

Workplace culture

What is safety culture: is it tangible?

1. In considering safety culture, Neil Gunningham and David Neal, in their 2011 review of the Department of Labour (DOL)'s interactions with Pike River, stated that it was 'exceptionally difficult for the inspectors to address issues of safety culture', since their occasional visits provided only a snapshot and 'they were not equipped to investigate complex issues of safety culture (or the lack of such a culture), which are largely intangible and do not lend themselves to ready investigation.'¹ Dr Kathleen Callaghan strongly disagreed with the latter part of this statement. In her view the published literature shows that safety culture is not intangible, and that it may be evaluated. Moreover, she believed that for the commission 'to dismiss safety culture as too complex and intangible [would be] to ignore a core element of the disaster at Pike River'.²
2. This difference of opinion suggests the need to define what is meant by culture. The commission has found a discussion by Andrew Hopkins helpful.³ He suggests that two common understandings about culture centre on 'mindset', and on 'the way we do things around here'. 'Mindset' involves a focus on individual values, while 'the way we do things' concerns collective behaviour. There is no conflict between the two ideas; rather they reflect a difference of emphasis. Both, in fact, go to make up culture – the way in which people both think and act.
3. Hopkins, however, stresses the importance of organisational practices because individual attitudes are more difficult to determine and unlikely to be capable of modification in a workplace unless the environment is conducive to change. James Reason suggests that the key may be conscious attention to safety systems and practices, in particular 'a safety information system that collects, analyses and disseminates the knowledge gained from incidents, near misses and other "free lessons"'.⁴

What organisational practices measure culture?

4. Operators in a high-hazard industries must establish structures that enable a response to the unexpected. These structures include safety, reporting, auditing, training and maintenance systems.⁵ They require resources, which should be allocated at governance level. This essential leadership from the top begins to set the cultural tone.
5. A safety conscious organisation needs to involve people at all levels: management, supervisors and workers at the coal face. Take methane control, a critical safety concern in an underground coal mine. Methane levels must be monitored throughout a mine on every shift. This requires the input of many people, from miners using portable gas detectors to control room operators who receive periodic methane readings from fixed sensors. Management must establish systems to assess this data to determine whether there is a hazardous trend and, if so, decide on the appropriate response.
6. The methane readings, however, are backward-looking indicators. Equally important are forward-looking indicators, which test the worth of the monitoring regime itself. There must be verification that portable detectors are readily available and accurate, and that there are enough fixed sensors in appropriate positions and that their calibration and accuracy are assured. This requires the involvement of operational planners, managers, electricians and technicians, who test and report on the monitoring system. Ongoing review and verification of the system's adequacy are also necessary as the mine grows and develops.

7. An assessment of the methane monitoring systems and practices, including the resourcing provided, the level of reporting, the response to data, the testing of devices, and the ongoing review and oversight of the system as a whole, will provide a valuable insight into the organisational culture.

A number of cultural influences

8. Organisational culture is not one-dimensional. A mixture of behaviours and attitudes is to be expected in a workplace, and particularly in a large and diverse organisation like Pike. Nor will the cultural influences be consistent, or all point in a single direction. Other chapters identify a number of cultural strands that existed at the mine.

An environmental culture

9. Pike had a strong environmental culture. When the company received an award from the Department of Conservation (DOC) in September 2008, the minister of conservation shortly afterwards described the mine as a 'showcase development'.⁶ Pike not only met the environmental requirements of its access agreement with DOC, but also initiated predator control programmes over and above its contractual obligations.

Production before safety

10. Coal production is, of course, the core objective of a mining company. But this imperative remains subject to an employer's statutory obligation 'to take all practicable steps to ensure the safety of employees'.⁷ The commission considers that the way in which hydro mining began at Pike indicates a culture that put production before safety.
11. Chapter 12, 'Hydro mining', discusses the reasons for this conclusion. They include locating the panel next to pit bottom, beginning coal production before a second outlet from the mine was developed, introducing hydro mining without completing a comprehensive risk assessment process, not adequately understanding the roof strata, proceeding before the ventilation fan was commissioned, widening the panel despite a geotechnical deficit, and failing to reassess the operation in light of methane issues and the collapse of the goaf on 30 October 2010.
12. In addition, Pike had no previous experience in hydro mining, and used a largely inexperienced workforce and a co-ordinator who was neither qualified nor confident in the role. The Pike board approved a hydro-mining bonus payable to workers if a production target was met by a defined date, after which the bonus reduced progressively each week. These factors, in combination, compel the commission to conclude that, in September 2010 as hydro mining began, the pressure for production overrode safety concerns.

Recklessness underground

13. Chapter 6, 'The workforce', considers workforce matters, including the inexperience of many of the miners and the low ratio of experienced to inexperienced men in the crews. A witness with almost 40 years' mining experience, who was trained in an English colliery, recounted safety incidents at Pike that he attributed to a gung-ho attitude underground. Inexperienced workers could be overconfident, failed to understand how their actions endangered others and did not treat mining with respect.⁸ He attributed these problems mainly to the experience ratio, saying that there were too few experienced miners to set and maintain the required standards.⁹
14. The commission accepts this opinion. It is supported by the evidence of contraband and bypassing incidents, conduct that seems inexplicable if viewed in isolation. There was clearly an attitude of recklessness in at least some quarters of the workforce.

The response to safety information

15. Many catastrophic accidents are preceded by situations in which warning signs are normalised, dismissed as intermittent or simply ignored.¹⁰ At Pike, however, a lot of safety information was not assessed at all. It simply remained unnoticed in the safety management system.

16. These aspects are discussed in Chapter 7, 'Health and safety management'. Throughout the commission's hearings, witnesses disavowed knowledge of methane spikes, ventilation problems and a host of other signs that suggested all was not well underground. A repeated refrain from witnesses was that no one drew this or that report or data to their attention. Pike's safety management system lacked an essential component – procedures that made specific people responsible for collecting, assessing and responding to safety information. Nor was there a functioning process for communicating information to everyone on a need-to-know basis.

Was health and safety management taken seriously?

17. As Pike's health and safety manager told the commission, his brief from the company was to develop a world-class health and safety management system. Much time and effort was devoted to putting in place what was seen as a best practice system. Documents were drawn up, systems were prescribed and training programmes established.
18. But, as discussed in the chapters on health and safety management and the critical mine systems, commitment from others was lacking. The board and executive management did not lead the process. Most documents remained in draft, and many were not followed anyway. Systems were set up, but were not used as intended. Safety information was not well monitored, and internal and external review of the system was very limited.
19. Ultimately, the worth of a system depends on whether health and safety is taken seriously by everyone throughout an organisation; that it is accorded the attention that the Health and Safety in Employment Act 1992 demands. Problems in relation to risk assessment, incident investigation, information evaluation and reporting, among others, indicate to the commission that health and safety management was not taken seriously enough at Pike.

The risk of an explosion

20. Did culture affect the ability of decision makers at Pike to appreciate the risk of an explosion? A culture that put short-term production before safety as hydro mining began could well affect the ability to appreciate an explosion risk as well. The following aspects are also relevant to this question.

The emergency response management plan

21. This plan was prepared in 2009, and signed off by Peter Whittall as general manager. Section 6.5 of the plan described emergency response actions with reference to six emergency situations: earthquake, flood, pipeline rupture, major slope failure, underground fire, and explosion and outburst.
22. The risk posed by explosion and outburst was described at 6.5.6 in these terms:
- The risk of outburst is considered as being low at PRCL [Pike River Coal Ltd] and gas build up is minimised via ensuring that ventilation is maintained at a level considered to be of sufficient quantity to dilute the methane content to more acceptable levels. Gas drainage is also conducted via in-seam drilling to pre-drain ahead of workings to further reduce the potential of outburst occurring and to reduce the gas make in active workings. Stone dusting practice is also maintained to reduce the risk of coal dust explosion potential. The use of hydro-extraction will minimise the risk of frictional ignition in the main coal extraction panels.¹¹*
23. This is an optimistic assessment of the risk posed by an underground explosion. It assumes that good ventilation and in-seam drilling to reduce the gas make will prevent a methane accumulation. It anticipates only one potential ignition source, frictional ignition, an unlikely source during hydro mining. Given that Pike River was a gassy mine located in a region with a history of methane tragedies, the commission regards the description of the risk profile as understated.

An indifference to methane spikes

24. Chapter 10, 'Gas monitoring', contains a review of methane monitoring at the mine, including reference to the prevalence of methane spikes in the period from 1 October to 19 November.¹² Employees must be withdrawn from

a mine when the volume of flammable gas in the general body of air is 2% by volume,¹³ and methane becomes explosive at a level of 5% in air.

25. Despite a paucity of well-positioned fixed methane sensors at Pike River, there were still numerous methane readings that provided ample warning of regular high methane accumulations in the period before the explosion. Deputies using hand-held detectors reported readings of 2% or higher on 48 occasions in 48 days, and 5% concentrations on 21 occasions. Readings of 5% were also routinely recorded in the hydro panel return, and the mine's remote monitoring system logged four methane readings of 2.5% or more in the final 26 days.¹⁴ Together, these readings provided a graphic illustration of the extent of this problem.
26. The mine manager, Douglas White, was asked whether this evidence indicated that the occurrence of methane spikes had become 'normalised' at Pike River, to which he responded not normalised but 'certainly something that was happening frequently, more frequently than was desired.'¹⁵

Disbelief on 19 November 2010

27. The explosion occurred at 3:45pm. All reporting and communications from the mine ceased immediately. At 4:26pm, 41 minutes after the explosion, Mr White finally authorised a call to emergency services. By then, Mattheus Strydom had been into the mine and had confirmed that an explosion had occurred.
28. In Chapter 16, 'Search, rescue and recovery', the commission finds that the loss of power and of telemetric reporting from underground, and the absence of response to calls from the control room, were unprecedented and indicated a serious situation that should have been recognised straightaway.

Witness accounts of the perception of risk

29. In giving evidence Messrs White, Stephen Ellis and Whittall each indicated their perception of the risk of a methane explosion. Mr White, questioned about using the vent shaft as an escapeway and whether this was of concern, replied, 'I think it's fair to say that having never actually considered the possibility of the mine blowing up ... it was not a matter that overly concerned me.'¹⁶
30. Mr Ellis, asked about confusion in the first few hours of the emergency response, responded, 'I've heard various statements around chaos, people running around and so on, and I would certainly argue against that ... [but] it was hectic, it was busy. We don't expect an explosion of that magnitude at a mine site.'¹⁷
31. Finally, Mr Whittall was asked whether he had ever contemplated an explosion. He gave a long answer, which included these words: 'you always hope for the best and plan for the worst. ... What I would say is that the – I would not expect rather than contemplate an explosion occurring ... So to say that it wasn't contemplated, not at all. The emergency response management plan was there for that. I had managed mines that had had explosions in them. I was familiar with explosions, Moura, many others.'¹⁸
32. In fact the emergency response management plan essentially discounted the risk of an explosion. The plan and the responses by the witnesses indicate a lack of appreciation of the explosion risk at Pike River, despite the history of methane explosions in mining and methane issues at Pike River.

Conclusions

33. The commission considers that as at November 2010, the emphasis placed on short-term coal production so seriously weakened Pike's safety culture that signs of the risk of an explosion either went unnoticed or were not heeded.

ENDNOTES

- ¹ Neil Gunningham and David Neal, Review of the Department of Labour's Interactions with Pike River Coal Limited, 4 July 2011, DOL0100010001/131, para. 471.
- ² Kathleen Callaghan, witness statement, 31 October 2011, FAM00042/55, para. 205.
- ³ Andrew Hopkins, Failure to Learn: The BP Texas City Refinery Disaster, 2008, CCH Australia Ltd, p. 141.
- ⁴ James Reason, 'Achieving a Safe Culture: Theory and Practice', *Work and Stress*, 1998, Vol. 12, No. 3, p. 302.
- ⁵ Andrew Hopkins, Failure to Learn, p. 145.
- ⁶ Pike River Coal Ltd, Activities Report: Quarter ended 31 December 2008*, DAO.008.04847/1.
- ⁷ Health and Safety in Employment Act 1992, s 6.
- ⁸ Albert (Alan) Houlden, witness statement, 14 November 2011, FAM00053/8, para. 39.
- ⁹ *Ibid.*, FAM00053/11–12, paras 58–61.
- ¹⁰ Andrew Hopkins, 'A Culture of Denial: Sociological Similarities between the Moura and Gretley Mine Disasters', *Journal of Occupational Health and Safety – Australia and New Zealand*, 2000, Vol. 16, No. 1, pp. 29–36.
- ¹¹ Pike River Coal Ltd, Emergency Response Management Plan, 20 February 2009, DAO.001.08110/39.
- ¹² Chapter 10, 'Gas monitoring', para. 43.
- ¹³ Health and Safety in Employment (Mining – Underground) Regulations 1999, reg 21.
- ¹⁴ Chapter 8, 'Ventilation', paras 140–141, 143.
- ¹⁵ Douglas White, transcript, p. 4945.
- ¹⁶ *Ibid.*, p. 1259.
- ¹⁷ Stephen Ellis, transcript, p. 2228.
- ¹⁸ Peter Whittall, transcript, p. 2791.