilation of the workings and the advances made in the science and art of mining...

... Towards the close of the 1880s such was the position; but there were thoughtful men in the mining world who, after careful observations made underground after colliery explosions, came to the conclusion that the solution lay in the presence of coal-dust, which had greatly increased in the roadways of the underground workings since the introduction of mechanical haulage, the production of higher ventilating currents, and owing to the mines being deeper, warmer, and drier. Some there were who maintained that not only were firedamp explosions intensified by the presence of coal-dust, but that colliery explosions might be initiated by coal-dust alone, that is, without the presence of any firedamp.²²

Two amongst these "thoughtful men" were W. N. and J. B. Atkinson, Mines Inspectors. In the wake of several disastrous explosions in

the Durham coalfield in the 1880s, they had conducted thorough examinations of the circumstances involved, and their conclusions were published in 1886, the kernel of which was that

The number of deep and dusty mines has increased [in proportion to shallow, damp mines] ... In this way the proportion of ignitions in the deeper and dusty collieries has increased, and an explosion in them, however initiated, is much more serious than in a damp pit. Great precautions are usually taken in these mines with regard to fire-damp. What is now required is that efficient precautions shall be taken with regard to coal-dust.²³

Before these conclusions could even be published, a fatal explosion took place at Altofts Colliery, near Wakefield in Yorkshire, and for the first time, an inquest jury returned the verdict that the explosion was caused by coal-dust. Indeed, it is only surprising that it took until 1886 for the dangers of coal-dust to be recognized: as far back as 1845, Faraday had demonstrated the volatility of coal-dust during a lecture to the Royal Institution.²⁴

Further backing for the theory put forward by the Atkinsons came from John Forman, the Durham Miners Association official, who explained in some detail how, in his view, coal-dust explosions occurred:

[The concussion of a fired shot] throws the finest particles of coal dust into the circulating current, in a finely divided state, with orbid motion, thereby causing each particle of coal dust to be surrounded with air, and these particles of dust in this condition coming in contact with the flame of a shot, are easily ignited.

At the moment of ignition the temperature of the particles of dust is low, but as the ignition extends to other particles, and they become ignited in quantity, the temperature rises, so that the motion of the heated particles becomes more rapid by expanding and compressing the air, until their velocity is so great that the temperatures of the burning dust is raised to the temperature of gas flame, exploding the coal dust in its course.

At this high temperature, the expansion of the air will develop great force, which acting on the

dust at rest, will whirl it into the air current, and this will be continued so long as there is a sufficient quantity of coal dust and air to feed the flame.²⁵

And it appeared that a Royal Commission of Inquiry into Accidents in Mines, reporting in March 1886, concurred:

It is . . . well-established that even when the air is quite free from firedamp . . . [coal dust] may, when raised by the shot, be ignited so readily, and carry on the flame so rapidly, that it may produce explosive effects of a similar character to those caused by a gas-explosion. The flame, as it rushes along, if fed by freshly raised dust, may extend under these circumstances to very considerable distances, with results resembling, in their disastrous nature, those of explosions originating with, and mainly due to, fire-damp.²⁶

But this finding was heavily qualified: the Commission could not accept that an explosion of coal-dust alone could occur. Coal dust could only be ignited by an explosion of gas, they said, and it was this line which was pursued by the Elemore colliery manager, Thomas Lishman, and the senior Mines Inspector, Thomas Bell, in their search for the cause of the explosion.

The Elemore inquest resumed at the Hetton Colliery Inn on 20, 21 and 22 December, then was further adjourned until 18 and 19 January. All parties agreed upon the point of origin of the explosion: the George Low Main, where three men were engaged in shot-firing. It was generally agreed that the flame from a shot had caused the blast. But differences arose as to whether the shot had ignited coal-dust alone, or whether a pocket of gas near the roof, ignited by the shot, had in turn ignited the coal-dust. The latter theory, however, was extremely problematical: before the explosion, "the ventilation was at its maximum",²⁷ and as the Mines Inspector Bell admitted, "The difficulty with me has been how to account for the presence of gas at that point."²⁸

At the inquest, "The only definite theory was that advanced by Mr. Atkinson . . ."²⁹

. . . that the explosion was entirely due to combustion of coal dust in pure air; and that its ignition was caused by a shot fired by Johnson [one of the three workmen enlarging a roadway] . . . Wherever there had been coal dust in the mine the explosion had gone; but wherever there was an absence of coal dust, there the explosion ceased . . .³⁰

W. N. Atkinson was present in his capacity as an assistant Mines Inspector, but he faced an uphill struggle, even though not one of the other assembled experts came up with a positive explanation of the cause of the explosion. The Newcastle solicitor Mr. Cooper, for the Hetton Coal Company, ridiculed Atkinson during the examination of witnesses:

Cooper: Do you presume to go beyond the conclusion of the Royal Commissioners [of Inquiry into Accidents in Mines]?

Atkinson: Yes

Cooper: Then I was correct in saying you had very advanced ideas?

Atkinson: I don't think that the Royal Commission were infallible

Cooper: And you only regret that you were not a member of the Commission? (Laughter) . . . you admit your ideas are somewhat against the prevailing authorities?

Atkinson: Perhaps so.³¹

And though Atkinson had put forward "the only definite theory", he did not succeed in convincing the inquest jury. Their verdict, presented on 19 January 1887, recorded

That Ralph Fishbourne and others met their death by an explosion in the George Low Main Seam, on the morning of Dec. 2nd 1886. That the said explosion occurred between the Dale Way End and the Greaser, but what caused the ignition there is not sufficient evidence to show.³²

The Employers Liability Act of 1880 had not been breached, so the Hetton Coal Co. was not liable to prosecution. But the matter did not end with the inquest, as the debate had aroused wider interest, with letters from min-

ers, engineers, and others appearing almost daily in the newspapers, during December 1886 and January 1887. Opinion was divided; older miners could not understand why the same coal dust they had faced for decades should suddenly become such a lethal danger, more so even than gas; but others wrote in support of the coal dust theory. One letter suggested the establishment of a Royal Commission of Inquiry into explosions from coal dust. This was answered in the *Newcastle Daily Chronicle* of 5 January 1887, with a letter signed only 'A', but which looks suspiciously like the work of W. N. Atkinson:

The appointment of such a commission is certainly desirable, but . . . why not look upon the explosions that have happened as experiments . . . The coal dust question has only arisen in the last few years; it was almost completely overlooked before. Yet the jury in the Usworth explosion of 1885 gave the following verdict:- "Explosion of coaldust, gas and air ignited by the shot fired at Brown's place." And more recently, the Altofts jury recorded the following verdict: "Explosion of coal dust caused by the firing of an unskilfully drilled shot." . . . compare coal dust with flour . . . It is admitted that flour mills have frequently been wrecked by the expansion produced by the rapid combustion of flour dust suspended in air . . .

What Atkinson was seeking was the acknowledgement of the validity of his theory, and that it should be recognized in legislation. The 1872 Coal Mines Regulation Act, in force at the time of the Elemore explosion, did not even mention coal dust, and it was to be hoped that the new Coal Mines Regulation Bill, which was being framed following the report of the 1886 Royal Commission into mining accidents, would recognize the danger of explosions from coal dust. To this end, the conference of the Miners Federation in Birmingham passed a resolution on the subject, moved by John Wilson of the Durham Miners Association, on Friday, 14 January 1887:

This conference, believing that recent explosions have demonstrated that coal dust is sufficient without the presence of gas to cause a serious

explosion, is of opinion that a clause should be inserted in the new Mines Act making it illegal to use blasting powder or other inflammable substance in any part of the tram or roley-way unless the dust on the top, the bottom, and the sides of such tram or roley-way has been properly damped or removed for a distance of 15 yards on each side of the hole in which the shot is to be fired.³³

The reference to the ban on the use of blasting powder derived considerable credence from the fact that, since the explosion, "the use of gunpowder [had] been discontinued at all the collieries belonging to the Hetton Coal Company,"³⁴ and also from the decision of the German authorities, on the same day as the announcement of the verdict of the Elemore inquest, prohibiting gunpowder blasting in coal mines throughout the German Empire.

Attention focused on the new Bill going through Parliament. A miners' deputation met the Home Secretary in February, and during the ensuing months, the passage of the Bill through its various stages was closely watched. But extra safety measures would involve extra expense, and it appears that the coal owners' lobby was brought to bear. The miners' conference approved a resolution on 13 September, stating

That this conference of delegates, representing the miners of England, Wales, and Scotland, enters its most solemn protest against the action of the House of Lords in mutilating the Mines Bill as passed in committee of the House of Commons, and also against the action of the Government in accepting the Lords' alterations . . .³⁵

The subsequent 1887 Coal Mines Regulation Act did not fulfil the miners' aspirations. However, more instances of explosions, though not all on the disastrous scale of that at Elemore, and no doubt further representations from the miners and from W. N. Atkinson, resulted in the appointment of a Royal Commission on Explosions from Coal Dust in Mines in 1891. When the First Report was published, also in 1891, it showed that W. N. and J. B. Atkinson had continued to press their

case: but more significantly, Thomas Bell, the Mines Inspector responsible for the Elemore case, now agreed that the Elemore explosion was of dust alone, and Godfrey Lushington, the Home Office Under-Secretary, was also persuaded that it was caused by dust without gas.

RESULTING LEGISLATION

The continuing concern finally resulted in some concrete steps being taken, as Redmayne later recounted:

In the year 1893 . . . a committee, appointed by the North of England Institution of Mining Engineers, was engaged in investigating the behaviour of the so-called flameless explosives when fired in mixtures of firedamp and air and coal-dust and air.

It was during these experiments (at Hebburn-on-Tyne) that some violent explosions with pure coal-dust alone were produced without the presence of any firedamp whatever . . . It was these experiments which finally convinced me of the great potential danger of coal-dust in mining.³⁶

This danger was acknowledged by C. Le Neve Foster, Inspector of Mines, in his first annual report to the Home Office, on the mining industry in 1894,³⁷ and explicit recognition of the inflammable qualities of coal dust finally appeared in government legislation, in the Coal Mines Regulation Act of August 1896, almost ten years after the Altofts inquest jury had originally pointed to the culpability of coal dust in colliery explosions.

However, the 1896 Act referred to coal dust only in the most cursory fashion, and did not go into any great detail on the subject of prevention of the ignition of coal dust, beyond the by now commonly acknowledged practice of damping and removal of coal dust. Occurrences of explosions continued. But a discovery by a coalowner, Sir William Garforth, offered some hope, as Redmayne commented:

. . . he had observed at his own colliery of Altofts in Yorkshire, after a great explosion there . . .

that the explosive force died out on reaching those roads in which the predominant dust was stone-dust not coal-dust. This discovery was of almost equal importance in the history of coal mining as that of the safety lamp by Sir Humphrey Davy, eighty years earlier.³⁸

It should be noted that the 1893 experiments had taken place at the initiation and expense of the coalowners, and it was thus that further experiments, involving stone dust, continued. It was not until 1908, when Redmayne was appointed Chief Inspector of Mines, that the government took over and extended the scale of the experiments. The result was

. . . the imposition of means for reducing the formation of coal-dust, removing it as far as possible from the mine, but, chiefly, for diluting the irreducible minimum by the admixture of certain proportions of inert dust.³⁹

However, these conclusions were not reached until after the First World War, as Redmayne continues:

There are certain provisions in the Coal Mines Act of 1911 . . . but it was not until 1st July 1920 that the General Regulations were introduced, which required, amongst other safeguards in mining, that no less than fifty per cent of the dust on the roof, floor, and sides of the roadways of the mine should be incombustible dust of a specific fineness . . .⁴⁰

It appears almost incredible that 34 years elapsed before an adequate response to the theories advanced in 1886 by Messrs. Atkinson, and John Forman of the Durham Miners Association, was finally forthcoming. It is a matter of speculation as to whether an earlier response might have avoided the loss of the lives of the thousands of miners killed in explosions up to 1920.⁴¹

It should be clear that the Elemore disaster was far from being the only explosion of its kind: it was only one of many. Similarly, it was far from being the worst in terms of lives lost, though in terms of sheer physical scale it was probably one of the largest. Its significance lies

more in the timing of its occurrence, hard on the heels of the recently proclaimed coal dust theory, and soon after the important verdict of the Altofts iquest jury. It provided a focal point for the protagonists of the new theory, and arguably a turning point in the opinion on the subject. It was not for a lack of agitation on the part of the Atkinsons or the miners' organizations, that it took so long to respond positively to the coal dust theory by legislation. More it was a combination of the vested interests of the coal owners in "mutilating" the 1887 Bill, and the lethargy of the cumbersome machinery of government, which delayed its ultimate recognition. The history of the mining industry is littered with many similar episodes of delay, and of human suffering and endeavour, of which the Elemore disaster is simply one tragic example.

NOTES

¹Newcastle Daily Chronicle, Friday December 3rd 1886.

²"Reports to the Rt. Hon. Sec. of State for the Home Department on the Circumstances Attending [the Elemore Colliery Explosion] By Haden Corser, Barrister, and Thomas Bell, Mines Inspector." pp. 6, 7.

³Newcastle Daily Chronicle, Friday December 3rd 1886.

⁴Ibid.

⁵Ibid.

⁶Ibid.

⁷Ibid., Saturday, December 4th 1886.

⁸Ibid.

⁹"Reports to the Rt. Hon. Secretary of State . . .", op. cit., p. 13.

¹⁰Newcastle Daily Chronicle, Monday December 7th 1886.

¹¹"Reports to the Rt. Hon. Secretary of State . . .", op. cit., p. 16.

¹²Newcastle Daily Chronicle, Wednesday December 8th 1886.

¹³Northumberland and Durham Miners Permanent Relief Fund, Rules 1887.

¹⁴Ibid., Relief Fund, 25th Annual Congress, Executive Committee Report.

¹⁵Ibid., Permanent Relief Fund. Annual Reports 1888, 1889, 1892, 1897, 1907. (The figures include

claims arising from other accidents at Elemore. Footnotes to the reports show that at December 31st 1892, 25 widows and guardians, and 19 children claimed benefits. In 1893, 25 and 16 respectively; in 1894, 23 and 14; and in 1895, 21 and 10.)

¹⁶Newcastle Daily Chronicle, December 9th 1886.

¹⁷Ibid., January 4th 1887.

¹⁸Ibid., January 18th 1887.

¹⁹This calculation was based on 20% of the workmen's subscriptions.

²⁰Ibid., Wednesday February 9th 1887.

²¹Royal Commission on Labour, Vol. I: Mining (1892), p. 18.

²²R. A. S. Redmayne, "Men, Mines, and Memories" (1942), pp. 159, 160.

²³W. N. & J. B. Atkinson, "Explosions in Coal Mines" (1886), p. 131.

²⁴R. L. Galloway, "Annals of Coal Mining and the Coal Trade", Vol. 2 (1904), p. 195.

²⁵In: J. Wilson, "History of the Durham Miners Association, 1870-1904" (1907), pp. 358, 359.

²⁶Royal Commission . . . Accidents in Mines (1886), Summary, p. 113.

²⁷Newcastle Daily Chronicle, December 3rd 1886.

²⁸Report to the Rt. Hon. Sec. of State . . . on the Elemore Colliery Explosion (1887), p. 19.

²⁹Ibid., p. 8.

³⁰Newcastle Daily Chronicle, January 20th 1887. Minutes of Inquest.

³¹Ibid.

³²Report to the Rt. Hon. Secretary of State . . . op. cit., p. 3.

³³Newcastle Daily Chronicle, January 5th, 1887.

³⁴Report to the Rt. Hon. Sec. of State . . . op. cit., p. 20.

³⁵Newcastle Weekly Chronicle, September 17th 1887.

³⁶Redmayne, op. cit., p. 160.

³⁷Also see W. C. Blackett's paper, "The Combustion of Oxygen and Coal Dust in Mines", in "Federated Institute of Mining Engineers," Transactions, Vol. VII, 1893-4, p. 54. He refers to Atkinson's book as being the best authority on the subject.

³⁸Redmayne, op. cit., p. 160.

³⁹Redmayne, *ibid.*, p. 162.

⁴⁰Redmayne, *ibid.*, p. 162.

⁴¹"Results have proved beyond the possibility of doubt the efficacy of stone-dusting . . . over the period 1908-16, during which stone-dusting was not practised, the loss of life from colliery explosions averaged 174 persons per annum; whereas over the period 1917 to 1936 inclusive, during which stone-

dusting became general—and after 1st July 1920 compulsory in dry and dusty mines, the average fell to 70 deaths per annum.” Redmayne, *ibid.*, p. 162.

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W. C. Blackett, “The Combustion of Oxygen and Coal Dust in Mines”, in “Transactions, Federated Institute of Mining Engineers”, Vol. VII, 1893–4, p. 54.

Newcastle Daily Chronicle, Dec. 1886–June 1887.

Newcastle Weekly Chronicle, Dec. 1886–Jan. 1888.

APPENDIX

The following is a list of names, ages and occupations of persons down Elemore Colliery, at the time of the explosion, on 2 December 1886:—

Seam	Name	Age	Occupation	Time and Date of Descent	No.	Remarks
	R. Hills	64	Deputy	8 p.m. Dec. 1st.	1	Killed
	M. Tempest	38	Hewer	10 ” ”	2	”
	W. Hunter	40	”	10 ” ”	3	”
Lady Hutton Seam	W. Seeds	41	”	10 ” ”	4	”
	J. Carr	65	”	10 ” ”	5	”
	G. Nicholson	21	Putter	6 ” ”	6	”
	G. Walton	17	”	6 ” ”	7	”
	R. Fishburn	60	Horsekeeper	8 ” ”	8	”
George Hutton Seam	E. Egglestone		Fitter	2.30 a.m. Dec. 2nd.	9	Rescued
	H. Moss		Horsekeeper	” ”	10	”
	H. Johnson		Rapperman	6 p.m. Dec. 1st.	11	”
	Wm. Johnson		Stoneman	11 ” ”	12	”
	J. Gleghorn		”	11 ” ”	13	”
Lady Low Main	Wm. Johnson		Driver	6 ” ”	14	”
	R. Bousfield		Shifter	6 ” ”	15	”
	G. Gustard		”	6 ” ”	16	”
	H. Johnston, Junr.		Stoneman	11 ” ”	17	”

Seam	Name	Age	Occupation	Time and Date of Descent	No.	Remarks
	H. Buckingham ..	22	„	2 a.m. Dec. 2nd.	18	Died since
	Frank Straughan ..	32	„	„ „	19	„
East Main Coal (Dale Way)	T. Hope		Stoneman	11 p.m. Dec. 1st.	20	Rescued
	Ralph Corner		Putter	6 „ „	21	„
	Sam. Grice	29	Stoneman	2 a.m. Dec. 2nd.	22	Killed
	Geo. Pattison	54	„	2 „ „	23	„
	Wm. Robson	43	Hewer	10 p.m. Dec. 1st.	24	„
	Jos. Williams	37	„	10 „ „	25	„
	S. Parkinson	27	„	10 „ „	26	„
	R. Pearson	54	„	10 „ „	27	„
	Thos. Robins	20	Putter	6 „ „	28	„
	Thos. Clark	51	Deputy	8 „ „	29	„
George Low Main	J. G. Laverick	22	Stoneman	11 „ „	30	„
	Thos. Charlton ..		Master Wasteman	2 a.m. Dec. 2nd.	31	Rescued
	John Johnson	58	Stoneman	11 p.m. Dec. 1st.	32	Killed
	Geo. Pattison	31	„	11 „ „	33	„
	Thos. Johnson		„	11 „ „	34	Rescued
	R. Appleby	53	„	11 „ „	35	Killed
	John Luke	38	„	11 „ „	36	Died since
	G. Thompson	43	Hewer	10 „ „	37	Killed
	Jno. Thompson ..	19	„	10 „ „	38	„
	G. J. Taylor	17	Putter	10 „ „	39	„
	Ralph Lawson	44	Electric Engineman	6 „ „	40	„
Lyons Low Main	Thos. Spence	36	Furnaceman	8 „ „	41	„

