1

Mt Kembla: Australia's Worst Land Disaster, 1902

Most Rhondda chapels were rather plain and functional from the outside, built of massive blocks of Pennant Sandstone to withstand the hazards of mine explosions, subsidence, and the window-rattling chords of the Hallelujah Chorus.

Clive Woosnam, Sydney Welsh chorister, reminiscing on his South Wales childhood

At the dawn of this century an old man stood beside the cemetery at the Soldiers and Miners' Memorial Church on Mt Kembla, a serene setting in the thickly wooded Illawarra escarpment on the south coast of New South Wales. The church overlooked Lake Illawarra to the south and the city of Wollongong to the north. Fred Kirkwood knew the area well. He had been keeping that cemetery in impeccable condition for more than 70 years. It was his way of honouring the 96 men and boys who were killed in Australia's worst land disaster, the Mt Kembla colliery explosion of 31 July 1902. It was an event not in his living memory—he was born on 25 February 1909, but he had mined at Mt Kembla his entire 46-year working life. From the age of 19 he had become involved in preserving the memory of an event, described to him from his earliest years, that had left him with what might be described as the 'death imprint'.

The Mt Kembla graves, with their faded lettering, told the story of 17 year olds David Stafford and Claude Pamay

having their lives snuffed out, of Percey Hunt dying at the age of 60 along with his sons Percey, 20, and William, 18. Tom Morris had died at the age of 75, 25 days before the tragedy, but when the mine blew up his son George, 34, and grandson Frederick Smith, 14, went with it. Mary Dungey, who was to lose two sons in the Great War, went to the temporary morgue to identify the body of her Cornish-born husband, Francis. He had been decapitated and his head placed back in position. When the widow tried to hug him, the head fell away.

The entrance to the old mine was still there, but the mine had ceased operation in 1970. It was silent now, apart from the calls of birds and the rustle of wind in the rainforest. The entrance to the shaft was sealed, perhaps to block out the howl of anguish said to come from the ghost of Mickey Brennan, the one miner whose body was never recovered. There had been other tragedies since 1902. During Fred Kirkwood's working life 16 men had lost their lives in the mine. He remembered all of them. A man called Funnell had had his right arm pinned by a fall of coal in 1924. It being necessary to get him out, a workmate had chopped his arm off with a shovel, but Funnell had bled to death before he could be brought to the surface.

Mt Kembla was not the only mine in the Illawarra to experience catastrophe. In 1887 the Bulli Colliery had gone up, killing 81 men and boys, making it the biggest land disaster in Australia at that time. It was hardly an unprecedented or unusual, or for that matter unpredictable, event and it was certainly not unfamiliar to many of the miners from the United Kingdom who took up tools in the Illawarra. An explosion in South Wales' Cymmer Old Pit in July 1856 had killed 114 miners. Another at Ferndale, South Wales,

in November 1867 had killed 178. A fractured pump bob at Britain's Hartley Colliery in 1862 had blocked the mine's single shaft and brought about the deaths of 204 miners from asphyxiation. Repeated explosions in the Richmond fields, Virginia, USA, killed 42 miners in 1836, 53 in 1839, 55 in 1855, 69 in 1867 and 32 in 1882. Despite these appalling cataclysmic events, sons wanted to follow fathers, and their sons after them. It was, as Kirkwood said, 'in your blood', and if you were injured or killed, it was simply a matter of your number being up.

Coal, with all its benefits, had long stamped itself on the history of Wollongong before Kirkwood came onto the scene. Explorer George Bass saw coal at Coalcliff as early as 1797. The outcrop was part of the Sydney basin, which came out at two other places: Newcastle and Lithgow. It was easily accessible at these places, though the area at the time had no natural harbour and the potential for coal mining was soon overshadowed by the developing industry in Newcastle. When the Australian Agricultural Company lost its monopoly on coal mining it also lost the right to restrict coal mining to the Newcastle fields. Coal began to be mined in the Illawarra, the first shaft going in at Mt Keira in 1849. The industry developed slowly. Mt Pleasant started in 1862 and the Bulli Coal Company started in 1863, using an ocean jetty. Four mines, employing a total of 182 men, were operating in the region by 1871.

From that point onward, there was sustained economic growth and an increasing interest in the riches of coal mining. Some of the colony's wealthiest and most influential people made speculative land purchases. In 1878 the Coalcliff Coal Company was formed. Three years later the NSW Government decided to build a railway to the Illawarra, the

decision prompting a new phase of development and a rush of investment into the region. The Mt Kembla Coal and Oil Company was founded in 1878 with £100 000 in British capital. Its mine opened, with some ceremony, on 27 February 1883. The company's board was chaired by Ebenezer Vickery, an enterprising individual who was to later win a place on the NSW Legislative Council. The NSW Government legislated for a railway to be built from the mine to Port Kembla. Vickery estimated that the seam comprised 67 million tonnes of coal and could produce some 3000 tonnes weekly for a period of 30 years.

There were plenty of takers for jobs. In 1884 the Mt Kembla mine employed 198 men, including 60 who had been brought from Scotland and Yorkshire. There were huge riches to be gained. There were also risks, one of which was fluctuating coal prices, another being the questionable level of demand. The New South Wales coal mines were always plagued with the problems of overproduction. There was the question of how to transport the coal. The Illawarra lacked a natural harbour. In time at least some of these problems could be overcome. The train line from Sydney was completed in 1887 and ocean jetties were erected at Port Kembla and further north at Bellambi. Other problems were far more intractable. There was always uncertainty about the dimensions and accessibility of seams. Nobody wanted cave-ins or explosions. On the other hand, nobody wanted to be denied an income either. For many men it was a choice between accepting risks and forfeiting the chance to earn a living.

Miners were paid according to production, but by contemporary standards they were not well-off. They had to meet costs that workers a century later would expect the company to cover, such as supply of gunpowder and fuses, and timber

and erected supports to prevent cave-ins. There was no money to be made out of this, so these vital safety measures tended to be put in hastily. There was neglect of important health issues. Over time, many men became victims of lung diseases related to their exposure to coal dust. Many also disguised their health problems for fear of losing their job.

There had to be an incentive for taking what on the face of it seem unbelievable hazards. Several kilometres underground, miners blasted rock or coal and were obliged to calculate whether the hole was big enough to cause a cave-in, and whether the timber struts would be capable of restraining several thousand tonnes of weight that could shift position. Add the hazards of drowning, asphyxiation, fire, explosion, being caught in machinery or blown to bits by percussion and one wonders why anyone would have bothered with it. Methane, a by-product of the formation of coal, was invisible and odourless. When present in concentrations of four to 15 percent in air it formed an explosive mixture known as 'firedamp'. Carbon monoxide, known as 'whitedamp', was also colourless and odourless, flammable, potentially explosive and highly toxic. Carbon dioxide, known as 'blackdamp', simply displaced oxygen, causing asphyxiation. Whitedamp and blackdamp mixed with air become 'afterdamp', which could catch fire and explode. Collectively, these commodities were simply referred to as 'gas'. Any gas in a mine spelt trouble.

Then there was coal dust, which normally does not present much of a hazard, but when thrown up in an explosion it would be suspended in air and surrounded by flame, making it potentially lethal. In major explosions, one lot of coal dust could explode and throw up another, creating a chain-reaction of explosions.

An obvious safety precaution, in the days before electricity was introduced, was to keep naked flame away from methane. But naked lights were taken into coal mines throughout the 19th century, beginning with candles, then replaced by tallow lamps, known as Scotch miners' lamps. This was despite of the fact that the Davy Safety Lamp had been developed in Britain in 1815, protecting the naked flame with a screen of metal. The metal cooled the flame of any ignited gas that entered the confines of the lamp, thereby preventing gas outside the lamp from igniting. An additional advantage was that if the concentration of gas was more than that of air, the flame went out. Thus, it could test for presence of gas. The disadvantage was that the metal screen so shielded the light that miners had much poorer illumination. Instead of the strong light of a naked flame they had a flickering orange glow. Miners could not see to lift the skip properly. They could have accidents and drop lumps of coal on their feet. If their lamp went out, they had to borrow a lamp and go to the surface to relight their own, which lost production time for two miners.

The problem was compounded by the system of paying by production, and by the motivation of the mine management to save money. Productivity was greater when a naked flame was used, so both management and workforce favoured it. Mine owners could have encouraged safety lamps by offering a higher hewing rate for those using them. In fact the miners said at one point if they used safety lamps, they wanted an extra 3d a ton. The owners did not want to pay it. Nor did they want the extra cost of providing safety lamps in the first place. Some mine owners made miners pay for broken safety lamp glass.

The decision to go underground in these conditions was a calculated risk. The most important calculations were made

on the basis of whether a mine was 'gassy' or not. The Mt Kembla mine was not regarded as particularly gassy. For that matter, it was regarded as a 'dry' mine but not particularly dusty. What risk there was from gas could be reduced by ventilating the mine. The first ventilation technique was to have a furnace that drew air towards it, expelled it up a shaft, and maintained the direction of the air-flow via a system of doors. Later, furnaces in at least some mines were replaced by a steam-driven boiler, although at Mt Kembla the furnace was retained into the early 20th century. From the main shafts, 'headings', or tunnels going off at right-angles, were cut. The rules required that at intervals of 35 yards (31.6 metres) there had to be 'cut-through' tunnels to a parallel heading to allow for ventilation. Rules also said that any gas discovered should be reported, and that a record be kept of such reports.

The history of the early mines showed that many ventilation precautions were tokenistic. Doors meant to stop back-flow of air were put into main thoroughfares and opened frequently. The coalface was sometimes pushed beyond the limit of the established ventilation cut-throughs. Sometimes hollowed-out areas from the headings (the 'bords') were simply bricked up, a cost-saving procedure that increased the risk of gas build-up in those areas. The desire to get on with the job of making money was so great that men undercutting at the coalface often did not bother to 'spag' the coal, which involved putting in short props to prevent a premature collapse. There was even evidence of collusion between management and the men to blatantly cheat on ventilation. When government inspectors came, entire sections of the mine would be sealed off to enhance the air current at the time it was measured. There was often not much chance of a mine being caught by a surprise visit.

Some inspectors gave mine managers several days' notice that they were coming.

Another major control was organised unionism, but its history was patchy. Miners were prepared to make major concessions to preserve their employment. An Illawarra Miners Mutual Protective Association was formed, but it was not until 1879 that a Wollongong Miners' Union was formed and that collapsed in 1880. Unionism reverted to local miners' lodges. Mt Kembla miners' lodge struck on 15 August 1885 over the hewing rate of 2/9 a ton. The seam had become narrower and miners had to work harder. They wanted more money in compensation: a halfpenny per ton for every two inches that the seam fell below five feet six inches in height from the shaft floor. The men remained on strike for two months and the company made some concessions. District miners struck for six months in 1886–7, but lost. The strike was only settled by the miners agreeing to accept reduced hewing rates and to variations in the rate according to the prices that coal was getting. They had to sign rules of engagement, which some miners later claimed prevented them from reporting the presence of gas.

A fallback position was naturally to get the government interested, and to enact legislation to enforce safety measures. The New South Wales Government passed the *Registration and Inspection of Coal Mines in the Colony of New South Wales Act 1854*, which dealt with the registration and inspection of coal mines, but did not specifically address safety. In 1862 the government enacted the *Coal Mines Regulation Act 1862*, which set an age limit of 13 for males working in the mines and prohibited employment of women. All accidents were to be reported, there were to be two egresses or exits for each mine, there was to be ventilation, dangerous sections of

the mine were to be blocked off and safety lamps were to be provided. In 1876 that Act was repealed and the *Coal Mines Regulation Act 1876* was substituted for it. This Act was ineffective. A Department of Mines Coalfields Inspectorate was established, but it was understaffed and among its officers were some very negligent individuals.

The government was always only lukewarm in its desire to intervene. Many of the legislators had interests in coal mines. Don Dingsdag points out in his study of the disaster, *The Bulli Mining Disaster 1887*, that 22 Legislative Councillors were directors or owners of coalmines and at least 25 of the Legislative Assembly's 124 members. The ministry of Premier Sir Henry Parkes had ten members, of whom seven were directors or proprietors of coal mines and Parkes himself owned 4000 hectares of coalmining leases at Jamberoo.

The explosion at Bulli mine on 23 March 1887 was not entirely without warning. The night before there had been a minor explosion of gas but the men involved had not reported it, possibly out of fear of losing their jobs if they did. When the disaster came, it rocked the city in more ways than one. A coroner's inquest into the explosion blamed the 81 deaths on management of the mines. It said that the deaths had been brought about by 'disregard for the *Bulli Colliery Special Rules* and *Coal Mines Regulation Act*, in allowing men to work while gas existed'. But that really would not do and the government ordered a royal commission and stacked it. There was a lot of money riding on the result. The other mine managers wanted the Bulli mine manager, Alexander Ross, exonerated because if he were to be heavily blamed it would reflect on themselves and they might be saddled with harsher government control measures.

The royal commission found that the prime cause of the explosion was careless use of explosives by the miners. Apart from some minor criticism of an overseer, it exonerated the mine management. It made recommendations regarding ventilation and amendments to the *Coal Mines Regulation Act*. It also said that only Davy lamps should be used in the coal mine and it made recommendations to improve management of the mine. The recommendations were ignored. Alexander Ross, manager of the mine before the explosion, continued to work in the mine. In 1890 Bulli mine management announced that naked flame would again be used 'until covered lights are cheaper'. The chance to thoroughly reform the system, and prevent a disaster in the future, was lost.

Unionism, which had been stronger in the northern coalfields, made progress elsewhere in the state's mining industry. In 1889 miners went on strike at Broken Hill, winning the right to have all miners join their union. One of the issues they fought over was safety. In 1890 the so-called Maritime Strike was called, a large-scale concerted action spreading across the country, dragging in the maritime, agricultural and mining workers. But the gains made by the unions met entrenched opposition from management. The colliery companies had no interest in what the men were fighting for. Through their Southern Cross Coal Owners Association, they pre-empted strike action by advertising for non-union labour. On 10 October 1890 police and soldiers escorted 75 non-unionists into the Mt Kembla mine. On hand were 160 men from the Permanent Artillery, who were equipped with carbines, bayonets, swords and machine-guns. The unionists tossed up the idea of storming the mine and carrying off the non-union labour. Ebenezer Vickery arrived from Sydney and was stoned. The mine manager John Evans threatened to

sack any man who actively promoted the union, and posred a sign at the pit mouth intimating that any man who joined the union would be given notice of dismissal. The miners drew little comfort from the courts.

There were other forces at work. At the time of the Maritime Strike the industry went into recession in line with a depression in economic conditions throughout the world, and coal, which had sold at 10/- a ton in 1889, fell to 6/- a ton in 1893. Mt Kembla's owners kept the mine open while other mines closed, but the miners were at a severe disadvantage. There were fewer jobs. At Kembla Heights in 1891, census-takers found that 20 percent of the town's 220 houses were unoccupied and in one case four men were found living in one tent. Between 1892 and 1896 Mt Kembla coal production declined by an average of 0.3 percent a year and employment declined by three percent. In 1899 coal was selling at only 4/- a ton. Men needed work. The safety issue was always present, but it tended to be disregarded.

On 31 May 1892 a Mt Kembla miner, David Howie, drove his pick into the rock face and missed the seam, breaking into empty space and releasing the methane that had built up there. Howie's naked light ignited the gas and his workmate, Michael Gallagher, was burnt on the back of his hand. It was a warning, but when this was brought to management's notice, they were more concerned with the fact that Howie had breached work procedure by hewing ahead of where he should have been working. No methane was found when the area was tested, and it was assumed the mine's ventilation system was working. The fact was that the Mt Kembla coal seam was slowly releasing methane. The best safety lamps could detect methane at a concentration of one percent of the air. But Mt Kembla was releasing methane at a lower rate.

There were more sensitive hydrogen lamps available, which could detect methane in concentrations of as low as 0.25 percent, but they were expensive and dangerous if not carefully handled.

The NSW Government proposed to introduce wide-ranging legislation to bring further regulation to coal mines. One was the introduction of the eight-hour day. Another was the raising of the minimum age of employment from 12 to 14. Vickery, who had been elected to the Legislative Council in 1887, spoke against the bill. In 1893 his manager, Dr James Robertson, gave evidence before a parliamentary select committee that New South Wales mines were worked under the world's most favourable conditions. He said the coal industry was on the verge of collapse and that the proposed provisions would be 'ruinously expensive' to the miners because their fortunes were bound up with the fortunes of the mine owners. Governments throughout the colonies were sympathetic to such pleas from proprietors.

Mt Kembla's management was as hard-driven as mine managements anywhere. It took precautions but was not overzealous in such matters. As with all other operations across the nation, the cost of safety measures and amenities was measured against productivity. Mt Kembla was neither very good nor very bad in terms of safety. Between 1886 and 1889 it had had eight fatalities from various accidents. Those statistics, and those for non-fatal accidents, compared favourably with other mines. The possibility of Mt Kembla being caught by a gas explosion was dismissed as minuscule. In 1895 Dr Robertson gave evidence to a royal commission into proposed new mining legislation that the mine gave off gas 'very rarely'. Mine owners, he said, had no interest in explosions and the miners were protected from misfortune in

'a number of ways'. It was common knowledge that there was some gas in the Mt Kembla mine, but it was of low concentration, from 0.5 percent to 1.5 percent, not enough to cause an explosion. This knowledge tended to be suppressed by both miners and management because they considered that Mt Kembla would get an unjustified stigma as a 'gassy' mine and in one way or another production would be inhibited.

The *NSW Coal Mines Regulation Act* was passed in 1896, making it mandatory that the presence of gas be reported immediately, with a sanction of three months jail with hard labour for anybody found guilty of 'wilful neglect endangering life and limb'. The workman discovering the gas was to make an oral report to his supervisor. The Act said that when gas was discovered, workmen should be withdrawn from the area and only safety lamps used thereafter where a 'dangerous' level existed. Mine proprietors ignored the provisions. There was no definition of what level of gas amounted to being 'dangerous', so it became a matter for the management to make a judgement. It was ultimately up to the management of individual mines to determine for themselves whether there was 'likely to be any such quantity of inflammable gas as to render the use of naked lights dangerous'.

Inspectors were appointed who could request that things be carried out in accordance with the Act. The inspectors had the general power to request managers to remedy 'any matter, thing or practice... [that would] threaten or tend to bodily injury of any person'. But any inspector's decision could be appealed and the resulting proceedings, involving arbitration, could be drawn-out. In the meantime, if the inspector had found dangerous conditions, they continued to exist. There was also prejudice throughout the coalfields against anyone who brought problems to notice. In 1899 a parliamentary

inquiry investigating the dismissal of a mining deputy called Bailey from Newcastle noted that he had reported firedamp three days before his dismissal. The colliery proprietors continued to push home their advantages against organised labour. The Southern Cross Coal Owners Association comprised the owners of Mt Kembla, Mt Pleasant, Mt Keira, Bellambi, South Bulli and Coalcliff mines. Vickery and Robertson urged unions to go on strike against mine owners outside this group, who were stalling on the issue of offering a lower hewing rate to the miners.

In the meantime mines continued to blow up or collapse. At Stockton Colliery in 1896 two men were killed in a fire and nine rescuers died, prompting the government to import specialist rescue equipment. An explosion at Dudley Colliery in the Hunter Valley in 1897 killed 15. In Queensland in 1897 there were a series of worrying firedamp explosions at Torbanlea, near Maryborough, and at Waterstown, near Ipswich. The statistics were positively screaming for attention. In the 20 years since 1882 there had been 546 fatalities in NSW coal mines. More than a third had come from gas explosions. Three of them accounted for 192 fatalities. Complacency seemed to be the watchword. Queensland held a royal commission into Torbanlea, which had had a second firedamp explosion in 1900, killing five miners. The royal commission into Torbanlea produced a damning indictment of Queensland coal mines generally, including the practice of taking naked lights into coal mines known to be gassy. It said, 'In the majority of cases, the persons employed to manage collieries are very much below the standards in intelligence, and knowledge of mining, than should be required.'

The chief mines inspector for New South Wales, Alfred Atkinson, who came from a mining background in Britain

and from the historical record appears a cut above other mining inspectors of the period, campaigned tirelessly for stricter controls. He wrote to mine managers urging them to introduce safety lamps when even the slightest danger of gas existed. Again there was resistance from the mine owners, saying that the inspector was interfering with their operations. In 1897 Atkinson wrote, 'It would appear . . . that nothing can be done by the Inspectors except point out to the managers in those cases where they consider safety lamps might be used.' In 1901 he sent samples of New South Wales coal dust to Britain to test how readily it would ignite. The results showed that the coal dust was quite inflammable and in concentration could explode. Atkinson wrote to all mine managers urging them to water down the areas when shot-firing took place.

Innovations favouring safety represented additional costs and trouble. The Metropolitan Colliery, between Sydney and Wollongong, was exceptional in that it did introduce locked safety lamps exclusively for illumination, electric motors being regarded as an unreliable source of power for illumination. When such precautions were not taken, there were disasters. 1902 saw some spectacular coal mine disasters. One was at Fraterville, Tennesee, on 19 May, when 184 were killed. 150 men were killed at Fernie mine in British Columbia and on 10 July 112 were killed at Johnstown, Pennsylvania.

Mt Kembla placed faith in its ventilation system. It was by now accepted practice to ventilate collieries continuously, whether they were being worked on or not, in order to avoid the accumulation of flammable gases in stagnant air and the risk of sucking them through the mine at the restart of ventilation. Mt Kembla's air conditioning, which provided between 3000 and 3700 cubic metres a minute, was considered more

than adequate for the 260 men and 30 horses working below. The mine was considered one of the best-equipped in the state, but Mt Kembla management did not accept the mandatory use of safety lamps. The ventilation, it was felt, would blow the dangerous stuff away. The rewards from continuing to operate the mine were apparent. At the turn of the century Mt Kembla was the second-largest producer out of 12 mines in the Illawarra district and the fifth-largest of 89 operating in New South Wales. Since it started operations, the mine had paid £100 000 in dividends and shareholder return by 1901 had reached eight percent of their investment. By 1902 the mine workings covered 300 hectares, of which 100 hectares had been completely mined. Inside the mountain, the excavated areas had had their struts removed. They were known as goafs, and were left to cave in naturally.

There was a sleeper present—a hidden menace—something so quiet and unobtrusive it was overlooked in the rush to make profits. In one section a huge area, some 13.6 hectares, became a goaf. It appears that low concentrations of gas were being emitted within this goaf, and, being lighter than the air, were concentrating in the roof cavities, far from the probing of the inspectors, unseen and virtually undetectable. In early 1902 some traces of gas were found at the edge of that goaf. No written report was made on the discovery, though it was required by regulations. Rogers knew about it, as did his undermanager, William Nelson. Mine deputy John Morrison was to say later that he checked the goaf once a month. Goafs were supposed to be checked once a week for gas when people were available to do the job and when it was considered safe to do it. In his monthly inspections Morrison did the checking with a naked light, which was an unenlightened and illegal practice—had there been a concentration of gas there he would

have set it off. On the grounds of safety he did not check under sections of the roof that were unsupported by props.

Leaving aside such inspections, there were other sets of eyes and ears. If there was gas in a mine, it would come to someone's attention. David Evans, the day deputy for the mining district, heard plenty of accounts from miners concerning the presence of gas. He even saw some evidence of it himself, but he regarded the quantity as too small to constitute a threat and did not report it to his superiors. Management tacitly accepted that there was gas, but they felt that with continuous ventilation, concentrations of gas would not build up to a dangerous level. Rogers was later to say, 'I knew that it was a seam that produced gas. I relied on there being no gas by reason of superior ventilation.' On 29 April 1902 inspectors did another check of the mine's ventilation system. Two days later they pronounced it to be in good order and in compliance with the regulations.

Despite all this, there was never any particular complacency about gas. As Drs Stuart Piggin and Henry Lee, authors of the most comprehensive study, *The Mt Kembla Disaster*, point out, management and workers were happy to perpetuate a public myth that there was no gas in the mine, but privately many held serious concerns. In July 1902 an arbitration hearing was in progress in Wollongong over the miners' claim for an increase in the hewing rate to compensate for the use of safety lamps.

On the morning of Thursday 31 July, the 'front' shift started operations at 7 am, intending as usual to work through to 3 pm. The 'back' shift started at 9 am and would work through to 5 pm. At 2 pm that day there were 261 men underground and 22 on the surface. At that moment, it appears from later inquiry, part of the 13.6 hectare goaf collapsed, displacing air

which, with nowhere else to go, was forced along the nearest passage, the No 1 Right Road. With the air came methane gas which, encountering the naked flame of a miner's lamp, exploded. Coal dust, thrown up by the percussion, ignited as well and the succession of explosions knocked out props from the working section, causing the roof sections to fall, displacing more air, throwing up more coal dust, and spreading the explosion further.

The mine was so extensive that in other parts the explosion was not heard at all, but the rumble was heard soon enough at the surface. The ground trembled as though hit by an earthquake. It looked as though a white sheet was coming up to the surface. This was the result of water vaporising immediately before the rush of flame—one of those extraordinary tricks of nature like the lightning bolts in the plume of a volcanic burst or the wafting breezes in the eye of a cyclone that are eerily fascinating to the trapped soul who might have a second or two for contemplation. The smoke and ash roared up through the mine entrance, picking up miner John Clark, who was wheeling a skip, and hurling him and everything around him 30 metres. All buildings were wrecked and the main haulage road was blocked by thousands of tonnes of rock. Piggins and Lee relate the story of Paddy Brownlee and William Wilson who were in a weigh-cabin 25 metres from the mine entrance: 'They neither heard nor saw anything before they were suddenly thrown to their floor and their ears went numb as if something had been savagely thrust upon them. As they were scrambling to their feet a flame rushed through the window to their left, passed under the desk, burned both of them on the left of their faces, peeled the skin from their left arms, and passed out of the cabin through a window on their right.'

Dust rose high above the mine, blotting out the sun. Beneath the surface, eight men had been killed or were mortally injured and another 15 were injured less severely, as were six more who, like John Clark, had been outside the mine. But that was only the start of it. The afterdamp spread quickly, assisted by the ventilation system which, damaged but not destroyed, was inadvertently drawing poisonous gas into other sections of the mine. A number of men from the front shift who were due to stop work were walking towards the main travelling road to get out of the mine. They had not heard the explosion and walked into the afterdamp, where a number succumbed. Others crawled or dragged mates from the deadly atmosphere. Jim Powell, acting in accordance with a mistaken belief that bare feet made one more resistant to gas, got out barefoot. Other miners, feeling their legs go weak and their hearts pumping faster under the effects of carbon dioxide, fell to the ground and into even greater concentrations of carbon dioxide. Some men, so badly affected by the gas, became disorientated and behaved irrationally. James Annersley sat down to light up a pipe and died with the match still between his fingers.

Miners rushed to the scene from all over the district. In the first hours after the explosion, for every two men who were carried out of the mine alive one was carried out dead. There were so many dead that the bodies were loaded onto skips and wheeled out. Nobody had put much thought into preparation for disaster. There were only a dozen safety lamps available. Spares had to be brought from other Illawarra mines. There was no clear knowledge of the layout of the Mt Kembla mine. There were not enough stretchers. Rescuers went into the mine workings and many were affected by the afterdamp and themselves had to be rescued. Two died, one being Henry

Osborne McCabe, a former mayor of Wollongong, who had distinguished himself in rescue work after the Bulli disaster 14 years previously. Another was a night deputy of Mt Kembla mine, William McMurray. Ebenezer Vickery, having received a telegram at 2.30 pm while attending a session of the Legislative Council in Sydney, returned to Port Kembla with sinking feelings.

By 4 pm the next day all hope was lost for any more survivors. Ventilation was so poor that all further searches were suspended. The final toll, after some initial survivors succumbed to the effects of afterdamp, was 96 men and boys. Thirty-three women had been widowed and 14 children aged 14 and under were left without a father. Another 15 adults had lost lovers, partners and breadwinners.

The disaster was followed by a coroner's inquest and a royal commission. The company, following the instinct of most corporate bodies after tragedy, wanted to be exonerated. The theory most appealing to the company was that there had been a wind-blast from the collapsed goaf and no explosion. But burnt bodies and death from carbon monoxide poisoning made that theory untenable. Three royal commissioners, headed by District Court Judge Charles Murray, did not, however, find against anybody in the company—not even Morrison. Morrison's chances of finding such a low concentration of gas in the roof of the 13.6 hectare goaf, they said, were 'practically nil'. The commissioners did find that had safety lamps been used, there would have been no explosion. They said that in future even if a mere trace of gas was found, a mine should be regarded as 'gassy' and appropriate measures taken. They said that use of naked lights to test for gas should be banned, that there should be regular tests of the Mt Kembla workings with safety lamps and each three

months tests should be conducted with hydrogen lamps. They ordered that a book be kept in which written records be made of every report by a miner about gas. Other recommendations concerned such things as ventilation, explosives and educational levels for the award of mine manager's certificates.

On 19 September 1902, less than two months after the disaster, 170 men presented themselves for work at the mine and on 25 September production recommenced. On 15 July 1903 Judge Charles Heydon was directed by the government to undertake an inquiry into the conduct of William Rogers, the mine manager. Heydon found that Rogers was 'unfit to discharge his duty by reason of gross negligence'. He found that Rogers had not observed Special Rule 10 for the mine, which required weekly inspections of the mine and regular checks to be carried out in 'idle places', or unworked sections of mine, for the accumulation of gas. Heydon did not find against Rogers on charges of having failed to introduce safety lamps or to recognise the dangers of the accumulation of coal dust. The penalty Rogers suffered was minor: he had his mine manager's certificate suspended for 12 months. For the next ten years almost all coal mines in the Illawarra District were worked with safety lamps, but there was intense opposition to the lamps from mine managers in Newcastle, who did not believe the problems of Mt Kembla had anything to do with them.

Other disasters were to follow. In 1912 a fire broke out in a pumping house on the 213 metre level at Mt Lyell North copper mine in Tasmania. Because there was no alternative escape route and because communications failed, 42 men lost their lives. A royal commission ruled that there should always be alternative escape routes in mines. But why was that precaution not taken beforehand? Coal mines had exploded prior to this, both in Australia and overseas. In the United Kingdom

the Senghenydd mine blew up in 1913 near Rhondda in South Wales, killing 439 men and boys. One woman lost her father, her husband and brothers, her three sons and her lodger, but the miners, just as they did at Mt Kembla, went back. This writer reported on a disaster for the *Sydney Morning Herald* at the Kianga coal mine at Moura in central Queensland in September 1975, when 13 miners died and it was decided that the afterdamp problem was so serious that the bodies should be sealed in the mine. In 1979 14 men were killed in a methane gas explosion at Appin, south of Sydney. In 1986 Moura No 4 mine went up and 12 died. In 1994 Moura No 2 Mine went up, killing 11 more.

In March, 1987, a century after the Bulli disaster, a memorial service was held in Bulli's St Augustine's Church in memory of those who died. Among those present were descendants of the victims, some of them fifth-generation miners from the district. Amid such spiritual matters the conflict that could be seen in the worker–employer confrontations of a century before continued. In Melbourne a verdict was given in a key compensation battle over repetitive strain injury. In Western Australia more court battles took place over asbestos diseases. In NSW there were allegations of deaths because of poor facilities in TAFE colleges and debate over changes to workers' compensation laws. The attitudes of employers remained as ever. Cliff Reece, then NSW director of the privately-operated National Safety Council, told this writer, 'I had a project manager for a building company in here two years ago who said, "I just don't know why you are getting stuck into us. We have had only two fatalities on this project and we thought we would have had five by now." Then he realised what he had said and he added, "Oh, I did not really mean it like that." And I said, "Oh yes you did."'

Despite all the modern improvements, the most notable being the introduction of electric lighting, the kinds of accidents which had bedevilled mining the previous century have continued to occur. On 14 November 1996 four miners broke into an old mine shaft at Gretley Colliery near Newcastle, misled by an inaccurate map, and drowned in the water that gushed out. In July 2000 a huge air blast at Northparkes gold and copper mine near Parkes in central western New South Wales picked up a land cruiser containing two men and dashed it against a wall. They died, as did two others caught in the blast. The managing director of the mine's owner, North Limited, blamed 'irregular' practices. Regardless of whether such a claim was justified, the real irregularity was that mining was, as it always has been, operating at the very edges of safety. Safety is considered to be merely a single factor in a more complex equation of risk cost, profit and share price. For the industry to survive these things have to be kept in balance. The problem is, when the balance becomes distorted, managements usually only stand to lose their jobs and shareholders only stand to lose their investment. The men at the workface stand to lose much more.