the Australia and New Zealand School of Government

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Disaster at Pike River (A)

In 2010, a small mining company on the West Coast of New Zealand became the founding member of the country's International Zero Harm campaign. Membership demonstrated the business's intention to create the safest environment for their employees while becoming a best practice blueprint for other companies to aspire to.

At the time Pike River Coal Limited (Pike River) held great promise for its shareholders. In 2008 the company had received an environmental award from the Department of Conservation, whose Minister described the organisation as a "showcase development".

A total of $288[1] million had already been invested in developing Pike River as a state of the art coal mine, complete with leading edge hydro-mining technology, world-class safety practices and even environmental predator control programmes.[2] By the end of 2010 owners were starting to see a return on their investment. After a series of delays, cost overruns and construction setbacks, Pike River had finally begun producing coal in February 2010.

Then, on the evening of 19 November 2010 miner, Daniel Rockhouse dragged himself, and an unconscious fellow-miner, 1500 metres to safety after a catastrophic explosion. Twenty-nine of their work-mates were not so lucky, and three years on, remained entombed. The event and its aftermath would rock the mining community and an entire nation, raising the question of whether it was avoidable long after the mine was closed and Pike River went into receivership.[3]

This case was written by Claire Callaghan for Dr Geoff Plimmer, Victoria University of Wellington, with editorial advice from Janet Tyson, Australia and New Zealand School of Government. It has been prepared from published materials, including the 2012 *Report of the Royal Commission on the Pike River Coal Mine Tragedy*. It is designed as a basis for class discussion rather than to illustrate either effective or ineffective handling of a managerial situation.

[1] All currency quoted in New Zealand dollars.

[2] Hartley, S. (2010), Pike River secures short-term money, *Otago Daily Times*. Retrieved from http://www.odt.co.nz/news/business/129106/pike-river-secures-short-term-money.

[3] Royal Commission on the Pike River Coal Mine Tragedy (2012), retrieved from http://pikeriver.royalcommission.govt.nz/Final-Report (Hereafter Royal Commission).

Underground mining – the industry and culture

Underground coal mining has had a checkered past. Internationally, it is considered to be one of the most dangerous industries with a long history of disasters to its name. One of the principal risks is that the methane gas found alongside the coal seam will explode. Careful control of methane emissions is absolutely critical to effective safety in underground mines. While injury and death rates have been steadily dropping in other countries over the years, in New Zealand the current record has remained unacceptably high.[4]

Global research on coal mining describes an industry steeped in cultural traditions, one of which is the reliance on senior miners; those with tenure. The same international research shows that the traditional practice of involving experienced miners and union representatives contributes to reducing accidents. Worker involvement in activities such as defining the recruitment selection criteria for new roles, overseeing realistic job previews and safety audits proved crucial to lowering accident rates. Overall, low-accident mines were described as those more likely to foster a feedback-rich culture of miners sharing ideas with management. Whereas miners surveyed from high-accident mines reported "spending more time working without clear-cut duties".[5]

The industry itself is not an easy one to enter into. One Australian publication on mining recruitment stated in 2013 that applicants from outside of the industry have to be "well connected and involved in mining networks…to have a chance of securing work." Given the high-risk nature of the work, hiring from outside the industry, even from similar fields such as oil and gas, is usually ruled out.[6]

In the United States and Australia the mining culture relies on strict hierarchy and sub-cultures, which can extend to a unique language for communication underground. In New Zealand too there is a clear delineation between above and below ground staff. When it comes to training, particularly for safety awareness, there is a tendency among all coal mining communities to "stick to their own", dismissing instruction from anyone who is not one of their immediate community or who does not have referential power. A New Zealand tradition is that miners who are Life Time Licence Holders (have held their licences for over 20 years) are not usually expected to be subject to the same level of training and development.[7]

As with other high-risk industries, underground crews self-regulate behavioral norms within their high-context culture. If one person puts a fellow miner at risk or breaches a cultural norm then there are sanctions applied *within* the team. Paradoxically, the environment engenders a heightened level of tolerance in individuals. This can be positive, in reducing stress and creating a sense of pride and belonging. The downside is the natural human

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[4] Cullen, E., Camm T, Jenkins M and Mallett, L. (2006) *Getting to zero: the human side of mining*. Spokane: USA: US Department of Health and Human Services. Centers for Disease Control and National Institute of Occupational Safety and Health.

[5] Peters, R.H. (1989) *Review of recent research on organizational and behavioural factors associated with mine safety*. US Department of the Interior, Bureau of Mines.

[6] Jenkin, C, (2013) *How to get a job in the mining industry*. Australian Federal Government: CareerOne. Retrieved from http://career-advice.careerone.com.au/job-hunting-strategy/employment-news/how-to-get-job-in-mining-industry/article aspx.

[7] The Institute of Quarrying New Zealand (IQNZ) (2013). Summary of submission on the New Zealand government's proposed changes to the health & safety in New Zealand mining industry. Retrieved from http://iqnz.co.nz/wp-content/uploads/The-Institute-of-Quarrying-New-Zealand-Submission-Summary-Document-Part-2.pdf.

tendency to then overlook or downplay risks in favour of relying on your mate or your own ability to self-rescue in a crisis. [8]

Managing a high risk environment

Despite this ingrained individual accountability, it is generally acknowledged that safety performance management must be driven from the top and embedded in company culture. The manager's role as "principal reinforcer of safety practices" is in many countries mandated by law,[9] with clear disciplinary policies for breaches. Some mining communities have had significant success by encouraging collaboration between management, miners and union. In Australia, for instance, the large union presence and influence has led to a positive power shift. For example, an Australian miner's immediate supervisor and union representative have the authority to order the immediate shutdown of an operation where there are serious incidents reported.[10] Until the early 1990s, a similar regime had operated in New Zealand. As Chief Inspector of Coal Mines, Harry Bell had the regulatory backing to order the shutdown of the Huntly West mine in 1992 over safety concerns. His actions were vindicated when the mine exploded three days later.[11]

That same year, 1992, saw the *Health and Safety in Employment Act* introduced to Parliament, as part of a wider government move towards light-handed regulation. Subsequently, during ongoing change at the Department of Labour, the Mining Inspectorate was disbanded. By 2010 the national safety standards, auditing and regulatory requirements were seen as weak and enforcement was often ineffective. There were only two warranted inspectors of mines covering 3000 sites, operating with funding that did not allow for much travel. Each month the inspectors flagged the risk of insufficient resource to the Department of Labour, with little or no effect. It was not surprising that they believed they had little power to enforce compliance or effect change. New Zealand law by then did not mandate minimum safety standards or auditing of emergency procedures.[12]

At the Royal Commission of Inquiry, Nicholas Davidson QC, described the Pike River Board of Directors as having little mining experience. They did not believe it was their role to critically challenge information placed before them by Pike River management. Despite the specific duties of care set out in the New Zealand Companies Act 1993 the Pike River Board believed in a clear separation of duties between them and mine management.[13] This was interpreted as an almost complete "freedom to manage". In practice this meant that assessments like the one by experienced mining expert, Dave Stewart, were never tabled at board level. In April 2010 Stewart documented fundamental inadequacies in Pike River's design and operations such as an unsuitable emergency exit and poorly managed gas detection and ventilation. The Board also knew about the comprehensive Risk Survey that was completed by their company insurer in mid-2010, but it too was never tabled.[14] Pike River chair, John Dow believed these matters to be the responsibility of operational management rather than Board.

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[8] Cullen et al, op cit.
[9] Peters, op cit.
[10] Cullen et al. op cit.
[11] Macfie, R. (Macfie). *Tragedy at Pike River Mine. How and Why 29 Men Died.* Wellington, New Zealand, Awa Press.
[12] Macfie p 167.
[13] Hughes, J. (2013) Pike River, *Lessons for directors and senior leaders*, Business Leaders; Health and Safety Forum, Zero Harm Workplaces, Wellington, New Zealand.
[14]Macfie, p 177.

Three original Board of Directors had resigned on the same day in 2007. Although all publicly cited that their departure was due to "personal reasons", the confidential resignation letter of one of them paints a very different story. Denis Wood, who was a West coaster and from a coal mining family stated that his decision was due to grave concerns over governance and what he saw as serious financial exposure forced upon the Board by New Zealand Oil and Gas (Pike River's parent company).[15]

World class intentions

Before then Pike River presented itself and was seen as a great example of how to design a new business to accommodate Human Resource best practice. The company started with a management team with expertise and good industry reputations. One was Peter Whittall, a 20 year veteran of coal mining with the Australian multinational company BHP. Another Australian was the first Human Resources Manager, Denise Weir, who set up a dedicated Health and Safety subcommittee, and planned third party safety audits.

Denise Weir worked hard to establish links with local politicians, employers and the Tai Poutini Polytechnic to promote the mine as a place for new recruits. Soon Pike River started to have a positive financial impact on local families and business. The mine attracted polytechnic graduates and international contractors on the promise of working in a high performing team in a leading-edge mine, working for very good remuneration rates. When production began, almost half the workers were "cleanskins" for whom it was their first job in an underground mine. In part because construction work was still being completed, there were also a number of contract workers such as electricians and builders, again some unfamiliar with conditions underground.

Peter Whittall, employed in 2005 as General Manager, Mines, to create a state of the art mine in a geologically complex environment, threw his energies into the challenge. He and his family created strong networks with the local school, businesses and church. He was the Chair of the Minerals West Coast Trust, a regional industry group. By mid-2010 he also led the national Business Leaders Health and Safety Forum, launched by Prime Minister, John Key. In October 2010, six weeks before the explosion, Whittall was made Chief Executive Officer.

By then many of the high ideals with which the company had started had been compromised. Whittall was facing increasing pressure to make up lost time, overcome issues with poor and even dangerous performance of new machinery (which he himself had ordered and advocated for) and get the mine into production. He was also seeing a high turnover in senior management.

By 2007, Denise Weir had joined the large number of foundation staff and key management personnel to have left Pike River. Those who replaced them were far less qualified. One of the senior managers, George Mason who was in charge of the critical hydro-mining operation, had been appointed to a role he held no formal certification for. He had also been out of the mining industry for twelve years as a result of being publicly criticised in Australia after two separate mining disasters. [16]

As the Royal Commission of Inquiry was told, there had been six different people in the important role of mine managers in the two years from September 2008. Little in the way of

[15] Macfie, p 62.
[16] Hughes, op cit.

position handover between senior roles was evidenced. In October 2010, Production Manager, Stephen Ellis was earmarked to take over the Mine Manager role, but before he had the necessary New Zealand qualifications for this regulatory position he was already performing many of the duties on delegation. In the handover itself crucial compliance reporting (methane trending analysis) fell through the cracks, never reaching Ellis' desk after he took over from Doug White who moved on to become Operations Manager.

Pike River's safety ethos

Evidence from the Royal Commission of Inquiry showed Pike River to be an organisation intent on creating world-class induction and safety procedures. Confidence in the safety-first process and tools was initially high, with worker involvement demonstrated through the dedicated health and safety sub-committee. The Emergency Response Management Plan, prepared by Peter Whittall in 2009 rated the risk of *any* underground explosion as low, due to several mitigation plans such as the utilisation of methane dilution and ventilation machinery and well-drilled underground safety practices.[17]

Over time, however, attendance at the health and safety committee dwindled with little representation from staff and none by the union. At the same time the number of identified risks was increasing, but became tolerated rather than mitigated in the race towards production. The site rated as a low to moderate gas risk in the shareholder prospectus was, by late 2010, being commonly described by those who had entered it as a very gassy mine. One contractor working underground, frustrated by the continual gas alerts, abandoned mandatory inspections and turned off the compulsory methane sensors.

A major safety concern had arisen when it became apparent that the Pike River would start operations with only one emergency exit, a narrow vertical shaft which trials had shown would be impossible for anyone to use while wearing rescue equipment. The Health and Safety Committee set out its concerns about emergency egress in a formal letter, which was never acted upon, nor advised to the Board.

Pike River's Safety and Training Manager from December 2006 was Neville Rockhouse. By the end of 2010 Rockhouse had prepared 386 documents on health and safety procedures and policies. Many of these were still in draft however; not signed off by department managers and many still not implemented.

There were separate efforts applied in 2009 and 2010 to restore safety practices to the forefront of business objectives. Harry Bell, the ex-Chief Inspector of coal mines, was engaged to provide refresher courses for miner self-rescue. After only two sessions it became evident that miners could not be spared from production and the course was suspended permanently.

Neville Rockhouse believed in staff participation and ownership of the safety culture. He actively promoted having union representation on site and in attendance at the health and safety sub-committee. This was sidelined, when Rockhouse received an email from Peter Whittall in which he clearly stated "Please do not use the union in the same sentence as anything at Pike."[18]

Rockhouse was said to be well qualified as a health and safety trainer. He strove to implement a sound safety strategy in a high-stress environment. However, he had never

[17] Royal Commission,Vol 2, part 1, p 160.
[18] Macfie, p181.

designed a training programme for mining and told the Inquiry that by mid-2010 he "struggled to find training resources on the internet and ended up learning on the job".

Although safety practices were well documented, they were often bypassed. For example, good mining practice should dictate mandatory induction to site and company safety protocols for all contract resource.[19] There was also the expectation that contractors comply with the same code of conduct and health and safety policies as permanent staff. Pike River did not have this practice in place by the time the explosion occurred, yet nearly half (13 out of 29) of the men killed were contract staff.

Neville Rockhouse, who had two sons working as miners at Pike River, found it increasingly difficult to be effective in his role. As it emerged at the Inquiry, not only did he lack any support from Peter Whittall, but the CE frequently mocked and bullied him. Twice, he had resigned and then been talked out of it. Some teams refused to complete his training along with the mandated safety incident reporting. Only five out of a thousand incident reports were ever reviewed.

One such incident occurred less than three weeks before the explosion. A section of the roof in the hydro-mining area completely collapsed, blocking the ventilation circuit in the area. It was written up as a major event. No investigation in to the incident was forthcoming. Almost-daily incidents were recorded in the early weeks of November 2010. Like previous reports the majority of them were simply written off, rather than investigated and corrective actions taken. The focus of management remained firmly on measuring progress towards coal extraction targets. In an effort to speed up lagging production bonuses were implemented for staff those who reached or exceeded their production targets.

In her 2013 book, *Tragedy at Pike River Mine: How and Why 29 men Died*, Rebecca Macfie wrote that the business seemed, in hindsight, to have been "awash with information foretelling catastrophe", but from early on there had been a positive and optimistic outlook by Pike River's management and Board. Over a relatively short period of time their vision tunneled to a point where even serious breaches and risks were trivialised or disregarded.

A mine inspector had visited Pike River two weeks before the explosion. He was not advised of the continued issue of methane spikes. The readings would have shown him that gas levels had risen to explosive levels on several occasions in the month prior. One week before the explosion, at a Board meeting on site, spikes in the gas readings had been reported to the Directors by senior management as a "nuisance", more of an impediment to production than of any real concern. Board chair John Dow was reassured by the fact that the average of readings was below the danger level. In the Commission's view: "the Board was not well placed to assess this assurance."

[19] Cullen et al.

Friday, 19 November 2010, 3.44 pm - the explosion

The Royal Commission of Inquiry report described the events of Friday 19 November 2010, beginning with the effort by Daniel Duggan in the aboveground control room to contact the underground crew at the time when the explosion occurred. (Note: ABM is a mining machine)

> 18. This exchange occurred:
>
> Daniel Duggan: 'Hello ABM or Road header.'
>
> Malcolm Campbell: [Eight seconds later] 'Hey Dan, who you looking for?'
>
> Daniel Duggan: [Three seconds later] 'I was just after ABM and Road header.'[3]
>
> At this point an unidentified sound interrupted the conversation. Mr Duggan did not interpret it as an explosion at the time. He recognised the voice from underground as that of Malcolm Campbell, an engineer with a distinctive Scottish accent, who was doing maintenance work on the continuous miner.[4]

Immediately thereafter, the alarms in the control room activated, indicating that all power and communication had been lost between above and below ground. The actions that followed by management and staff are detailed in Appendix B. Key actions included:

- Pike River management raised the alarm to Mines Rescue Services forty-one minutes after the explosion,
- Douglas White, the Operations Manager was alerted immediately. At 4.01pm he went out to the car park and noticed a distinctive and overpowering smell of diesel. He then went back to his office and continued email correspondence on unrelated matters
- After a quarter of an hour the engineering manager sent the electrical contractor in to the mine portal to investigate. The contractor was not supplied with any of the required safety equipment. He had to turn back to the entrance after his breathing became difficult and he feared for his life,
- Peter Whittall, the Chief Executive was telephoned in his office in Wellington at 4:45pm, just over one hour after it occurred,
- The two miners who survived said their rescue equipment had failed and the underground fresh air rescue station was empty and decommissioned,
- The phone call made by one of the survivors, Daniel Rockhouse, to the control room an hour before their exit was the first contact from inside the mine. There is no record of that call in the incident records, and
- When the two survivors stumbled to the mine entrance, two hours after the explosion, no one, from company or emergency services, was there to meet them.

One of the 29 men who did not make it out of the mine was a seventeen year old taking a pre-hire job preview. He stayed down the mine longer than planned, because "he chose to" and he was left with pit crew instead of remaining with the Mine Manager as per protocol. After the incident the management was initially unsure if the recruit was still down the pit; indeed there was confusion over who exactly was in the mine, as some had come out and left without removing their tags.

In the days following the initial explosion (and the three others which occurred before the end of the month) Peter Whittall was lauded as a professional, caring and empathetic business leader. This view of him would change dramatically following the Royal Commission of Inquiry.

Appendix A – The New Zealand Herald, 27 November 2010

The New Zealand Herald

Pike River: Man of the moment for miners

By Phil Taylor
5:30 AM Saturday Nov 27, 2010

Peter Whittall. Photo / Mark Mitchell

His legs shook but his voice never wavered. "They've looked to me for hope," said Peter Whittall, of the families when it came time to tell them all 29 were lost.

Wednesday afternoon and the face of the country's worst mining disaster since 1914 had come to dispel false hope. There had been a second deadly explosion. Whittall, an Australian, a mining engineer, a business graduate but, importantly, also a miner has fronted in the most trying of circumstances.

Tragedy seeks heroes (and villains). Whittall, 47, from the Illawarra district of New South Wales, coal country, a father of two, was the man for this moment, for this week and for this time in his company's short history. "It was my task and I wanted to tell them," he said.

Whittall encompasses technical expertise, hands-on mining experience, a passion for the industry and its people, a natural affability and rare presenting skills. Amidst hope and grief and with the pressure that 200 journalists can bring, he stood and delivered beyond expectation.

John Dow, Pike River Coal's chairman since 2007, has no doubt that in Whittall he has the right man for the worst task in mining. "He's the most human guy people here could want for a boss," says Dow.

"He knows what makes people tick. He identifies with their wives and kids. Peter employed most of them he played squash with them, drank beer with them. They were his family.

"If he hadn't been born in Wollongong he probably should have been born in Greymouth because the people in Greymouth see him as a Coaster and if you could see the outpouring of love, support and affection that he has received during the past few days it's boosted his sense of belonging to this community.

"In a meeting which he came into with his legs trembling to tell families he didn't think there was any chance any of the staff had survived the second blast ... he described it as the worst moment of his life ... and yet, if you'd seen the number of people who burst into tears and threw their arms around his neck ... "

St Patrick's School in Greymouth is where Whittall's teacher wife Leanne worked and where their daughter, Heather, and young son, Morgan attended. The school motto "Treat others as you would like them to treat you" might as well have been Whittall's. "Peter is ... well, we all love Peter," says St Patrick's principal, Mary-Clare Murphy. "He's just a friend to everyone. This week, he has been God-inspired." ...

...Passionate about the quality of coal being mined at Pike River low in sulphur and ash content, a high fluidity count, ideal for use in pot furnaces to make steel it was to Whittall the company turned recently to replace the previous CEO after a history of cost overruns and missed production targets had buffeted the confidence of investors.

Whittall spoke sense in that role too. The company, he said, needed to set more realistic production goals.

He was real this week too, explaining what was happening with gas concentrations, why it was considered unsafe for rescuers to enter the mine. And he did so without the usual verbal tics, as noted by the principal of the town's secondary school, John Paul II High. "I'm keen on oral presentation and I listened intently for an um or an ah," said Harold Leask.

"There are very few people able to articulate themselves so well that they don't need pauses. – NZ Herald

Appendix B – excerpt from Royal Commission of Inquiry, Volume 2, Chapter 1

Explanation of terms (source in brackets):

DAC system:Digital Access Carrier, a system providing simultaneous communication to all work areas within the mine. (Royal Commission)
Driftrunner: A specialised vehicle used to transport miners in and out of a mine (Macfie).
Fresh air base (FAB): Ideally, a sealed refuge area where miners can recharge their self-rescue devices.(Royal Commission)
Inbye and outbye: directions towards (in) and away from (out) the coalface at any point in the mine (Macfie).
Pit bottom in stone: Site for underground services, at Pike River part way up the main access tunnel (Macfie).
Self-rescuer: Device that provides 30 to 60 minutes of oxygen for a mine worker when air becomes unbreathable (Macfie).

20. At the same time as the unidentified noise was recorded on the DAC system, alarms in the control room were activated. This indicated that reporting from underground had ceased. Power, ventilation, pump and gas data were no longer being fed to the control room. Previously, when power to underground had been lost, miners would quickly contact the controller. On this day there were no callers. Mr Duggan also tried ringing different sites underground, using the telephone system which, like the DAC, had a back-up battery system, but there was no reply.

21. Meanwhile Douglas White, the statutory mine manager, Stephen Ellis, the production manager, and George Mason, the hydro-mining co-ordinator, were meeting in Mr White's office in the main administration building. At one point the office lights flickered but no one was concerned. At about 3:47pm Mr Duggan spoke to Mr White and told him they had lost power and communication to the mine. Mr Duggan added that he would contact the communications and monitoring engineer, or an electrician.

22. At 3:48pm Robb Ridl, the Pike engineering manager, and John Heads, a contract electrician, entered the control room. Mr Duggan spoke of his concerns and said, 'I've got a real bad feeling about this.'[6]

23. At 3:52pm Mr Duggan again spoke to Mr White and asked whether the Mines Rescue Service (MRS) should be placed on standby. Mr White replied, 'Oh, we won't go there yet, we'll get someone up there.'[7] Mr White then left his office and went out to the car park near the administration building, where he spoke to Messrs Ridl and Heads. They noticed an unusual smell in the air, like excessive diesel exhaust fumes. Mr White then returned to his office and between 4:01 and 4:04pm he sent three emails on other matters.

24. The explosion had been recorded on CCTV footage taken by the portal camera. This footage was not seen until some time later. Beginning at 3:45:36pm and continuing for about 52 seconds, there was a pressure wave out of the portal. Movement of a tell-tale indicator tied to the rib opposite the camera showed the duration of the wave, and debris coming from the portal indicated the velocity of the explosion.

27. Mr Strydom filled the driftrunner with water and set off to the portal, where he encountered Messrs Ridl and Heads. Mr Heads said that he had already checked the portal substation and that power was on there. This indicated to Mr Strydom that the power outage must have occurred at pit bottom in stone, 1900m into the mine. At 4:11pm Mr Strydom entered the portal, without a self-rescuer, and Messrs Ridl and Heads returned to the administration area.

29. As Mr Strydom was driving up the drift, his first thought was that 'something just didn't feel right.'[12] He noted that reflector sticks, pieces of PVC pipe wrapped with reflector tape, were missing from the conveyor belt infrastructure to which they were ordinarily tied. He wondered whether the sticks had been removed by a fitter, as the belt was to be decommissioned the following week. He also noted a cordite-like smell, which he likened to diesel exhaust fumes. The smell became stronger as he continued up the drift. Also missing were signs that identified the position of fire hoses. Other items attached to the ribs were displaced. He drove past the decommissioned fresh air base (FAB) at 1500m into the drift. The substation at pit bottom in stone was a further 400m inbye. The air became increasingly thick and the engine of the driftrunner began to falter. Mr Strydom looked for a place where he could turn the vehicle around.

30. Then he saw a light in the distance. Relieved, he went on, and recognised a Jugernaut and, some metres outbye of it, the figure of a man lying on the roadway. The man was on his back, with arms outspread and his head pointing outbye. From Mr Strydom's training, he knew this was the typical position of a person killed by explosive forces. Breathing had become difficult and the engine of the driftrunner continued to splutter. This was a dangerous situation. In fear of his life, Mr Strydom put the driftrunner into neutral and it began to run backwards downhill.

36. Nearing 3:45pm Daniel Rockhouse was in the drift en route to stub 2 to uplift the gravel required for road repairs at the ABM worksite. He stopped at the diesel bay at pit bottom in stone to fill his loader with diesel and water. The loader was parked with the engine running. While he was turning on a water valve there was a bright white flash and he felt an extreme pressure blast. Felled by the explosion, Daniel Rockhouse hit his head and ended up lying on his back. His first impression was that the loader had blown up, but he then realised that the engine was still running, although spluttering. He turned it off. Small amounts of debris fell from the roof and the ribs, although there was no cave-in. Within seconds a pungent strong smell, and dense smoke, reached the area. The atmosphere was warm and breathing became difficult.

37. To escape the effects, Daniel Rockhouse went inbye towards the crushing station (see Figure 1.1). It was clearer, but there was no place of refuge. He donned and activated his self-rescuer and moved back out to the main drift. The self-rescuer did not seem to be working properly so he discarded it. In the drift, next to his loader, he was overcome and fell to the ground again. He shouted for help, but there was no response. His eyes watered, his body tingled and he thought he was 'shutting down'.[15] He lapsed into unconsciousness.

38. After some time he revived and sensed that feeling had returned to his fingers and toes. He was shivering with cold from lying in the mud. He tried to roll onto his stomach and push himself up, but he had no strength. Eventually he managed to stand, fell again and then was able to reach compressed air and water lines that ran along the rib. He turned on an outlet valve on the air line. There was only limited pressure, but enough flow to clear the smoke from around him. The fresh air was 'like gold'.[16]

39. After a minute or two breathing the fresh air and relieving the stinging of his eyes, Daniel Rockhouse looked for a telephone. Just inbye of his loader he located telephone 353 and rang the emergency number, 555. The telephone rang, but no one answered before the call was diverted to an answering service. He then dialled 410, the control room number. Mr Duggan answered the phone. Daniel Rockhouse said he was not injured, but that he could not see or breathe. At this point Mr White took the telephone, was told that the air seemed to be clearing and instructed Daniel Rockhouse to 'stay low', get to the FAB about 500m outbye and make contact from there.[17]

40. There is no record of the telephone call, or of its timing. However, it is apparent that Daniel Rockhouse made the call at approximately 4:40pm and that Mr Duggan answered it soon after his call to St John Ambulance. Immediately after Mr Strydom contacted him, Mr Duggan telephoned the MRS at 4:26pm. He then called and spoke to the St John operator until 4.39pm, twice mentioning he had not heard from anyone underground. Had Daniel Rockhouse already rung Mr Duggan, he would undoubtedly have said so.

42. After the phone call Daniel Rockhouse followed the compressed air and water lines along the rib and proceeded outbye. As he found outlet valves he opened them and breathed in fresh air. He left the valves open, thinking this would improve the atmosphere. About 300m outbye he encountered a vehicle stationary in the drift. A few metres beyond it, he found Russell Smith lying semi-conscious on the ground, with his eyes open, but rolling back in his head. He could hardly speak. He was not wearing a helmet and light. Daniel Rockhouse removed Mr Smith's self-rescuer from his belt, opened it and tried to insert the mouthpiece into the other man's mouth. He could not do so. Daniel Rockhouse discarded the self-rescuer, lifted Mr Smith from behind and dragged him outbye towards the FAB.

45. On reaching the FAB, Daniel Rockhouse propped Mr Smith up in a sitting position against the rib and said, 'I'll be back in a sec.'[18] The FAB was a shipping container converted to include a two-door sealable entrance. Daniel Rockhouse thought it would provide a fresh air source, a telephone and spare self-rescuers. In fact, he found it had been decommissioned.

46. After venting his anger, Daniel Rockhouse returned to Mr Smith, got him to his feet and continued to drag him in an outbye direction. After a time he paused and asked Mr Smith whether he could walk. He tried, managed a few steps, but then fell. Daniel Rockhouse lifted him up again, and found that, if he supported Mr Smith, they could walk in tandem, with Daniel Rockhouse holding the rail of the conveyor belt to his left side for support. Periodically the pair stopped and looked inbye, hoping to see other lights coming down the drift. There were none. Daniel Rockhouse continued to open air valves as they went. To motivate Mr Smith, he told him to think of his family and to keep his legs moving for them.

47. As they progressed outbye, the atmosphere became clearer and it was easier to breathe. Natural ventilation provided a fresh air flow inbye from the portal. At 5:26pm the two men completed the 1500m walk from the FAB to the portal. From the time of the phone call at 4:40pm it had taken them 46 minutes to walk out of the mine. No one was there to meet them. Daniel Rockhouse used the DAC to call the control room for help. Vehicles arrived at the portal within minutes. Mr Smith was incoherent and Daniel Rockhouse broke down. Paramedics gave both men oxygen and they were taken by ambulance to Greymouth Hospital.