

Report on a number of matters with regard to the Board of Inquiry Investigation into the methane incident at the Anglo American Grosvenor Mine at Moranbah on 6 May 2020 and related matters

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I was asked by Counsel assisting the Board of Inquiry into the methane incident at the Grosvenor Mine and related matters to prepare a report (based on the research literature and other materials) on a number of matters pursuant to mine safety to assist the Board in understanding the role of mine workers in the management of health and safety risks, as well as the real or potential impact of:

- (a) Use of labour hire workers and changed work arrangements;
- (b) The payment of production and safety bonuses to both workers and executives;
- (c) Employment arrangements on the performance by Site Safety and Health Representatives of their functions.
- (d) Learning on issues such as the role of corporate governance in health and safety, normalisation of risk, identifying harbingers of an accident, potential causes of lapses in regulatory oversight and other factors that are corrosive of safety. Lastly, given the obvious tension between production and safety, a review of the appropriate key indicators and weightings in respect of all incentives for all employees would be of great assistance.

The report addresses each of the four areas/issues identified in turn as well as identifying inter-linkages between them. In examining these specific issues it will cover the role of mine workers in the management health and safety risks.

The primary sources used in this report were the academic/scientific research literature (mainly refereed journal articles but also scholarly books and papers) and government reports and investigations (principally those relating to mine safety). On occasion, reference is made to non-mining research and reports in order to place the information pertaining to mining in context and assist in interpreting it. In addition to the materials just mentioned selective use was also made of some other sources like government information documents/press-releases, court cases, and mining company annual reports. The material was drawn primarily from a number of web-searches, my existing collection of relevant materials, reports obtained from colleagues and some statistics provided by the Department of Natural Resources, Mines and Energy.

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(a) The Use of Labour Hire Workers and Contract Labour

The terms of reference for the Board of Inquiry included, “where relevant, recommendations directed to the nature of any particular employment arrangements which may be better apt to ensure acceptable risk levels to workers.” Consistent with this the section considers the research on the association, if any, between different types of employment arrangements, especially labour hire and contract labour, and risk (and associated OHS outcomes) in coalmining. This review will briefly consider the evidence more generally before turning its attention to coalmining. This is because there is far more research on the effects of employment/work arrangements across a range of industries (including non-specific industry research) and this helps set a context for mining and particularly coalmining specific research/evidence. This helps inform policy learning especially as the findings in coalmining are consistent with more general research.

1. *Growing Use of Contractor, Temporary and Agency (labour hire) Work Arrangements*

At the outset it is worth establishing some context in terms of the growing use of labour-hire and other associated work arrangements. The past four decades have witnessed significant global shifts in work arrangements. In rich countries like Australia, the UK, USA and Canada there has been decline in the proportion of the workforce holding full-time and permanent/ongoing employment and a corresponding growth in workers employed on a temporary basis (labelled casuals in Australia and New Zealand), part-time work and self-employment – shifts now often labelled the so-called Gig economy (although it extends well beyond digitally-connected work).¹ These shifts and repeated rounds of downsizing/restructuring by large employers have undermined job security even amongst those holding nominal permanent/ongoing work. A related trend has been the growing use of contractors to undertake tasks previously done by employees directly engaged by organisations. Contractors range in size from self-employed workers through to partnerships, small firms and large enterprises. Contractors may, in turn, employ subcontractors to undertake some tasks and this process may extend through a number of stages (as many as four to seven layers in trucking or clothing manufacturing is not unusual) leading to a highly elaborated process known as multi-tiered subcontracting.

Labour hire has been defined as ‘a form of indirect employment relationship in which an agency supplies workers to work at a workplace controlled by a third party (the host), usually in return for a fee from the host’ similar to placement agencies but involving an ongoing relationship between agency and host (for as long as the contract lasts) with the labour hire firm remaining the employer (paying wages and the like) while both agency and host share responsibilities under OHS legislation.² The creation of arrangements where two employers have responsibility for workers at the same worksite has often been referred to as a triangular employment relationship and the complexities and issues associated with this have been the subject of academic research, policy debate and legislation (some aspects of which are discussed later in this report). Labour hire can be seen as

¹ For a summary of these changes and their ramifications in terms of the regulation of work see Johnstone, R. McCrystal, S. Nossar, I. Quinlan, M. Rawling, M. Riley. J. (2012), *Beyond Employment: The Legal Regulation of Work Relationships*, Federation Press, Sydney.

² O’Neil S. (2004) *Labour hire: issues and responses*, Economics, Commerce and Industrial Relations Group Research Paper No. 9 2003–04, Department of Parliamentary Services, Canberra, 1.

more formally structured type of contracting whereby an organisation specialises in providing labour (either generally or those with particular skill-sets like miners or nurses and other healthcare workers) to host firms on a short or longer term basis. In some industries, like maritime and mining, specialist bodies providing workers have emerged (known as global crewing agencies in the maritime industry). Effectively, this establishes a triangular employment arrangement at the workplace with (at least) two employers on the same work-site. In practice labour hire and more specialist contractors undertaking maintenance or other specialist tasks (a long term feature of mining) may operate on a mine site. As already noted the term labour hire is specific to Australia and New Zealand. In many other countries firms essentially undertaking the same role are referred to agency labour or temp agencies. In the USA, as far I can determine, the term contractor is used to describe both labour hire and other contracting arrangements described above. When specific reference is made to contractor operated mines (see below) in the USA it can be presumed this is describing what would be described as labour hire contractor operated mines here. This practice can be found in both coalmining and metalliferous mining. As apparently is also the case in the USA and probably elsewhere, labour hire firms may undertake more specialised or restricted tasks at a mine which is still owner-operated.

Labour hire firms vary greatly in size and scope of operations and the situation is further complicated because labour hire firms engage their workers under different employment arrangements (part-time, casual or permanent and even self-employed in some areas like aged-care and disability services). Further, as already indicated terminology is not used consistently in all countries. The term labour-hire is largely confined to Australia and New Zealand. In other countries these organisations are known under terms such as temp agencies and labour leasing firms or just included under the rubric 'contract labour.' This complicates attempts to compare research. However, the evidence of the use of subcontracting and labour-hire/temporary agencies has reached similar findings, indicating that the risk factors associated are predominantly the same (see discussion below).

Metalliferous and coalmining has not been immune to these trends, especially a growing use of contractors/labour hire. There has been, it seems, limited detailed research into the shift which has been evident since the 1990s. A study of the growth of temporary and contract employment in the Australian coalmining industry was undertaken by Waring in 2003. Tracing the earlier history of the union he argued the piecework system that dominated mining prior to mechanisation bred considerable competition amongst workers, safety problems and job insecurity that antithetical to the union's efforts to build solidarity. In efforts to maximise jobs and build its strength the union:

Union controls included prohibitions on the employment of non-permanent mineworkers, especially part-time and casual labour, and limiting the circumstances under which employers could utilise contractors. Aside from these measures, the union maintained a strict overtime policy, which restricted the number of overtime hours that could be worked in any one week. The policy was designed to both increase overall employment in the industry and remove the temptation to work unsafe amounts of overtime. Moreover, the industry award, which came into effect in 1990, did not contain any provisions allowing for part-time, casual, temporary or contract labour, effectively limiting employment to full-time, permanent status only. With the advent of enterprise bargaining in the early 1990's, a small number of employers began to challenge the union's support for permanent employment. For example, in 1995, the Ensham mine in Queensland controversially negotiated an

Enterprise Flexibility Agreement that effectively excluded the principal coal union, the Construction, Forestry, Mining and Energy Union (CFMEU). Among other controversial provisions, the En sham agreement provided for the employment of casuals, contract, and temporary labour (Foots 1998).³

Viewing the changes at a broader level Waring stated:

the mid-1990s, permanent employment was heavily protected through a range of union-sponsored mechanisms at the workplace that prevented the use of part-time and casual employment, and that tightly controlled contract and temporary labour. Collectively, the effectiveness of these mechanisms and controls served to reinforce permanency as a feature of the industry's employment relations. However, a combination of legislative reforms, significant industry-wide downsizing, and employer challenges to union control has begun to erode permanency in the industry in the last decade.⁴

Waring argued federal industrial relation law changes, falling coal prices, widespread downsizing and some mine closures, Productivity Commission pronouncements that permanent employment was inhibiting productivity growth, and more employer aggressive and union-hostile strategies resulted in a substantial decline in employee numbers. Contractors had long been used to undertake maintenance/repair and surface activities at mines but from the mid-1990s contractors were used increasingly and in core activities. In other words, some producers contracted out their mining activity 'to specialist contract firms such as Thiess Pty Ltd', others established contract mining companies to operate 'greenfield agreements' that enabled contractors 'to circumvent negotiations with coal unions.' Waring argued the benefits of using contract and contact labour included improving appearances on balance sheets by reducing their permanent workforce.⁵

To obtain a better insight into the extent of the practices Waring examined 187 enterprise agreements covering about 95% of all coal operations in Australia for flexible employment provisions. Use of contractors had long been a contentious issue with agreement clauses commonly governing their use. Examining the agreements Waring found that 75% of agreements had clauses restricting the use of contractors in 1995 but this had declined to 38% by 2003 (and clauses that highly restricted the use of contractors fell from 25% to 0). During the same period the proportion of agreements where management had unrestricted control over the use of contractors grew from 0 to 50%.⁶ Waring also examined the proportion of agreements with clauses providing for part-term, casual and temporary labour hire arrangements. In 1995 25% of agreements had no clauses on this which fell to 19% in 2003. The other 75% of clauses in 1995 restricted the use of non-permanent workers to those on fixed-term contracts but this type of clause had fallen to 19% in 2003. On the other hand, clauses permitting part-time, casual and temporary labour hire grew from 0 in 1995 to 62% in 2003. Waring concluded these changes had potentially serious consequences for the OHS,

³ Waring, P. (2003) The Nature and Consequences of Temporary and Contract Employment in the Australian Black Coal Mining Industry, *Labour & Industry*, 14(2): 83-96 at 85 DOI: 10.1080/10301763.2003.10669289

⁴ Waring, P. (2003) The Nature and Consequences of Temporary and Contract Employment in the Australian Black Coal Mining Industry, *Labour & Industry*, 14(2): 83.

⁵ Waring, P. (2003) The Nature and Consequences of Temporary and Contract Employment in the Australian Black Coal Mining Industry, 87.

⁶ Waring, P. (2003) The Nature and Consequences of Temporary and Contract Employment in the Australian Black Coal Mining Industry, 90.

the skill base and wages in the industry.⁷ An earlier study by Waring and Barry had reached essentially similar conclusion, also noting a decline in union preference provisions and a slight shift away from seniority to merit in redundancy.⁸

Research conducted in Queensland coalmining confirmed the shift. In the Central and Northern Queensland coalfields in 1996 Department of Natural Resources and Mines data indicated that of a total open-cut workforce of 7081 6665 (94.1%) were employees and 416 (5.9%) were contractors. By 2002 overall workforce numbers had fallen to 6434 of which 3954 (61.5%) were employees while contractor numbers had grown to 2480 (39.5%).⁹ Like Waring, De Milia and Bowden's Queensland study argued the rapid shift was associated with falling coal prices and changes in federal industrial relations legislation (the *Workplace Relations Act*, 1996) which facilitated more flexible work arrangements, including 'unfettered use of contractors' and longer shifts (employers could introduce 10 hour shifts without agreement and could apply for 12 hours). De Milia and Bowden found these changes were, in turn, associated with an increase in the number of drive-in drive out workers (DIDOW) and a survey they conducted indicated a potential link between the combination of longer shifts and long 'commutes' (mean distance 238km) with fatigue related safety.¹⁰

It is worth noting in passing that, as in other industries and other jurisdictions (like South Australia) long commutes following prolonged shifts have led to tort actions for negligence against companies by workers injured or killed while driving home from such shifts. For example, in one relatively recent case a truck driver employed by a labour hire firm at a mine sued both the labour hire and host company after suffering permanent brain damage in a crash in his commute after 4 consecutive 12 hour shifts, arguing fatigue contributed to the accident.¹¹

More recent evidence reinforces the significance of the shift to contract labour. In 2016 a Fair Work Commission review of redundancy provisions in the Black Coal Mining Industry Award 2010 included survey evidence that a substantial majority long-term employed miners made redundant who were subsequently re-employed 'in casual or fixed term jobs, often for contractors rather than mine operators'.¹² In his submission of evidence to the review Professor David Peetz (Griffith University) observed:

A major reason for the shift from permanent to casual status was the move from employment by mine operators to contractors. Only 14% of long-tenure employees currently in employment were now employed by a mine operator—whereas 81% of the same group had been employed by a mine operator before being made redundant. Some 9% of medium-tenure employees currently in employment were now employed by a mine operator (whereas 66% had previously been so employed); and 21% of short tenure

⁷ Waring, P. (2003) The Nature and Consequences of Temporary and Contract Employment in the Australian Black Coal Mining Industry, 91-92.

⁸ Waring, P. & Barry, M. (2001) The Changing Frontier of Control in Coal: Evidence from a Decade of Enterprise Bargaining in the Australian Black Coal Mining Industry, *Australian Bulletin of Labour*, 27(3):216-237.

⁹ Cited in De Milia, L. and Bowden, B. (2007) Unanticipated safety outcomes: Shiftwork and drive-in, drive-out workforce in Queensland's Bowen Basin, *Asia Pacific Journal of Human Resources*, 45(1): 100-112 at 102.

¹⁰ De Milia, L. and Bowden, B. (2007) Unanticipated safety outcomes: Shiftwork and drive-in, drive-out workforce in Queensland's Bowen Basin, 104-109.

¹¹ Kerle v BM Alliance Coal Operations Pty Limited & Ors [2016] QSC 304.

¹² Fair Work Commission (2017) FWCFB [584], Four yearly review of the Black Coal Mining Industry Award 2020 Decision, at paragraph 41.

employees currently in employment were now employed by a mine operator (whereas 42% had previously been so employed). Slightly less than half of each group were in the same occupation as before, and only around a half of each were still in mining, so the number of short-tenure employees working for mining contractors had also fallen, whereas the proportions of medium-tenure and long-tenure employees working for mine contractors had grown. For all tenure groups, there were more now working for contractors than for mine operators, but (if working for a mine operator is considered superior) the gap was most adverse for long-tenure employees, as was the shift between the 'before' and 'after' periods, while the gap was most favourable for long-tenure employees before redundancy.¹³

Global workforce data for major mining companies is generally consistent with the trends described above. Companies generally only break their data down by employee or contractors. In 2015 Glencore had a total employment of 156,468, of which 100,614 or 64.3% were employees and 55,854 or 35.7% were contractors. There was a steady decline in the proportion of employees relative to contractors in 2016 and 2017, so that by the latter year of total employment 145,977 of which 83,679 or 57.3% were employees and 62,298 or 42.7% were contractors. As at 31 December 2019 Glencore had 89,092 employees (55.9%) and a total of 70,253 contractors (44.1%).¹⁴ While total employment shrank the number of contractors grew. BHP Billiton initially bucked the trend though in the context of a significant workforce reduction. Overall, employment fell from 80,368 (29,670 or 37% employees and 50,698 or 63% contractors) in 2015 to 60,644 (26,146 or 43% employees and 34,498 or 57% contractors). However, this trend reversed and by 2019 of a total workforce of 72,414 39.9% or 28,926 were employees and 60.1% or 43,488 contractors.¹⁵ In 2018 Anglo American reported that it has 64,000 employees and a total workforce of 92,000 employees and contractors, indicating there were 28,000 contractors (30.4%).¹⁶ Another country by country report for 2018 indicated Anglo American had 1706 employees in Australia (it does not report the number of contractors).¹⁷

Recent annual reports of the Commissioner for Mine Safety and Health include data on contractor and employee numbers in Queensland, with 11 648 employees and 14 090 contractors in open cut coalmines, and 2564 employees and 2723 contractors in underground coalmines, in 2016-17 – the proportion of contractors in coalmining slightly higher than the mining and quarrying industry as a whole.¹⁸

Recently published research by Bowden (2020) provides further insights while also reinforcing points made by Waring and others about the importance of industrial relations law changes, notably the 1996 *Workplace Relations Act*.¹⁹ Bowden compared employer strategies on the Western Canadian and Central Queensland coalfields since the 1960s, noting that while Queensland operators had 'dramatically increased their use of contractors' in response to falling coal prices after 1996 while

¹³ Peetz, D. (2016) Employment in the Australian Black Coal Industry, Attachment DP 3.

¹⁴ Glencore Annual Report 2019, 31.

¹⁵ BHP Annual Report 2019, 54.

¹⁶ Anglo American Integrated Annual Report 2018, 7.

¹⁷ Anglo American Country by Country Report 2018, 4.

¹⁸ Commissioner for Mine Safety and Health (2017) *Queensland Mines Inspectorate Annual Performance Report 2016–17*, Queensland Government, Brisbane, 23 & 29, 73.

¹⁹ Bowden, B. (2020) The Ties of Place: Contractors and Employer Strategies on the Western Canadian and Central Queensland Coalfields, *Relations Industrielles*, 59(3):490-512.

their Western Canadian mining counterparts had not. In explaining this difference Bowden the critical factor was spatial location within the global coal trade.

For Canadian owners, the key issue was locational disadvantage, due to the distance of mining operations from deep-water ports. In consequence, Canadian owners reacted to falling prices by concentrating mining operations in the most favourable location, the Elk Valley. Given the scale of this restructuring exercise, employers had little incentive to engage in industrial battles over what were, for them, peripheral labour issues such as the use of contractors. As a result, previously negotiated restrictions on the use of contractors remained in force. By contrast, Queensland producers were forced to deal with the industrial consequences of superior location. In essence, Central Queensland employers had allowed, during the period of high profitability, their entire transport advantage vis-à-vis western Canada to accrue to their workforce via higher mine-site labour costs. To alter this situation required a radical transformation of employment relations. As a result, from 1992 Queensland coal owners became active supporters of a major overhaul of Australian labour laws; a campaign that was crowned with success following the passage of the WRA in December 1996. The decisive impact of the WRA in transforming labour relations is particularly evident in the use of contractors, as the numbers engaged rose from minuscule levels in 1996 to more one-third of the workforce just four years later.²⁰

In the USA Massey Energy reputedly led to shift to contractors in coalmining. Buessing and Boden noted that:

the owner of the mine may use the contractor to shift liability for pension and health obligations of union mine operators to other entities; to lower the cost of civil penalties arising from violations of the Mine Safety and Health Act; and to avoid other employment related costs. In addition, contracting can be a means of shifting legal liability to low capitalized entities as a means of reducing costs associated with potential torts. When contracting is used to pursue these ends, social costs can be significant. There is some evidence that these ownership arrangements were used to avoid collective bargaining agreements in the early 1990s.²¹

Returning to the situation in Australia in 2004 Dunlop indicated a more contingent approach was required, identifying an array of advantages and costs/threats (including legal/regulatory issues similar to the USA) and noting that open-cut metalliferous operations in Western Australia had moved away from contractor and back to operator run mines.²² In some Australian mines, notably the Beaconsfield Goldmine, there was some evidence that labour hire was used as a form of probationary employment, with labour hire workers deemed satisfactory later transferring to direct employment in the mine (this practice was used in other industries).²³ Of course, this process could

²⁰ Bowden, B. (2020) The Ties of Place: Contractors and Employer Strategies on the Western Canadian and Central Queensland Coalfields, 508.

²¹ Buessing, M & Boden, L. (2016) The Impact of Contract Operations on Safety in Underground Coal Mines, Journal of Occupational and Environmental Medicine, 58(9):952.

²² Dunlop, J. (2004) Contract versus owner mining – an update on Australasian open pit mining practice, *Mining Technology*, 113(1):17-29, DOI:10.1179/037178404225004256

²³ Quinlan, M (2009) *Report on OHS Management at the Beaconsfield Joint Venture Gold Mine, Tasmania up to and Including the Time of the Rockfall Incident at the 925 Level of the Mine that Occurred at around 9.23 pm, Resulting in the Death of Larry Paul Knight and the Entrapment of Todd Andrew Russell and Brant George*

only occur where the mine operator retained a substantial directly-engaged workforce and didn't transfer its entire operations to a contractor.

Recently published research by Bowden (2020) provides further insights while also reinforcing points made by Waring and others about the importance of industrial relations law changes, notably the 1996 *Workplace Relations Act*.²⁴ Bowden compared employer strategies on the Western Canadian and Central Queensland coalfields since the 1960s, noting that while Queensland operators had 'dramatically increased their use of contractors' in response to falling coal prices after 1996 while their Western Canadian mining counterparts had not. In explaining this difference Bowden the critical factor was spatial location within the global coal trade.

For Canadian owners, the key issue was locational disadvantage, due to the distance of mining operations from deep-water ports. In consequence, Canadian owners reacted to falling prices by concentrating mining operations in the most favourable location, the Elk Valley. Given the scale of this restructuring exercise, employers had little incentive to engage in industrial battles over what were, for them, peripheral labour issues such as the use of contractors. As a result, previously negotiated restrictions on the use of contractors remained in force. By contrast, Queensland producers were forced to deal with the industrial consequences of superior location. In essence, Central Queensland employers had allowed, during the period of high profitability, their entire transport advantage vis-à-vis western Canada to accrue to their workforce via higher mine-site labour costs. To alter this situation required a radical transformation of employment relations. As a result, from 1992 Queensland coal owners became active supporters of a major overhaul of Australian labour laws; a campaign that was crowned with success following the passage of the *WRA* in December 1996. The decisive impact of the *WRA* in transforming labour relations is particularly evident in the use of contractors, as the numbers engaged rose from minuscule levels in 1996 to more one-third of the workforce just four years later.²⁵

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For many mine owners, the optimal risk management profile involves a practical offsetting of the assumption of mining risk on the one hand, against the removal of litigation risk and potentially reduced operating costs on the other. Potential pitfalls may arise where

²⁴ Webb, Expert Report Prepared for Greg Melick SC, Independent Investigator appointed by the Tasmanian Government, 30 August 2007, 150.

²⁵ Bowden, B. (2020) The Ties of Place: Contractors and Employer Strategies on the Western Canadian and Central Queensland Coalfields, *Relations Industrielles*, 59(3):490-512.

²⁶ Bowden, B. (2020) The Ties of Place: Contractors and Employer Strategies on the Western Canadian and Central Queensland Coalfields, 508.

²⁶ Dunlop, J. (2004) Contract versus owner mining – an update on Australasian open pit mining practice, *Mining Technology*, 113(1):17-29, DOI:10.1179/037178404225004256

equipment size and type requirements vary with time or where manpower management, mining flexibility, job skills or safety exposure factors are relevant.²⁷

In some Australian mines, notably the Beaconsfield Goldmine, there was some evidence that labour hire was used as a form of probationary employment, with labour hire workers deemed satisfactory later transferring to direct employment in the mine (this practice was used in other industries).²⁸ Of course, this process could only occur where the mine operator retained a substantial directly-engaged workforce and didn't transfer its entire operations to a contractor.

The rationale for contract labour/labour hire, and views on it

Shifting to contract labour/labour hire has been seen offer a number of advantages in terms of costs, productivity and flexibility, evident in some of the research already discussed. In his review, O'Neil pointed to the rationale and advantages of labour hire from the perspective of labour hire workers and companies:

Employment placement or labour hire arrangements have benefits for workers in the sense of having an agent scouting for work and perhaps tailoring the conditions—say, short hours or temporary periods—to suit the worker. For businesses the immediate advantage is ‘numerical’ flexibility, particularly the ability to add labour during periods of demand, while not increasing the prime workforce numbers. In many respects then, labour hire appears to be a feature of a modern labour market.²⁹

On the other hand, echoing a number of inquiries and union complaints O'Neil noted concerns labour hire workers were paid less than directly hired workers.³⁰ Another persistent suggestion in Australia and other countries like South Africa is that contract labour has been used to undermine labour standards more generally and weaken or remove union present as part of a cost-cutting agenda. Academic/industry literature referring to these effects in countries with significant mining industries are decades old.³¹

In 2016 a Queensland parliamentary inquiry into labour hire provided a good summary of the positive and negative views, strengths and weaknesses or arguments for and against labour hire. In

²⁷ Dunlop, J. (2004) Contract versus owner mining – an update on Australasian open pit mining practice, *Mining Technology*, 113(1):A28.

²⁸ Quinlan, M (2009) *Report on OHS Management at the Beaconsfield Joint Venture Gold Mine, Tasmania up to and Including the Time of the Rockfall Incident at the 925 Level of the Mine that Occurred at around 9.23 pm, Resulting in the Death of Larry Paul Knight and the Entrapment of Todd Andrew Russell and Brant George Webb*, Expert Report Prepared for Greg Melick SC, Independent Investigator appointed by the Tasmanian Government, 30 August 2007, 150.

²⁹ O'Neil S. (2004) *Labour hire: issues and responses*, Economics, Commerce and Industrial Relations Group Research Paper No. 9 2003–04, Department of Parliamentary Services, Canberra, 2.

³⁰ O'Neil S. (2004) *Labour hire: issues and responses*, Economics, Commerce and Industrial Relations Group Research Paper No. 9 2003–04, Department of Parliamentary Services, Canberra, 1-2.

³¹ See for example Kenny B, & Bezuidenhout A, (1999) Contracting, complexity and control: An overview of the changing nature of subcontracting in the South African mining industry, *The Journal of The South African Institute of Mining and Metallurgy*, July/August, 185-192; Crush J, Ulicki T, Tseane T, & Jansen van Vuuren E, (2001) Undermining Labour: The Rise of Sub-Contracting in South African Gold Mines, *Journal of Southern African Studies*, 27(1): 5-31.

explaining why the industry had rapidly expanded the report indicated that research had identified areas where labour hire could help business, including:

- providing enhanced numerical flexibility to cope with peaks and troughs in demand, staff absences, or to manage specific work (e.g. programmed maintenance)
- simplifying recruitment and selection processes and meeting interim or immediate staff needs at short notice
- facilitating access to specialist skills from time to time as required
- reducing in-house staff and outsourcing non-core business areas, including the management of areas of expertise (e.g. human resources, occupational health and safety)
- reducing costs associated with staff overheads and entitlements,
- simplifying tax planning, and
- outsourcing risk management and administrative burdens associated with regulatory compliance, including unfair dismissal claims and workers' compensation.

For workers, it has been suggested that supplying labour on a temporary basis may also afford certain benefits in terms of maximising their independence in determining work options, and supporting more flexible and varied work than would be readily accessible or achievable through more rigid or traditional employment options...However, it is also recognised that while agency workers in Australia are a diverse group spanning all occupational levels and industries; they tend, on average, to be engaged in low-skilled and labour-intensive positions and exhibit the characteristics of "marginal, peripheral workers"³²

These points were largely re-echoed in a later section summarising the benefits of labour hire. On the negative side the parliamentary inquiry pointed to a 'wide range of adverse consequences and risks are also associated with the use of labour hire employment' namely:

- Labour hire is underpinned by cutting labour costs and can be used to substitute an existing workforce with a cheaper workforce with lesser pay and conditions, and which is also more likely to be compliant due to the uncertain nature of their employment arrangements.
- While businesses may benefit from the reduced costs associated with labour hire employment, workers ultimately tend to receive lower hourly rates of pay and are unable to access entitlements available to permanent workers. Inquiry submissions particularly pointed to increased use of enterprise bargaining agreements which fall outside typical award rates and may offer different standards of conditions. For example, labour hire workers at a particular site may be paid under a specific enterprise bargaining agreement, while their directly employed colleagues at the same site may be paid under a more recent, higher award or higher enterprise bargaining rate.
- The increasing use of labour hire arrangements with poorer conditions on average is widening the gap between standard and non-standard workers (cast as insiders versus outsiders), at a time when insecure work arrangements are becoming more common. The heavy reliance on casual rather than permanent workers – often over the long term – largely

³² Finance and Administration Committee (2016), *Inquiry into the practices of the labour hire industry in Queensland*, Report No. 25, 55th Parliament, Queensland, Brisbane, 5.

negates the protection of unfair dismissal afforded to other employees. Further, this may have the effect of displacing other legitimate sources of labour and eroding employment rights and conditions. The Anti-Discrimination Commission Queensland (ADCQ) has reported that some local people or other permanent residents in regional areas have raised concerns that local people would not be considered for employment by many labour hire operators, and that often it was extremely difficult or impossible for local people or other permanent residents of Australia to obtain temporary work in horticultural areas. One reason for this put forward to the ADCQ was that permanent residents had a better awareness of their employment rights, and would not tolerate the working conditions that were being offered by labour hire contractors, and therefore they were being excluded from the opportunity to work.

- The growth of unstable, non-regular patterns of work that characterise labour hire has implications for the living standards of these workers and their families, including limiting their ability to access loans and credit or plan for their futures.
- Ambiguities in the employment relationship pose a potential threat to occupational health and safety standards, with a lack of clarity over parties' specific responsibilities potentially serving to degrade workplace conditions and reduce protections for employees. Studies have particularly identified that labour hire workers are more likely to be injured at work than direct hire workers, and their workplace injuries underreported, with the obligation and ability to rehabilitate injured workers often limited (labour hire workers are less likely to have a specific work site to which to return for rehabilitation and return-to-work duties).
- Labour hire firms are less likely to invest in the training and development of staff, with opportunities for career advancement often limited within labour hire arrangements.
- Labour hire workers may have less of a "workplace voice" in the host's workplace than directly employed workers, may find it harder to join a union and may be excluded from collective bargaining about the conditions which apply to their work.
- Employees of labour hire companies have considerably less bargaining power and may be disinclined to speak out about their conditions largely out of fear for their employment.
- Low barriers to entry into the labour hire sector allow opportunistic operators to easily enter and work in an industry. Some labour hire suppliers are driven by price considerations to the detriment of compliance with workplace laws, with labour hire structures linked to instances of "phoenix" activity – namely, the transfer of assets of an indebted company into a new company (such as an associated labour hire entity operated by the same director/s), to evade tax, employment and other legal obligations.
- Submissions to the inquiry highlighted the scope for sham independent contracting arrangements to be engaged in labour hire arrangements, whereby the labour hire contractor claims that a worker is an independent contractor when they are in fact an employee, usually in an effort to avoid the responsibilities associated with having employees.

- Anti-poaching agreements engaged by many labour hire companies mean that host employers are not able to transition a worker from temporary to permanent employment, limiting their opportunities for professional development or greater employment security.³³

Unlike most other inquiries the 2016 Queensland parliamentary inquiry gave significant attention to the mining industry. Therefore, some of its findings in this regard are worth noting as they pertain to issues raised by academic studies in the last subsection. For example, the inquiry report noted that while it had been unable to obtain statistics on economic impacts it had heard evidence that the growing use of labour hire in mining towns and consequent the loss of permanent jobs for local workers had ‘a devastating impact on those towns and their once thriving communities’ before adding:

It is clear that the downturn in the mining industry has clearly had an impact and cannot be avoided when discussing employment in regional towns. However, the Committee has heard that some companies in the mining industry do not contribute to or integrate with the local communities and that some do not allow their workers to find accommodation in, or even shop in the local towns. Instead, those fly-in, fly-out or drive-in, drive-out workers are restricted to the camps run and serviced by the mining company which can house up to 1000 workers in some camps.

While the particular issue regarding the use of mining camps is outside the Committee’s Terms of Reference as it does not relate to labour hire, it is clearly part of the wider discussion around how our regional towns are faring and the way in which mining companies can better contribute to their local communities. The Committee heard that amendments to the town planning processes in regional areas may go some way to addressing the issue of mining camps. This, however, is a matter for local governments to address.

This increased casualisation, the Committee heard, means that there is a loss of permanent jobs in regional towns. With fewer opportunities for permanent work in regional towns, locals cannot obtain secure, permanent employment and young people in the towns often move away to secure work, traineeships or apprenticeships in other regions. The Committee heard that locals in regional areas who secure work with mining companies, for example, are more often than not employed on a labour hire basis. The Committee heard that labour hire companies offer labour at a lower cost than that of permanent employees and this can lead to loss of permanent jobs, with those workers replaced by labour hire fly-in, fly-out workers.³⁴

The Queensland parliamentary report also noted evidence of wider social impacts and the particular vulnerability of labour hire workers in mining regions:

Fewer people in the towns also means that there is less money to keep the economy going. The Committee heard that in Blackwater many shops have closed as the businesses could

³³ Finance and Administration Committee (2016), Inquiry into the practices of the labour hire industry in Queensland, Report No. 25, 55th Parliament, Queensland, Brisbane, 14-15.

³⁴ Finance and Administration Committee (2016), Inquiry into the practices of the labour hire industry in Queensland, Report No. 25, 55th Parliament, Queensland, Brisbane, 16.

not survive the lack of patronage, despite thriving in previous years. This has resulted in fewer jobs in industries other than that of the main employer in the town.

Fewer people buying properties and homes in the towns means that locals struggle to sell their homes and may have negative equity in their home if they bought it during the mining boom, when property was in demand.

The Committee heard that social impacts include less participation in local community associations, such as sporting clubs. Labour hire workers told the Committee that they cannot afford to take sick days as they fear they will lose their insecure work with no notice. Due to this job insecurity, they cannot afford to risk injury and no longer participate in their local sporting clubs. The Committee heard that this has resulted in the closure of adult sporting clubs in some towns.³⁵

With regard to employment involving labour hire mining was nominated by the report, along with the seasonal fruit and vegetable industry, as having the most reports of bad practices. The report went on to state:

The rise in labour hire employees in the mining industry was seen as a reaction to the downturn in the price of mineral commodities on the world market. While the change to labour hire has caused some angst in the sector between full time and labour hire workers on the same site, it appears that the agreements between the mining companies and the labour hire companies are legally binding and not unlawful.³⁶

A subsequent regulatory impact report made several specific references to mining including complaints of substantially lower level of payment and union concerns:

In the coal mining industry in Queensland, the increasing use of labour hire is causing problems, and local members and mining workers have expressed their concern about casualisation of workers. There has been a significant downturn in mining, with resultant reductions in staff and decreases in wages. The use of labour hire can further weaken workers' entitlements and result in job losses for permanent employees. This was an issue recently in Queensland, at the Anglo American German Creek mine in late 2016 when Anglo American advertised for labour hire workers.³⁷

The most detailed investigation into labour-hire in Australia identified was an inquiry commissioned by the Victorian government and chaired by professor of law, Anthony Forsythe (RMIT) in 2016 which received hundreds of submissions (many detailed) from individuals and a wide spectrum of organisations and also carefully reviewed available academic research. In examining reasons for the growth as identified in research the review stated:

³⁵ Finance and Administration Committee (2016), Inquiry into the practices of the labour hire industry in Queensland, Report No. 25, 55th Parliament, Queensland, Brisbane, 18.

³⁶ Finance and Administration Committee (2016), Inquiry into the practices of the labour hire industry in Queensland, Report No. 25, 55th Parliament, Queensland, Brisbane, 61-62.

³⁷ See also Office of Industrial Relations, (2017) *Labour Hire Licensing Scheme Decision Regulatory Impact Statement March 2017*, Queensland Government, Brisbane, 10.

In 2002, Hall examined the growth of the labour hire industry in Australia over the previous 10 years. He described its development from the 1980s when a number of small specialist firms began to offer contract labour as a way for employers to replace or supplement existing staff in highly unionised and dispute-prone industries. Hall considered the essential quality of the labour hire industry to be a split between the contractual and control relationships, whereby the worker is under the control of the host organisation but is paid by the labour hire firm. He contended that the industry grew from a benevolent 'temp employment agency' model to one that drives down labour costs, seeks to replace the current workforce with a more compliant one and sees employers attempting to minimise their responsibilities and liabilities.

In 2004, Campbell, Watson and Buchanan profiled temporary agency work in Australia. They described temporary agencies as ranging from the very large to the very small. The authors outlined that temporary agency work probably began as a way of organizing office workers to meet occasional needs, however had since diversified and spread to numerous other occupations. They cited Australian Workplace and Industrial Relations Survey data to suggest that over 20% of workplaces with 20 or more employees were using agency workers. In a 2005 paper, Laplagne, Glover and Fry identified a number of demand-side factors which led to the growth in labour hire employment between 1990 and 2002, both in terms of the number of firms using labour hire and the rate of use.²⁶ They attributed this growth in part to changes in the broader industrial relations landscape in the early 1990s including the move away from compulsory unionism, the increase in human resource management approaches and the spread of workplace bargaining. The authors described these changes as having a 'threshold' effect only, encouraging firms to use labour hire where they had previously not done so. They considered that competitive pressures which intensified in the early 1990s also contributed to the growth of labour hire.

A further examination of the evolution of the temporary agency work sector in Australia was conducted in 2005 by Burgess and Connell. They noted that whilst labour hire employment arrangements had previously primarily been used to fill temporary absences, the average duration of labour hire placements had increased, with a quarter of workers estimated to have been on labour hire contracts for more than two years.

Coe, Johns and Ward's 2009 analysis of the Australian temporary staffing market illustrated that in 2005, the eight largest agencies accounted for only 20% of the market, indicating very low barriers to entry into the sector with agencies mainly competing on price. Further, the authors noted that due to the Australian temporary staffing industry comprising small, locally oriented firms targeting blue collar and clerical workers, the industry had become highly segmented and fragmented.

In 2013, Bonet, Cappelli and Hamori examined the growth and increasing prominence of labour market intermediaries in Australia. The authors classed labour hire agencies as 'administrators'. Administrators directly hire workers, become their legal employer and supply those workers to a host organisation. Administrators manage the employees' wage and other costs but also accept the risk of the employment relationship. The authors distinguished labour hire agencies from two other kinds of labour market intermediaries:

information providers such as job boards, social media sites, and outplacement agencies; and ‘matchmakers’, which describes the traditional recruitment role.³⁸

In essence, these findings are consistent with research into the growth of contract labour in coalmining discussed earlier, namely it was primarily organisationally driven by labour hire firms offering a more flexible and cheaper labour supply option both in response in employer demand and facilitating a widening of this demand by making the option available to a greater array of employers. Other factors identified included regulatory changes (and regulatory advantages of these arrangements) and a shift in HR practices.

Worker views on labour hire and impacts on working conditions/labour standards

In addition to points already made, the Victorian inquiry also provided a valuable summary of evidence on worker attitudes to and reasons for using labour hire agencies, although this evidence is not specific to the mining industry. This included an Australian Bureau of Statistics survey conducted in November 2008 on why employees use labour hire which identified the following reasons (and their response rating) ease of obtaining work 55.7%, hassle free 15.6%, like short term work 2.8%, unable to find work in their line of business 7.1%, condition of working in job/industry 9.2%, lack of experience prevents finding permanent job 2.4%, gain more experience 2.8%, flexibility 7.4% and other reasons other 17.8%.³⁹ The Report then cited the findings of three studies of worker attitudes to labour hire - the largest most representative was reported as finding:

In a 2009 study, De Jong, De Cuyper, De Witte, Silla and Bernhard-Oettel explored the motivations behind acceptance of temporary work assignments by workers in the EU. They found, based on a survey of 645 workers from the manufacturing and retail industries in Europe, that over half of the workers had involuntary motivations, meaning that they would prefer permanent to temporary employment, along with using the job as a stepping stone to other work. A second group were motivated only by using the job as a stepping stone to permanent employment.¹¹⁸ A third cluster comprised ‘non-involuntary’ workers who were ambivalent about, rather than positively inclined towards, temporary work. This third group were described by the authors as a ‘resigned group’ who have become trapped in temporary work, despite their relatively high scores on perceived employability.⁴⁰

³⁸ Forsythe, A. (2016) *Victorian Inquiry into the Labour Hire Industry and Insecure Work: Final Report*, Industrial Relations Victoria, Department of Economic Development, Jobs, Transport & Resources, Melbourne, 50-51. The cited studies are Hall R, (2002) *Labour Hire in Australia: Motivation, Dynamics and Prospects*, Working Paper 76, ACIRRT, University of Sydney; Campbell I, Watson I & Buchanan J, (2004) Temporary agency work in Australia (Part I) in John Burgess and Julia Connell (eds.), *International Perspectives on Temporary Agency Work*, Routledge, London, 129; Laplagne P, Glover M and Fry T, (2005) *The Growth of Labour Hire Employment in Australia* (Productivity Commission Staff Working Paper, Melbourne; Burgess J, & Connell J, (2005) Temporary Agency Work: Conceptual, Measurement and Regulatory Issues, *International Journal of Employment Studies*, 13(2):21; Coe N, Johns J, & Ward K, (2009) Agents of casualization? The temporary staffing industry and labour market restructuring in Australia, *Journal of Economic Geography*, 9:55; Bonet R, Cappelli P, & Hamori M, (2013) Labour Market Intermediaries and the New Paradigm for Human Resources, *The Academy of Management Annals*, 7(1):341.

³⁹ Forsythe, A. (2016) *Victorian Inquiry into the Labour Hire Industry and Insecure Work: Final Report*, Industrial Relations Victoria, Department of Economic Development, Jobs, Transport & Resources, Melbourne, 68.

⁴⁰ The two studies not mentioned were both small and one involved a study of nurses which probably has limited relevance to the attitude of workers in the mining industry. Forsythe, A. (2016) *Victorian Inquiry into*

Later the Victorian Labour Hire Report cited another study submitted to it by Cochrane and McKeown, based on a survey of 178 (response rate 24%) of workers from eight agencies (all members of the RCSA). Cochrane and McKeown, like previous research, some workers preferred agency work (ie. supply-side drivers) family-related and flexibility reasons; personal needs (like fewer working hours or greater scheduling flexibility); economic reasons (like earning supplementary wages quickly or superior pay rates); self-improvement reasons (like opportunities to try out employers or perform challenging work and to develop new skills); personal preferences for autonomy, control and independence from organisational constraints); and views agency work may provide a pathway to a permanent or more stable job:

Their own study found evidence of economic, psychological and social vulnerabilities for labour hire workers although favourable features were also reported. They considered this to reflect linkages between features of nonstandard work, worker preferences, individual characteristics and the experience of worker vulnerability.⁴¹

The Inquiry also received a number of submissions from unions, industry groups, NGOs and academics as to why workers choose labour hire with industry submissions generally highlighting flexibility benefits while union submissions focused on the ease of finding work through agencies and involuntary choice.⁴² Drawing all this evidence together the Inquiry concluded:

While there is evidence that some workers are attracted to the flexibility that labour hire offers and see it as a path to ongoing employment, many workers accept labour hire engagements as the only choice open to them and would prefer permanent positions. There is also considerable financial insecurity attached to many labour hire engagements.⁴³

As far as could be determined there have been relatively few large and systematic studies of the attitudes of labour hire/temporary agency workers since the Victorian Labour Hire Inquiry was completed. A German study, involving a survey of 3000 agency workers, tested a number of hypotheses about what motivated and maintained positive morale, including amount of remuneration, project employment duration, and remaining in the agency for follow-up employment. The study found a significant positive between motivational morale and the amount of remuneration and longer duration employment and remaining with the company on a follow-up employment.⁴⁴ As the authors note, much of the research on worker attitudes focuses on negative worker attitudes and adverse consequences rather than what motivates labour hire workers.

⁴¹ *the Labour Hire Industry and Insecure Work: Final Report*, Industrial Relations Victoria, Department of Economic Development, Jobs, Transport & Resources, Melbourne, 69. The cited study details are de Jong J, De Cuyper N, De Witte H, Silla I, & Bernhard-Oettel C, (2009) Motives for accepting temporary employment: a typology, *International Journal of Manpower*, 30(3):236-238.

⁴² Forsythe, A. (2016) *Victorian Inquiry into the Labour Hire Industry and Insecure Work: Final Report*, Industrial Relations Victoria, Department of Economic Development, Jobs, Transport & Resources, Melbourne, 71. The cited study was Cochrane R, & McKeown T, (2015) Vulnerability and agency work: from the workers' perspectives, *International Journal of Manpower*, 36(6):947-953.

⁴³ Forsythe, A. (2016) *Victorian Inquiry into the Labour Hire Industry and Insecure Work: Final Report*, Industrial Relations Victoria, Department of Economic Development, Jobs, Transport & Resources, Melbourne, 74.

⁴⁴ Forsythe, A. (2016) *Victorian Inquiry into the Labour Hire Industry and Insecure Work: Final Report*, Industrial Relations Victoria, Department of Economic Development, Jobs, Transport & Resources, Melbourne, 82.

⁴⁵ Grund G, Minten A, & Toporova N, (2017) *The Motivation of Temporary Agency Workers: An Empirical Analysis*, Discussion Paper Series, IZA DP No. 11229, Berlin.

Nonetheless, there is some consistency, especially as the authors' caution against a misalignment of remuneration and job prospects from those expected.⁴⁵

The Victorian Labour Hire Inquiry devoted considerable attention to effects of labour hire on working conditions, labour standards and regulatory compliance, which identified a number of positive experiences for workers although the weight of evidence was negative. This (including current regulatory coverage and arrangements and comparisons with other jurisdictions) and discussions of the wider effects of insecure work take up the bulk of rest of the Report.⁴⁶ Adverse effects included low/irregular earnings, under-payment, fear to report problems, job insecurity, irregular hours, powerlessness to negotiate, abuse and exploitation. Given the focus of this report attention will focus on the most significant ones that might apply to the mining industry. The report makes some references to the mining industry, though comparatively few and mainly with regard to the extent of labour hire in the industry and methods of payment, drops in apprenticeship numbers in the energy sector, model labour hire award provisions, employment characteristics, transfers of business complications and on-site accommodation.⁴⁷ The Inquiry noted in its discussion of access and hours of work:

Similarly, CFMEU Mining and Energy described the practice of holding casual workers captive by keeping an available panel of such workers far in excess of the company's requirements and penalising those who accept other work at other employers by 'black banning' them from getting casual work.⁴⁸

On the question of payment the Inquiry Report included the statement of one anonymous mining, oil and gas industry worker who stated:

I was employed through a labour hire agency less than a year ago. I work for various employers. You always need to check pay. When the pay is wrong after the job has finished you never say anything because you may never get another call for work.⁴⁹

With regard to the section of the report that dealt with the wider context of insecure work the Victorian Labour Hire Inquiry Report cited the views of one mining industry worker:

They make you take unpaid leave to attend training courses and pay for your own courses. They sack you by text with 3 hours' notice. They notify you by text with 3 hours' notice that there is no work or to leave work. You're too scared to take any time off as you would lose your job. You come to work sick. You don't report incidents. There is bullying, intimidation and harassment. There is immense pressure on families. You can't get a home loan as NO

⁴⁵ Grund G, Minten A, & Toporova N, (2017) *The Motivation of Temporary Agency Workers: An Empirical Analysis*, Discussion Paper Series, IZA DP No. 11229, Berlin, 27.

⁴⁶ Forsythe, A. (2016) *Victorian Inquiry into the Labour Hire Industry and Insecure Work: Final Report*, Industrial Relations Victoria, Department of Economic Development, Jobs, Transport & Resources, Melbourne, 75-388.

⁴⁷ Forsythe, A. (2016) *Victorian Inquiry into the Labour Hire Industry and Insecure Work: Final Report*, Industrial Relations Victoria, Department of Economic Development, Jobs, Transport & Resources, Melbourne, 55, 58-63, 78, 81, 95, 105, 122, 136, 150, 176, 189, 272, 275, 278, 279, 282, 284, 285, 305, 307, 370.

⁴⁸ Forsythe, A. (2016) *Victorian Inquiry into the Labour Hire Industry and Insecure Work: Final Report*, Industrial Relations Victoria, Department of Economic Development, Jobs, Transport & Resources, Melbourne, 122.

⁴⁹ Forsythe, A. (2016) *Victorian Inquiry into the Labour Hire Industry and Insecure Work: Final Report*, Industrial Relations Victoria, Department of Economic Development, Jobs, Transport & Resources, Melbourne, 150.

permanent job. There's no money in the bank, so you can't socialize, and you can't spend money as you're too far in credit card debt.⁵⁰

Some of the more significant findings were in relation to the overlap between labour hire and casualisation, minimum labour standards and entitlements, labour hire and enterprise agreements, protections from unfair and discriminatory treatment:

The overwhelming mode of engagement of labour hire workers in Victoria is casual employment. To a lesser extent, labour hire workers may be engaged as independent contractors, particularly in professional roles in industries such as information technology. To a significantly lesser extent, labour hire employees are engaged on a fixed term employment basis. Permanent employment is rare. Whilst each of these non-permanent forms of engagement is present across the broader Victorian labour market, their cumulative prevalence within the labour hire industry is considerably greater.⁵¹

It is an unavoidable consequence of the engagement of labour hire workers as casual employees, or as independent contractors, that they do not receive the benefit of many/any minimum employment conditions under the NES. Labour hire workers engaged as fixed term employees receive most but not all of the minimum NES conditions. Casual labour hire employees also miss out on many award conditions, so are often worse off than directly engaged permanent employees of the host, even taking into account the casual loading.⁵²

Based on the above material, I consider that there are two main problematic aspects of the application of the Fair Work Act framework of enterprise agreements and bargaining in the labour hire context...Some labour hire employers seek to use enterprise agreements as a mechanism to drive down employment conditions. Vigorous application of the BOOT test by the FWC is needed to prevent this from occurring...In many instances, host enterprise agreements do not apply to labour hire employees, resulting in differential treatment (i.e. lower pay and conditions) for those workers compared with direct employees of the host whom they work alongside. This problem is more pronounced where (as the Inquiry heard is common in some sectors) labour hire employees have been working at the site of one host over a lengthy period.⁵³

The current unfair dismissal provisions in the Fair Work Act operate, in practice, to limit substantially the protections from unfair dismissal for labour hire workers. This principally arises from the exclusions of most casuals, as well as fixed term/specified task employees and contractors, from being able to bring an unfair dismissal claim. Even for labour hire employees who can bring an unfair dismissal claim, the relevant provisions are sometimes interpreted by the FWC so as to enable the labour hire agency to 'hide' behind the actions of

⁵⁰ Forsythe, A. (2016) *Victorian Inquiry into the Labour Hire Industry and Insecure Work: Final Report*, Industrial Relations Victoria, Department of Economic Development, Jobs, Transport & Resources, Melbourne, 370.

⁵¹ Forsythe, A. (2016) *Victorian Inquiry into the Labour Hire Industry and Insecure Work: Final Report*, Industrial Relations Victoria, Department of Economic Development, Jobs, Transport & Resources, Melbourne, 90.

⁵² Forsythe, A. (2016) *Victorian Inquiry into the Labour Hire Industry and Insecure Work: Final Report*, Industrial Relations Victoria, Department of Economic Development, Jobs, Transport & Resources, Melbourne, 97.

⁵³ Forsythe, A. (2016) *Victorian Inquiry into the Labour Hire Industry and Insecure Work: Final Report*, Industrial Relations Victoria, Department of Economic Development, Jobs, Transport & Resources, Melbourne, 106.

the host and/or their commercial relationship with the host. This approach enables both the host and the labour hire employer to avoid having to account for their respective roles in causing or contributing to the termination of the labour hire employee's employment.⁵⁴

The evidence presented to the Inquiry, and the relevant case law, illustrate a number of ways in which labour hire employees miss out on protections against unfair treatment at work enjoyed by other workers... In relation to rostering and notice of shifts, the evidence of a number of labour hire agencies indicated that labour hire works best for the labour hire agency, employee and host when rostering and shift allocation are undertaken in a transparent and fair manner. Conversely, much evidence demonstrated that poorly managed rostering can have a significantly detrimental impact on labour hire workers and their families.⁵⁵

Some of the evidence presented to the Victorian Labour Hire Report relating to OHS and its findings in this regard are included later in this section of the report.

Research undertaken since the Victorian Inquiry has reached similar conclusions. A large study of the impact of agency labour in the aged-care sector based on data 2481 organisations and over 5,000 internal employees found their use impacted adversely on the job satisfaction of the latter, resulting in more labour turnover and the disruption associated with this so what was seen as a 'quick fix' solution to labour needs could prove costly in the long-term.⁵⁶

As already indicated, locating mining-specific studies proved difficult. In 2020 Dr Kate Hepworth prepared a report for the Australian Centre for Corporate Responsibility on labour hire and Contracting in the ASX100 that focused on several industries including mining.⁵⁷ This is an advocacy body so its findings should be treated with caution. Nonetheless, parts of the report are reproduced below given the paucity of other sources and the report drew on government along with some other relatively reliable data sources and examined the documents of 10 mining companies. With regard to the use of labour hire in mining the report stated:

ASX100 companies in the mining sector

Alumina Ltd. (AWS), BHP Group Ltd. (BHP), Evolution Mining Ltd. (EVN), Fortescue Metals Group Ltd. (FMG), Iluka Resources Ltd. (ILU), Newcrest Mining Ltd. (NCM), Northern Star Resources Ltd. (NST), Rio Tinto Ltd. (RIO), South 32 (S32), Whitehaven Coal Ltd. (WHC). Two ASX100 service contractors in the mining industry - Downer Edi Ltd. and CIMIC Group Ltd. - are discussed below in 'Contract Services in the Mining and Construction Sectors', on p. 30.

Labour hire in the mining sector

⁵⁴ Forsythe, A. (2016) *Victorian Inquiry into the Labour Hire Industry and Insecure Work: Final Report*, Industrial Relations Victoria, Department of Economic Development, Jobs, Transport & Resources, Melbourne, 115-116.

⁵⁵ Forsythe, A. (2016) *Victorian Inquiry into the Labour Hire Industry and Insecure Work: Final Report*, Industrial Relations Victoria, Department of Economic Development, Jobs, Transport & Resources, Melbourne, 123-124.

⁵⁶ King D, Svensson S, & Wei Z, (2017) Not always a quick fix: The impact of employing temporary agency workers on retention in the Australian aged-care workforce, *Journal of Industrial Relations*, 59(1):85-103.

⁵⁷ Hepworth K, (2020) *Labour Hire & Contracting Across the ASX100*, Australian Centre for Corporate Responsibility.

The mining sector has some of the highest rates of labour hire in Australia. In some mining operations, labour hire and contract workers constitute almost the entirety of operations.

While labour hire has always been used in the mining sector, since 2012 “many mining operators have moved to predominantly labour hire workforces in recent years with the stated aim of reducing overheads and increasing workforce flexibility”. In 2017, Rio Tinto announced that they will only use labour hire workers in their iron ore operations. Deloitte notes that 88% of new hires to BHP in the two years to 2019 were labour hire, while 50% of new workers at Fortescue in the same period were indirect hires.⁵⁸

In describing the different types of arrangements, their use and implications for earnings Hepworth stated:

Contract-run mining operations: where a labour hire organisation is contracted to run the mining operation on behalf of a lease holder. This gives an overall appearance of permanency, and workers may even have an Enterprise Bargaining Agreement (EBA) with the labour hire organisation. However, the leaseholder will still exert a degree of control over employees - employees can be terminated if the leaseholder terminates the contract of the labour hire agency, and have their conditions changed by the leaseholder.

- **Long-term contracting:** long term contracted workers are considered “full-time” employees of a labour hire company, employed on contracts over 6 months. They usually have skills that direct employees at a mine site do not. The mine operator can remove their rights to work at any time.
- **Short-term contracting:** where workers are employed for short term tasks such as repairs. They generally work full-time for the length of the task.
- **Casual, temporary supplementary labour:** this is the most prevalent form of labour hire in the industry. These are non-permanent workers, who receive a flat rate of pay. While technically ‘casual’, many of these workers will be on regular, long-term rosters.

Deloitte summarises the companies in the above arrangements into two predominant groups: “labour hire agencies” and “service contractors”. Service contractors are companies engaged to undertake specific, often specialised tasks and will often have their own workforces and equipment, while labour hire workers are “employed by a labour hire company but undertake work for the host minerals company”, typically under the direction of the host company. This distinction corresponds to feedback provided by companies profiled in this report.

Risk: A two-tier workforce

In the Australian mining industry, labour hire employees are often employed on significantly different conditions to their directly employed counterparts on the same site. The federal parliamentary inquiry Keep it in the Regions found significant differences in the conditions of labour hire workers and permanent staff in the mining industry:

⁵⁸ Hepworth K, (2020) *Labour Hire & Contracting Across the ASX100*, Australian Centre for Corporate Responsibility, 23.

- Labour hire workers are paid on average 30 percent less than permanent workers (even taking into account casual loading, and considering unpaid leave arrangements);
- 72 percent of workers on labour hire contracts reported they are worse off than their previous employment in regards to pay and conditions.

Another area of difference between direct employees and labour hire workers is in the provision of safety equipment. The Queensland Mining Inspectorate (QMI) also found that in many cases labour hire workers and contractors were asked to provide their own safety equipment. This is in breach of Queensland OHS legislation, which states that the company in charge of a worksite must provide equipment for the entire onsite workforce, irrespective of whether workers are direct employees or contractors. The lack of protective equipment is just one factor in poorer safety outcomes for labour hire and contract workers (see below).

The implementation of a two-tier workforce can be an explicit company strategy. At BHP's Mt Arthur coal mine in the NSW Hunter Valley, the workforce is a mix of employees hired directly by BHP, and casual labour hire workers employed by Chandler McLeod on the Chandler Macleod Northern Districts of NSW Enterprise Agreement 2015. These labour hire workers reportedly earn 40% less than their directly employed counterparts. The shift to a two tier workforce at the Mt Arthur mine is detailed in a 2015 internal BHP report. That report outlined a strategy to reduce the percentage of direct, permanent employment to 60% by 2017, with the remaining workers employed as casuals via a third party labour hire provider. This was despite the report acknowledging significant short-comings in the use of labour hire, including that permanent staff have better safety records and bring "greater productivity to the table".

As discussed below (p. 25), this can increase litigation and other compensation risks for companies. Additionally, Deloitte has argued that a shift to contract labour in the mining sector may undermine the loyalty of workers, which is necessary for "safety, collaboration and innovation". Deloitte cites differential rates of pay, along with employment agreements that allow contracts to be terminated with as little as four hours-notice, as factors that may impact on loyalty and performance.⁵⁹

There is some awareness in the mining industry that the use of contractors may lead to problems regarding labour rights. In the human rights section of its 2018 Annual Report Anglo American stated under the subheading governance and performance:

Each operation conducts an annual social risk assessment to identify human rights risks and potentially vulnerable groups. Over the past three years, we have conducted human rights due-diligence exercises across all our sites, with assistance from external experts. Each site has identified its key human rights issues in terms of the potential impact on people or the operation and has developed action plans to address the human rights concerns raised. Common issues identified include perceptions of discrimination associated with employment

⁵⁹ Hepworth K, (2020) *Labour Hire & Contracting Across the ASX100*, Australian Centre for Corporate Responsibility, 24-25.

and the visibility of procurement opportunities, unfulfilled commitments and disrespect among contractors for labour rights.⁶⁰

The operations or countries where the latter problems had occurred was not indicated, although a later section on employee relations noted ‘in 2018, there was one incident of industrial action at De Beers’ Venetia mine in South Africa relating to contractor concerns around benefits, which was resolved after five weeks.’⁶¹

Impacts on union presence

The coalmining and general research examined earlier (and union/worker submissions to government inquiries like the Victorian inquiry for example) suggests the growth of labour hire appears to have reduced union presence/influence. Indeed, the effects may have been more profound given the traditionally high union density in coalmining (other industries where labour hire grew had a greater mix of union density). While union density has been declining generally in Australia for some decades (and globally) the apparent decline as contract labour grew seems more than coincidental (and matches evidence in other countries).

One 2007 study of corporate social responsibility (CSR) pledges and labour relations tracked the anti-union strategies pursued by two large mining companies in the 1990s, largely driven by converting workers to individual contracts (they make no reference to contract labour) and focused on their Western Australian metalliferous operations rather than east coast coalmines. The authors concluded:

Although it is difficult to determine exactly what concrete effect the adoption of CSR has had on the labour management system at Rio Tinto and BHP Billiton, certain factors are in evidence. Both companies had carried out aggressive de-unionisation strategies prior to their globalising mergers. Both companies subsequently made significant commitments to the principles of freedom of association and collective bargaining as part of their CSR policies. Yet neither company has acted consistently in line with their stated commitments. Since the adoption of its CSR strategy, Rio Tinto has stopped actively de-unionising worksites. Where unions still have coverage, the company provides effective recognition for unions. However, Rio Tinto has not reengaged in collective bargaining with workers or unions on sites previously de-collectivised. BHP Billiton, for its part, has similarly refrained from collective bargaining in the Pilbara, notwithstanding its endorsement of the fundamental collective labour standards through the Global Compact and other international regulations. Its strategy in the Illawarra region, where it has side-stepped the union at one site and negotiated highly flexible collective terms with the union at others, is perhaps indicative of an on-going de-collectivisation strategy.⁶²

⁶⁰ Anglo American *Integrated Annual Report 2018*, 33.

⁶¹ Anglo American *Integrated Annual Report 2018*, 38.

⁶² Jones M, Marshall S & Mitchell R, (2007) Corporate Social Responsibility and the Management of Labour in Two Australian Mining Industry Companies, *Corporate Governance*, 15(1):57-67. For another study of individual contracts and mining de-unionisation see Ellem B, (2015) Unions, community, work and family in Australia’s iron ore sector, *Labour & Industry: a journal of the social and economic relations of work*, 25(1): 9-22, DOI:

10.1080/10301763.2015.1043511

This report could not explore this issue in any depth but would observe that even if reducing union presence wasn't one of the objectives behind the shift (linked to flexibility and labour cost advantages amongst other things) it was almost certainly a consequence mining companies were aware of and 'comfortable' with. There is evidence that mining companies track union presence in their operations as the following excerpt from Peabody Energy's 2019 Annual Report indicates:

(24) Management — Labor Relations

On December 31, 2019, the Company had approximately 6,600 employees worldwide, including approximately 5,000 hourly employees; the employee amounts exclude employees that were employed at operations classified as discontinued operations. Approximately 42% of those hourly employees were represented by organized labor unions and were employed by mines that generated 19% of the Company's 2019 coal production from continuing operations. In the U.S., two mines are represented by an organized labor union. In Australia, the coal mining industry is unionized and the majority of hourly workers employed at the Company's Australian mining operations are members of trade unions. The Construction, Forestry, Maritime, Mining and Energy Union generally represents the Company's Australian subsidiaries' hourly production and engineering employees, including those employed through contract mining relationships. The Company believes labor relations with its employees are good. Should that condition change, the Company could experience labor disputes, work stoppages or other disruptions in production that could negatively impact the Company's results of operations and cash flows.⁶³

Peabody has both contractor and owner-operated mining activities. While making no direct reference to contractor operations, while discussing potential risks the Peabody report pointed to the importance of good industrial relations but also the higher costs if some mines were unionised:

Approximately 42% of our hourly employees were represented by organized labor unions and generated approximately 19% of our coal production for the year ended December 31, 2019. Relations with our employees and, where applicable, organized labor are important to our success. If some or all of our current non-union operations were to become unionized, we could incur an increased risk of work stoppages, reduced productivity and higher labor costs. Also, if we fail to maintain good relations or successfully negotiate contracts with our employees who are represented by unions, we could potentially experience labor disputes, strikes, work stoppages, slowdowns or other disruptions in production that could negatively impact our profitability.⁶⁴

⁶³ The report went onto list the status of agreements with unions at its eight owner-operated mines in Australia and the contribution to overall production of each. Peabody Energy Corporation, (2019) Annual Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934 for the fiscal year ended December 31 2019, F72.

⁶⁴ Peabody Energy Corporation, (2019) Annual Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934 for the fiscal year ended December 31 2019, 30. At page 21 the report also listed a number of important OHS regulatory changes in Queensland including the following statements: In October 2018 the Queensland government passed the Mines Legislation (Resources Safety) Amendment Act 2018, which introduces significant changes to the Coal Mining Safety and Health Act 1999 concerning, among other things, duties of officers, reporting requirements for coal mine worker diseases, reporting defects and hazards affecting plant and substances, contractor and service provider safety and health management plans, new

2. The OHS Effects of contracting, labour hire and other contingent work arrangements

2.1 General evidence

Before examining the effects of contract labour, casualisation and related work arrangements on mining it is useful to briefly review the evidence pertaining to industry/the workforce in general which provides a context for better understanding the evidence in mining including causal/risk factors, impacts in other high hazard work-settings and regulatory challenges/responses.

While research on these issues is evident from the 1980s (actually before), over the past 25 years there has been growing research into the effect of temporary and insecure work, subcontracting and labour hire arrangements on health, safety and well-being. These contingent work arrangements are frequently labelled precarious or non-standard work to differentiate them from the standard full-time ongoing employment contract. As already noted, growing job insecurity amongst workers holding nominally secure employment complicates neat distinctions based on labelling. Indeed, the largest body of research has examined the impact of job insecurity/downsizing/restructuring overall finding a clear association between this and worse OHS indices, especially mental health, for those who survive such incidents (other effects include increased drug-use or poorer physical health).⁶⁵

The amount of research, methods used (for example survey, incident analysis and longitudinal) and the extent to which connections with particular OHS indices (injuries, hazard exposures, mental health, drug use, regulatory knowledge and compliance) have been assessed varies with regard to contract/subcontract labour, labour hire workers/agency workers and direct-hire temporary employment varies as does the use of terminology. It is also important to note that work arrangements are not mutually exclusive. For example, many part-time workers are also casuals. More to the point, while labour hire workers are generally typified as employees some are self-employed (working for one agency or more), some employees work for multiple agencies and the contract under which employees are engaged range from casual through fixed term contracts to (more exceptionally) something approaching ongoing employment. Amongst other things, this

powers to suspend or cancel an individual's statutory certificate of competency and increasing penalties and inspector powers. Following the re-identification of coal workers' pneumoconiosis and six mining and quarrying fatalities that occurred over a 12-month period, the Resources Safety and Health Queensland Bill 2019 was introduced into Queensland Parliament in September 2019. The bill establishes Resources Safety and Health Queensland (RSHQ) as a statutory body designed to ensure independence of the mining safety and health regulator. RSHQ will include inspectorates for coal mines, mineral mines and quarries, explosives and petroleum and gas. The bill seeks to enhance the role of advisory committees to identify, quantify and prioritize safety and health issues in the mining and quarrying industries. It also provides for an independent Work Health and Safety Prosecutor to prosecute serious offences under resources safety legislation. In February 2020, the Queensland government has introduced into Parliament legislation which will introduce the criminal offense of 'industrial manslaughter' for executive officers, individuals who are "senior officers" and companies in the mining industry. Individuals would face a maximum prison sentence of 20 years and companies could be fined up to approximately \$13 million Australian dollars. The legislation has also introduced the requirement for statutory role holders to be employees of the coal mine operator entity with a 12-month transition period. The bill is currently under review by a Parliamentary Committee.

⁶⁵ Quinlan, M. (2007) Organisational Restructuring/Downsizing, OHS regulation and worker health and wellbeing. *International Journal of Law and Psychiatry*, 30:385-399; Quinlan, M. & Bohle, P. (2009), Over-stretched and Unreciprocated Commitment: Reviewing research on the OHS effects of downsizing and job insecurity, *International Journal of Health Services*, 39(1): 1-44.

means research into the OHS effects of fixed-term and other 'direct-hire' temporary workers has some relevance to labour hire workers.

Acknowledging these complexities is important and valuable in identifying different aspects of work arrangements at Grosvenor the Board of Inquiry might wish to examine. At the same time, as the previous point indicates there is overlap between some categories so the associations with risk need to be examined in combination. Reinforcing this approach, the bulk of the research studies (with the exception of permanent part-time work where findings are more mixed, outcomes typically falling between permanent and temporary work) have reached broadly similar findings with regard to the OHS outcomes associated with these types of work arrangement.⁶⁶ Findings from studies in a range of countries that specifically examined labour hire/agency labour have overwhelmingly reached similar findings, particularly a higher rate of injury amongst these workers when compared to direct-hire ongoing/permanent employees (other findings relate to lower reporting of OHS problems and more problematic access to workers' compensation).⁶⁷

Overall, there has been a high if not remarkable degree of consistency in the findings of the hundreds of articles now published on the health outcomes associated with this array of arrangements or the effects of job-insecurity.⁶⁸ This point has been made repeatedly, including comparisons of contract labour with other types of precarious work (like temporary employment). For example, in a 2015 paper on the use of independent, dependent and employee contractors at the Pike River Coal Mine Lamare et al stated there 'is also a substantial body of evidence that shows that the effects of insecure work, whether it is through subcontracting or not, are pervasive and overwhelmingly negative.'⁶⁹ In addition to academic research this conclusion has also been reached

⁶⁶ For summaries of this evidence see Quinlan, M. (2015) The effects of non-standard forms of employment on worker health and safety, *Conditions of Work and Employment Series Working Paper No.67*, International Labour Organisation, Geneva.

⁶⁷ See for example Francois M, & Lievin D, (1995) *Emplois Precaires et Accidentabilite: Enquete Statistique Dans 85 Entreprises*. Paris, Institut National de Recherche et de Securite; Storrie D, (2002) *Temporary Agency Work in the European Union*, European Foundation for the Improvement of Living and Working Conditions, Dublin; Silverstein B, & Foley M, (1998) Protecting contingent workers from work-related injury. Paper presented to the Ergonomics Society of Australia Conference, October 5-7, Melbourne; Park Y, & Butler R, (2001) The safety costs of contingent work: Evidence from Minnesota, *Journal of Labor Research*, 22(4):831-850; Underhill E, (2008) Double Jeopardy: Occupational injury and rehabilitation of temporary agency workers, PhD thesis, UNSW Sydney; Lippel K, MacEachen E, Saunders R, Werhun N, Kosny A, Mansfield L, Carrasco C, Pugliese D, (2011) Legal protections governing the occupational safety and health and workers' compensation of temporary employment agency workers in Canada: reflections on regulatory effectiveness, *Policy and Practice in Health and Safety*, 9(2):69-90, DOI: 10.1080/14774003.2011.11667762.

⁶⁸ For reviews of this research see Quinlan, M. Mayhew, P. & Bohle, P. (2001) The Global Expansion of Precarious Employment, Work Disorganisation and Occupational Health: A Review of Recent Research, *International Journal of Health Services*, 31(2):335-414; Virtanen M, Kivimäki M, Joensuu M, Virtanen P, Elovainio M, & Vahtera J, (2005) Temporary employment and health: a review *International Journal of Epidemiology* 34:610–622; Quinlan, M. & Bohle, P. (2008) Under pressure, out of control or home alone? Reviewing research and policy debates on the OHS effects of outsourcing and home-based work, *International Journal of Health Services*, 38(3): 489-525; Quinlan, M. & Bohle, P. (2009), Over-stretched and Unreciprocated Commitment: Reviewing research on the OHS effects of downsizing and job insecurity *International Journal of Health Services* 39(1): 1-44

⁶⁹ Lamare R, Lamm F, McDonnell N. & White H, (2015) Independent, dependent, and employee: Contractors and New Zealand's Pike River Coal Mine disaster, *Journal of Industrial Relations*, 57(1): 78.

in international reports such as a report on employment inequalities prepared as part of a wider project on the social determinants of health by the World Health Organisation in 2007.⁷⁰

Broadly summarised, the main negative health and safety outcomes associated with these types of work arrangement that have been identified when compared to workers holding full-time permanent/ongoing jobs are:

1. Higher incidence/frequency of injuries, including fatalities
2. Poorer physical and mental health (including susceptibility to bullying and drug use).
3. Poor knowledge of and access to regulatory employment rights and less willingness to raise OHS concerns.

Importantly, the use of contract labour/subcontracting has also been linked to workplace disasters in a number of industries by official investigations, or detailed research. The use of contractors and especially multi-tiered subcontracting has been associated with fractured OSH management and corner cutting on safety that was a causal factor in catastrophic incidents. Five examples include the AZF factory fire in France in 2001 (30 killed and resulting a recommendation to ban multi-tiered subcontracting on Seveso type sites), the sinking of the Brazilian Petrobras 36 oil rig (claiming 11 lives) in the south Atlantic in the same year, Texas City refinery fire in 2005 (15 killed), the Hangzhou (China) subway collapse in 2008 (21 killed immediately) and the Soma mining disaster in Turkey in 2014 (claiming 311 lives).⁷¹ In the cases just mentioned the association was identified either in official government inquiries (like AZF which was later reinforced in court proceedings) or later peer-reviewed independent research. In the context of this report it is only possible to a few illustrative examples of these connections.

The Petrobras incident provides an illustration of the intermeshing of contracting with the disaster. Two inquiries into the Petrobras P-36 rig incident found that workers (particularly contractors) had been inadequately trained to deal with emergency situations which had serious consequences, including ballast doors being left open for a scheduled inspection during the early stages of oil and gas leaks. No operator followed contingency procedures to prevent flooding, including closing doors opened by the fire fighting team. Moreover, in the 17 minutes after the EDT burst and the upper level gas explosion, 1723 alarms were triggered with no system to assist the operators prioritise their response.⁷² Another independent review found lack of training meant operators were unaware

⁷⁰ World Health Organisation Employment Conditions Knowledge Network (EMCONET) (2007) *Employment Conditions and Health Inequalities*, Report, Geneva:

http://www.who.int/social_determinants/resources/articles/emconet_who_report.pdf

⁷¹ Loos, F and Le Deaut, J (2002) *Rapport Fait Au Nom de la Commission D'Enquête sur la Sureté des Installations Industrielles et des Centres de Recherche et sur la Protection de Personnes et de L'environnement en cas D'Accident Industriel Majeur*, Assemblée Nationale No 3559, Paris; P-36 Accident Inquiry Commission (2001) *Final Report, Inquiry Commission, Final Report*; Baker, J (2007) Report of the BP US Refineries Independent Safety Review Panel, United States; Ma, Y. de Jong, M. Koppenjan, J. Xi, B. & Mu, R. (2012) Explaining the organizational and contractual context of subway construction disasters in China: The case of Hangzhou, *Policy and Society*, 31:1, 87-103, DOI: 10.1016/j.polsoc.2012.01.001.

⁷² P-36 Accident Inquiry Commission (2001) *Final Report, Inquiry Commission* www.rootcauselive.com/Files/Past%20Investigations/Petrobras%20Oil%20Platform%20Collapse/P36%20Final%20Report.pdf; NASA Safety Center (2008) That sinking feeling, *System Failure Case Studies*, 2(8) <<http://nsc.nasa.gov/SFCS/Index/SortBydate/Descending/Page4>>.

of imminent danger until a series of gas explosions occurred.⁷³ Even a business publication pointed to a connection between Petrobras' aggressive pursuit of a non-union contractor workforce and a workforce that lacked training and experience in emergency procedures.⁷⁴ The union of Brazilian oil workers (FUP) claimed Petrobras had downsized the oil rig's workforce by almost 50 per cent (and outsourced work to contractors despite increasing production activities) and that contractors had received inadequate training and lacked both technical knowledge and knowledge as to their legal rights (including their right to withdraw or halt work when perceiving an imminent danger).⁷⁵ The issue of workers reporting incidents was also seen as central to the Texas City explosion the Baker commission finding significant deficiencies in this regard was a significant contributor to the disasters and observing:

Employees and contractors must trust that they can report incidents, near misses, and other concerns—even when it reflects poorly on their own knowledge, skills, or conduct—without fear of punishment or repercussion.⁷⁶

Similarly, the outsourcing/offshoring of heavy aircraft maintenance was linked to three fatal air crashes (subsequent research identified a fourth fatal crash, the Chalks Ocean Airways flight 101 crash in 2005)⁷⁷ and also a number of serious 'near misses' (or what would be termed HPIs in mining) in the USA between 1995 and 2009 (including two involving ValuJet aircraft in the months prior to the fatal crash of a ValuJet plane into the Florida swamp in 1996). Outsourcing aviation maintenance has been a global trend primarily driven by a desire to reduce costs and regulatory response to the emerging risk was belated to say the least not only in the USA but elsewhere including Australia where similar (but as yet not catastrophic) deficiencies were identified.⁷⁸ Contract labour has also been linked to serious hazard exposures, one example being the French nuclear industry where Thebaud-Mony found contract labour received far higher exposure to radiation than direct-employees.⁷⁹

⁷³ Pedrosa Jr, O (2002) *Analysis of the P-36 Accident in Campos Basin, Brazil*, ANP <www.slc.ca.gov/Division_pages/MFD/Prevention_First/Documents/2002/Presentation%20by%20Oswaldo%20A%20Pedrosa%20Jr.pdf>.

⁷⁴ Herper, M (2001) Disaster of the day: Petrobras, Forbes <www.forbes.com/2001/03/19/disaster.html>.

⁷⁵ ICEM News (2001) Brazilian oil workers: for safety's sake, end subcontracting now, *ICEM News*, 16 March <www.forbes.com/2001/03/19/disaster.html>.

⁷⁶ Baker, J (2007) Report of the BP US Refineries Independent Safety Review Panel, United States, 75.

⁷⁷ The other incident identified subsequently was a seaplane that lost its wing. NTSB (2007) *Accident Report: In-flight Separation of Right Wing Flying Boat, Inc (doing business as Chalk's Ocean Airways) Flight 101 Grumman Turbo Mallard (G-73T) N2969 Port of Miami, Florida December 19, 2005*, NTSB/AAR-07/04, National Transportation Safety Board, Washington DC.

⁷⁸ Quinlan, M. Hampson, I. Gregson, S. (2013c) Outsourcing and offshoring aircraft maintenance in the US: Implications for safety, *Safety Science*, 57:283-292; Quinlan, M. Hampson, I. Gregson, S. & Russell, K. (2014) Slow to Learn: Regulatory Oversight of aircraft maintenance safety in the USA, *Policy and Practice in Health and Safety*, 12(1):71-90; Gregson, S. Hampson, I. Junor, A. Fraser, A. Quinlan, M. & Williamson, A. (2015) Supply chains, maintenance and safety in the Australian airline industry, *Journal of Industrial Relations*, 57(4):604-623; Hampson, I. Junor, A. Fraser, D. & Quinlan, M. (2016) The uncertain oversight of offshore aircraft maintenance, *Journal of Air Law and Commerce*, 81(2): 225-250.

⁷⁹ Thebaud-Mony, A. (2011) *Nuclear Servitude: Subcontracting and health in the French civil nuclear industry*, Routledge, New York.

Concerns and evidence linking contract labour to poorer OHS outcomes are not new, with research pointing to this from the 1980s if not before. A series of studies of the comparatively poor safety performance on the British North Sea offshore oil industry (in comparison to Norway), including the Piper Oil Rig disaster in 1988 identified three a number of critical causal factors.⁸⁰ Carson (1982) argued that rather than technological challenges what really drove poor OHS outcomes in the British North Sea oil industry was overriding production priorities, with non-compliance with safety standards being tolerated by a government keen to maximise oil-production derived revenue.⁸¹ Another study by the North Sea oil industry undertaken by Wright found the use of contractors had undermined OHS management on the rigs as contractors were reluctant to report injuries and incidents because they were used as key performance indicators (KPIs).⁸² These findings raised more general issues about the use of KPIs to evaluate performance as well as contractor under-reporting of OHS problems identified in other industries including mining. Studies of the Piper Alpha disaster by Carson, Whyte and Woolfson⁸³ pointed to three sets of causal factors namely:

- Cost-saving measures undermined safety on the rig in terms of its design and its capacity to deal with emergencies.
- Widespread use of subcontractors weakened safety systems, including avenues for worker ‘voice’.
- Regulatory capture (the regulator overly identified with the interests of the party being regulated)

While further research investigating interconnection between these work arrangements and OHS would be valuable three sets of risk/causal factors repeatedly emerge as significant, namely

- Economic and Financial Pressures
- Disorganisation
- Regulatory Failure

It is worth identifying some salient elements of these risk factors, especially those most potentially relevant from a mining perspective particularly with regard to serious incidents/disasters, with several examples in addition to those discussed above. Table 1 provides a summary of risk factors

⁸⁰ Norway had experienced a disaster on the Alexander Kielland (123 killed) in 1980 which was followed by major regulatory changes including the imposition of stringent management system requirements and contractor management. These changes and strong labour standards legislation and substantial worker voice were seen to lead to substantial improvements. For a summary of these developments see Lindoe, P and Hanse (2000) Integrating Internal Control into Management Systems: A Discussion Based on Norwegian Case Studies, in K. Frick, PL Jensen, M Quinlan and T. Wilthagen (eds.) *Systematic Occupational Health and Safety Management: Perspectives on an International Development*, Pergamon, Amsterdam, 437-455.

⁸¹ Carson, W (1982) *The other price of Britain's oil: safety and control on the North Sea*, Martin Robertson, Oxford.

⁸² Wright, C (1986) Routine deaths: fatal accidents in the oil industry, *Sociological Review*, 34(2): 265-289; Wright, C (1994) A fallible safety system: institutionalised irrationality in the offshore oil and gas industry, *Sociological Review*, 42(1): 79-103.

⁸³ Carson, W (1989) Occupational health and safety: a political economy perspective, *Labour and Industry*, 2(2): 301-316; Whyte, D (2006) Regulating safety, regulating profit: cost-cutting, injury and death in the British North Sea oil industry after Piper Alpha in Tucker E (ed) *Working Disasters: The Politics of Recognition and Response*, Baywood, New York, 181-205; Woolfson, C (2013) From Piper Alpha to Deepwater Horizon in Nichols, T and Walters, D (eds) *Safety or Profit: International Studies in Governance, Change and the Work Environment*, Baywood, New York, 181-204.

typically linked to each element of the Pressure, Disorganisation and Regulatory Failure (PDR) model.⁸⁴ The PDR model of how work organisation factors shape OHS outcomes applies to a number of health indices (including mental health)⁸⁵ as well as safety, and is not restricted to situations of contracting or other uses of non-standard labour. Most of the risk factors identified in Table 1 can apply to incidents not involving precarious workers. The difference is that these failures/risks appear more likely and conspicuous in situations with non-standard work arrangements. For example, disorganisation is more likely at work-sites where multiple employers (with different chains of command and communication processes) are present, a problem that has attracted considerable attention in the research literature on subcontracting. The risk factors or elements are fairly self-explanatory to those familiar with OHS but a number of examples relevant to the mining context will be given below.

Table 1: Pressure, Disorganisation and Regulatory Failure Risk Factors

Economic/Reward Pressures	Disorganization	Regulatory Failure
Economic/financial pressures on work effort/cost cutting	Short tenure, inexperience	Poor knowledge of legal rights, obligations
Contingent, irregular payment and job insecurity	Poor induction, training & supervision	Limited access to OHS, workers compensation
Long or irregular work hours	Ineffective procedures & communication	Fractured/complex or disputed legal obligations
Multiple job holding/ under-employment	Ineffective OHSMS / inability to organise into unions	Non-compliance & regulatory oversight (stretched resources and poor targeting)

Economic/reward pressures refer to the economic pressures that can encourage worker and organisational behaviour to increase production to the extent or in ways that safety is compromised (for example longer hours or corner cutting on safety, including not pausing production to consider potential hazards). The financial pressure aspect relates to how irregular income or hours of work or the fears associated with job insecurity (and its implications for family budgeting, housing and the like) can affect the behaviour of workers or others in ways that compromise safety. As a number of

⁸⁴ For examples of international research applying the model (including to temporary agency/labour hire workers) see Strauss-Raats P (2019) Temporary Safety. Regulating Working Conditions inTemporary Agency Work, *Safety Science* 112: 213–222; Pilbeam C, Denyer D, & Doherty N, (2020): Safety risk factors in two different types of routine outsourced work: a systematic literature review, *Policy and Practice inHealth and Safety*, DOI: 10.1080/14773996.2020.1787701; Lippel K, & Thebaud-Mony A, (2020) Precarious Employment and the Regulation of Occupational Health and Safety: Prevention, Compensation and Return to Work in Peter Sheldon, Sarah Gregson, Russell D. Lansbury, and Karin Sanders (eds.) *The Regulation and Management of Workplace Health and Safety*, Routledge, New York, 80-99.

⁸⁵ See for example, Bohle, P. Quinlan, M. McNamara, M. Pitts, C. & Willaby, H. (2015) Health and wellbeing of older workers: Comparing their associations with Effort–Reward Imbalance and Pressure, Disorganisation and Regulatory Failure, *Work & Stress*, 29(2):114-127.

studies have observed, outsourcing/subcontracting primarily motivated by a cost-cutting objective has repeatedly compromised safety within workplaces, including transferring more hazardous activities to contractors.⁸⁶ Financial pressures, especially associated with insecure work, can encourage multiple-jobholding.⁸⁷ Research pointing to connections between economic/reward and financial pressures and poorer OHS outcomes include studies of labour hire workers.⁸⁸ Reward and financial pressures can be especially acute when workers are paid under performance-based regimes including bonuses, piecework or analogous arrangements, including subcontracting or paying truck-drivers for the number of kilometres driven (and remaining unpaid for other activities like waiting-times/queuing at warehouses etc.). Evidence of these reward/pay connections with OHS are examined in another section of the report and will not be repeated here. Contracting arrangements, especially multi-tiered subcontracting can translate into more intense pressures on successively lower levels (including businesses) as the price for the service/work progressively reduces. Further, in competitive industries the deteriorating remuneration and conditions on contract labour can flow onto to employees as has occurred in trucking in Australia through a variety of mechanisms most obviously the extension of performance-based pay (like driving distances) to employed-drivers.⁸⁹

Disorganisation refers to gaps in systems and practices that increase the likelihood of hazardous incidents. Disorganisation is not confined to organisations using contractors or other 'precarious' work arrangements but some factors, including the greater complexity associated with using these arrangements arguably make these failures more likely. Key elements of disorganisation include short tenure, inexperience, induction/training deficiencies and poor supervision. With regard to the crash of Air Midwest commuter plane crash (killing all 21 aboard) in the USA the National Transportation Safety Board (NTSB at pages 58-59) identified a series of flaws or limitations with regard to the outsourced maintenance arrangements including the short job tenure of SMART mechanics at the maintenance site; training deficiencies regarding new hires (and record keeping); and that RALLC's site manager worked a day shift and was not present at night to oversee maintenance when the work was actually being carried out. Five of the six SMART mechanics on duty the night maintenance was carried out on the ill-fated plane had worked at the site for less than eight weeks and the RALLC site manager estimated average tenure at the site was 'about three months' (NTSB at pages 58, 98).⁹⁰ All these factors increased the likelihood of errors and miscommunication. Another aspect of disorganisation is ineffective procedures and communication. The National Commission inquiry (at pages 116-124) into the Deepwater Horizon disaster found

⁸⁶ See for example Walter J, (2017) Safety management at the frontier: Cooperation with contractors in oil and gas companies, *Safety Science*, 91:394–404 at 395.

⁸⁷ As an important aside, the current pandemic has provided a graphic demonstration of the wider public health implications of large sectors of the workforce being casual/temporary/self-employed who must work to live, including casuals working in more than one aged-care facilities.

⁸⁸ See for example, Underhill E, & Quinlan M, (2011) How precarious employment affects health and safety at work: the case of temporary agency workers, *Relations Industrielles*, 66(3):397-421; Strauss-Raats P (2019)

Temporary Safety. Regulating Working Conditions in Temporary Agency Work, *Safety Science* 112: 213–222

⁸⁹ Hensher D, Batellino H, Gee J, & Daniels R, (1991) Long Distance Truck Drivers On-road Performance and Economic Reward, Research and Analysis Report. Institute of Transport Studies, Graduate School of Management & Public Policy, Sydney; Mayhew, C. & Quinlan, M. (2006) Economic pressure, multi-tiered subcontracting and occupational health and safety in the Australian long haul trucking industry *Employee Relations*, 28(3): 212-229; Rodriguez, D., Targa, F. and Belzer, M., (2006), 'Pay incentives and truck driver safety', *Industrial and Labor Relations Review*, 59(2): 205-225.

⁹⁰ Cited in Quinlan M, Hampson I and Gregson S, (2013) Outsourcing and offshoring aircraft maintenance in the US: implications for safety, *Safety Science*, 57: 283-292.

inadequate communication between BP and its contractors and sometimes its own employees, including failing to pass on safety critical information to personnel on oil rigs.⁹¹

Regulatory failure can arise from gaps or flaws in legislative coverage as well as limitations in regulatory oversight/enforcement.⁹² Changes in work arrangements, and particular contract labour, present more complex inter-organisational chains of responsibility and increase demands on regulator/inspectorate resources. The challenges associated with outsourcing tasks and contract labour including labour hire have attracted research and policy attention for over 20 years.⁹³ Problems that have been identified include poorer knowledge of and ability to exercise legislative rights amongst contract and other contingent workers, fractured/disputed regulatory obligations and more problematic regulatory oversight and stretched inspectorate resources. Research on temporary workers has found they are significantly less likely to have access to complaint mechanisms, health services, statutory entitlements to protections/benefits, return to work pathways, and representation. A Swedish study found temporary workers were less likely to raise safety issues than permanent workers and when they did raise concerns they were less likely to be treated seriously.⁹⁴ Further, the presence of precarious workers tends to weaken legislative participative mechanisms. One recent review of employee voice stated:

With precarious work becoming more common in both developed and developing economies, the prospect of increasing numbers of marginalised workers, who benefit neither from progressive HR involvement policies and practices nor from the protective activities of representative participation or indeed from representative democracy in civil society, has become very real (Standing 2011, 2014).⁹⁵

In a similar vein a Canadian study pointed to similar shifts as well as changes in economic policies, globalisation and role unions of unions:

Historically unions have successfully influenced workplace safety and protected workers' rights but under globalized capitalism, neoliberalism, the growth of employment precarity (Facey & Eakin, 2010; Lewchuk et al., 2013) and the attendant shift in the balance of power toward employers (Johnstone, Quinlan, & Walters, 2005; Scott, 2004) their power has declined (Glyn, 2006; McIlroy & Daniels, 2009; Upchurch, Martin, & Andy, 2012) and their ability to safeguard workers' health and safety has correspondingly been weakened. Likewise, workers' (participatory) rights have eroded or have been limited through weak

⁹¹ National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling (National Commission) 2011, *Deepwater: The Gulf Oil Disaster and the Future of Offshore Drilling*, Report to the President, Washington DC <www.oilspillcommission.gov/final-report>.

⁹² See for example Quinlan M, Johnstone R & McNamara M, (2009) Australian health and safety inspectors' perceptions and actions in relation to changed work arrangements *Journal of Industrial Relations* 51(4): 559-575.

⁹³ See for example Johnstone R, Quinlan M & Mayhew C, (2001) Outsourcing Risk? (2001), The regulation of OHS where contractors are employed, *Comparative Labor Law and Policy Journal*, 22(2&3): 351-93; Johnstone, R. & Quinlan, M. (2006) The OHS Regulatory Challenges of Agency Labour: Evidence from Australia *Employee Relations*, 28(3): 273-289.

⁹⁴ Aronsson, G. (1999) Contingent Workers and Health and Safety, *Work, Employment and Society*, 13(3): 439-459.

⁹⁵ Hyam J, (2018) *Employee Voice and participation, contested past, troubled present, uncertain future*, Routledge, London, 3.

enforcement of legislation (Morgenson, 2006; Reshef, 2007; Swimmer & Bartkiw, 2003; Tucker, 2003).⁹⁶

This evidence sets a context for a later section of this report which examines safety representative mechanisms and the impact of changed work arrangements.

Inquiries, policy debates and regulatory responses

Concern with the effects of changed work arrangements (including temporary work, contracting and labour hire/agency labour), including in terms of OHS, have prompted a number of government inquiries and government commissioned reports in Australia, New Zealand, Canada, the European Union, the UK and indeed many countries. This includes the challenges posed to regulators such as a report prepared for the European Commission in 2011 after concerns expressed by the body representing inspectorates in Europe.⁹⁷ In the building industry alone subcontracting has been subject of a number of state and federal government inquiries stretching back well over 30 years. It is beyond the scope of the report to provide even a brief summary of all these reviews as far as they pertained to OHS although they are indicative of longstanding concerns.

However, given background to this report it is worth making a few observations about inquiries into labour hire conducted by a number of Australian states, including Queensland, which may be informative or of value. Reports on or inquiries into labour hire, including its implications for OHS, are not new, with a report being prepared for the NSW Department of Industrial Relations in 2000 for example and every state having conducted inquiries or made regulatory changes dealing with labour hire by 2004.⁹⁸ In 2016 the Queensland Office of Industrial Relations issued a discussion paper on labour hire as part of an inquiry prompted by disturbing reports of the exploitation of these workers (especially those working under temporary visa arrangements).⁹⁹ In identifying the concerns raised in relation to labour hire the discussion paper observed:

The nature of labour hire work leads to a number of concerns. Professor Elsa Underhill, in a submission to the Productivity Commission review of the national workplace relations system, noted that:

- labour hire workers, in Australia and overseas, receive a lower hourly rate of pay than comparable direct hire workers;

⁹⁶ Facey M, MacEachen E, Verma A, & Morales K, (2017) The everyday functioning of joint health and safety committees in unionized workplaces: a labour perspective, *Policy and Practice in Health and Safety*, 15(2):160-173, DOI:10.1080/14773996.2017.1341595

⁹⁷ Cardiff University et al, (2011), *Contract to assess the potential impact of emerging trends and risks on labour inspection methodologies in the domain of occupational health and safety (the NERCLIS* Project)*, Report prepared for the European Commission, Luxembourg, <http://www.cf.ac.uk/cwerc/reports/NERCLIS%20Vol%201%20FINAL.pdf>

⁹⁸ Watson I, (2000) *Labour hire in NSW - an issues paper*, Australian Centre for Industrial Relations Research and Training, University of Sydney. For a summary of early inquiries see O'Neil S. (2004) *Labour hire: issues and responses*, Economics, Commerce and Industrial Relations Group Research Paper No. 9 2003–04, Department of Parliamentary Services, Canberra.

⁹⁹ Office of Industrial Relations, (2016) *Regulation of the Labour Hire Industry 2016: Issues Paper*, Queensland Government, Brisbane. See also Office of Industrial Relations, (2017) *Labour Hire Licensing Scheme Decision Regulatory Impact Statement March 2017*, Queensland Government, Brisbane.

- labour hire workers, in Australia and overseas are more likely to be injured at work, compared to direct hire workers;
- Australian and international research shows that the main reason organisations use labour hire workers is to reduce labour costs and increase flexibility;
- injured labour hire workers, in Australia and overseas, are less likely to be offered employment post-injury than permanent employees;
- labour hire workers overwhelmingly would prefer to be employed directly rather than work for a labour hire employer; and
- there is little evidence internationally that non-standard employment creates a stepping stone to more secure employment.

A good part of the reason for the poorer labour market outcomes for labour hire employees lies in the insecurity of employment. This makes workers vulnerable to exploitation but also less likely to speak up about their concerns for fear of losing their job, and, in the case of temporary visa workers from overseas, jeopardising their prospects of staying in the country.¹⁰⁰

The discussion paper made no reference to the mining industry. The Finance and Administration Committee Parliamentary Committee inquiry issued its report in June 2016 which found serious exploitation of labour hire workers was occurring and legislation (the *Labour Hire Licensing Bill 2017*) was introduced with the stated objective of protecting ‘labour hire workers from exploitation and restore confidence in the labour hire industry through the regulation of providers of labour hire services in Queensland’ most notably by imposing a licensing scheme.¹⁰¹ Moves to license the industry were not confined to Queensland but had occurred in other states (a practice also adopted in a number of other countries). Unlike the discussion paper, the Report made several references to mining, noting mining was one of number of industries that labour hire arrangements had expanded into mining and its specific use there including ‘a labour hire company being contracted to perform the daily running of a mining operation on behalf of a mining leaseholder’ while the Australian Mines and Metals Association (AMMA) and Queensland Resources Council (QRC) argued that labour hire was a longstanding industry practice.¹⁰² The report added ‘many mining operators have moved to predominantly labour hire workforces in recent years with the stated aim of reducing overheads and increasing workforce flexibility – especially in major Bowen Basin operations stretching from Biloela to Blackwater and Moranbah.’¹⁰³ With regard to OHS the parliamentary report made no specific reference to mining but did point to a number of general problems referred to elsewhere in this report, including the of raising OHS concerns:

The Committee heard that some workers are employed on a labour hire basis for several years in the same role. Due to the casual nature of their employment, many of the workers are afraid to complain about safety issues at work and are afraid to take sick leave for fear of

¹⁰⁰ Office of Industrial Relations, (2016) *Regulation of the Labour Hire Industry 2016: Issues Paper*, Queensland Government, Brisbane, 47.

¹⁰¹ Finance and Administration Committee (2016), *Inquiry into the practices of the labour hire industry in Queensland*, Report No. 25, 55th Parliament, Queensland, Brisbane.

¹⁰² Finance and Administration Committee (2016), *Inquiry into the practices of the labour hire industry in Queensland*, Report No. 25, 55th Parliament, Queensland, Brisbane, 5, 9, 11.

¹⁰³ Finance and Administration Committee (2016), *Inquiry into the practices of the labour hire industry in Queensland*, Report No. 25, 55th Parliament, Queensland, Brisbane, 12.

losing their jobs. Some workers advised the Committee that they consider the labour hire industry to equate to a trade in humans to the convenience of the employers.¹⁰⁴

The Victorian Labour Hire Inquiry Report referred to earlier in this section of the report included extensive evidence on labour hire, including the fears of those reporting safety concerns and poor responses when they did. This included some evidence from workers in mining, oil and extractive activities like the following:

An anonymous worker from the mining, oil and gas industry submitted that:

If the job is unsafe, nothing is said because the phone will never ring again for work. You get told the safety rules but on the job that's a different story. Contractors and night shift will get any job done.

Labour hire worker Harry Marshall submitted that he had raised a safety issue with his supervisor. The employer reproached him for raising safety concerns. That weekend the labour hire agency sent him a text message telling him not to come back on the following Monday.¹⁰⁵

Concluding the OHS evidence the Inquiry Report stated:

The evidence presented to the Inquiry shows that injury rates for labour hire workers are higher than for other Victorian workers; and that there is in some instances a lack of cooperation on the part of hosts with return to work arrangements for injured labour hire workers.¹⁰⁶

2.2 Mining

International Research

Concerns about the adverse OHS effects of increasing contractor and other contingent work arrangements in mining are not new. A 1995 Swedish study found that an apparent improvement in safety in the Swedish mining industry was actually due to the growing contractor workforce that was not counted as mining employees. Further, contract workers experienced more frequent and severe injuries.¹⁰⁷ A recent PhD thesis on safety on multi-employer mine sites echoed these earlier findings, namely contractors undertook a significant amount of work in mining and sustained more frequent

¹⁰⁴ Finance and Administration Committee (2016), *Inquiry into the practices of the labour hire industry in Queensland*, Report No. 25, 55th Parliament, Queensland, Brisbane, 17.

¹⁰⁵ Forsythe, A. (2016) *Victorian Inquiry into the Labour Hire Industry and Insecure Work: Final Report*, Industrial Relations Victoria, Department of Economic Development, Jobs, Transport & Resources, Melbourne, 136.

¹⁰⁶ The Inquiry made reference to economic/reward pressures, disorganisation and regulatory failure in OHS especially but also other areas of non-compliance, mainly drawing on my work with Elsa Underhill. In addition to Underhill others making submissions referred to pressures and regulatory failure including Dr Jill Murray. Forsythe, A. (2016) *Victorian Inquiry into the Labour Hire Industry and Insecure Work: Final Report*, Industrial Relations Victoria, Department of Economic Development, Jobs, Transport & Resources, Melbourne, 146.

¹⁰⁷ Blank, V. Andersson, R. Linden, A. and Nilsson, B. (1995) Hidden Accident Rates and Patterns in the Swedish Mining Industry due to the Involvement of Contract Workers, *Safety Science*, 21(1):23-35.

and serious injuries (based on an analysis of Swedish injury statistics).¹⁰⁸ The main focus of the thesis was in examining the reasons for this, including disorganisation and blurred organisational boundaries. The research methods used for this was a detailed case study based on extensive documentary analysis, interviews, multiple visits to a mine-site over 18 months (including attending and observing meetings and making field notes), industry level workshops, and 26 interviews with mine managers, safety and operations specialists, safety managers, supervisors and others working for the mine, its 10 contractors and a subsidiary. The thesis found:

As for the relations between the mining company and the contractors, these were characterized by an asymmetry of power with a difference between being affiliated to the company or a contractor in terms of the status and rights each affiliation entailed. This ultimately had an impact on contractor managers' and supervisors' ability or willingness to communicate with the client on safety-related issues...An overall conclusion can be drawn that the dynamic, unfolding relations between the client and its contractors complicate the division of and adherence to legal responsibilities for safety management. This is a particular challenge facing policy and regulatory development going forward, not only in relation to the mining industry but on multi-employer worksites in general where workplace safety is especially important to consider.¹⁰⁹

With regard to disorganisation and the complexities associated with this, including efforts to manage it, Nygren found:

A conclusion is drawn that the challenges that have been identified by the participants in the study overall correspond to certain disorganization effects emerging as a consequence of outsourcing – issues that also have been identified in various industry sectors worldwide (see Milch & Laumann, 2016; Quinlan & Bohle, 2008).

However, these initiatives can also be viewed as a matter of clarifying the conditions for boundary-spanning agents in inter-organizational contracting, i.e. the role certain individuals have in maintaining inter-organizational relations and which can be found on both sides of a given contract. These roles have been conceptualized as primarily being something formal in the sense that they have been defined in relation to the legal requirements. Although this may reduce some of the negative effects of disorganization, a one-sided focus on formality where one of the organizations, i.e. the client company, also is in a dominant position may not necessarily lead to open and candid communication and trusting relations in the end – a lack of which has shown to be problematic when it comes to safety in multi-employer arrangements (Milch & Laumann, 2016). Rather, it may lead to a certain distance in the relations with increased pressures being placed on the boundary-spanning agents on the

¹⁰⁸ Nygren M, (2018) Safety Management on Multi-Employer Worksites: Responsibilities and Power Relations in the Mining Industry, PhD thesis, Luleå University of Technology, Luleå, v-vi, 13-16.

¹⁰⁹ Nygren M, (2018) Safety Management on Multi-Employer Worksites: Responsibilities and Power Relations in the Mining Industry, PhD thesis, Luleå University of Technology, Luleå, v-vi. As is a common practise in a number of European countries components of the thesis are published as a series of refereed journal articles. At the time the thesis itself printed/published three papers had been submitted to journals and a further paper had been published, Nygren M, Jakobsson M, Andersson E, & Johansson B, (2017) Safety and multi-employer worksites in high-risk industries: An overview. *Relations Industrielles/Industrial relations*, 72(2): 223–245.

often dominant, client side of the relationship to ensure that the counterpart organization comply with the formal requirements. However, complicating matters further, the increased focus on the duties of boundary-spanning agents on the client side can also place extra pressure on the work these individuals perform out at the “frontline” in terms of making sure that the work conducted by contractors operates smoothly and within the scheduled time frame. This, in turn, may make it more likely for these individuals to, directly or indirectly, take charge of matters that contractor employers in actuality are legally responsible for as a means of ensuring that deadlines are held and production activities are not disturbed.

An overall conclusion is drawn in the paper that further research should hone in on the consequences of implementing changes where the client company contractor relations become dictated and characterized by strict and formal legal requirements, focusing specifically on the consequences of this for the boundary-spanning agents that ultimately are responsible for upholding a given contract and maintaining inter-organizational relations.¹¹⁰

A South African study published in 1999 (mainly based on interviews and examination of regulation and other documentary materials) argued that the recent renewed growth of subcontracting of mining operations (which had been common prior to 1920), and with regard to core activities in particular had serious implications for the mining industry to improve OHS standards and was also liable to fracture relations amongst different groups of workers and consequently greater instability in the industry.¹¹¹ Interviews cited referred to contractors being deployed in more dangerous tasks, a lack of mixing between contractors and employees, and more problematic access to medical treatment, compensation or being dismissed when injured. The evidence was illustrative and not statistically validated. However, a November 2010 report on mine safety prepared for the South African Mine Health and Safety Council, based on extensive interviews and site visits confirmed that contractor safety was a significant issue – echoing an earlier report on NSW mining *Digging Deeper* referred to elsewhere in this report.¹¹² This concern was repeated in a further South African study which concluded:

Precarious subcontracted work, illegal mining and the divisive scourge of inter-union rivalry are currently serious threats to life and limb that some mineworkers must face in addition to their harsh conditions of underground mining. The venerable tradition of occupational safety and health simply must be seen as needing to assume new conceptual, practical and political dimensions.¹¹³

¹¹⁰ Nygren M, (2018) Safety Management on Multi-Employer Worksites: Responsibilities and Power Relations in the Mining Industry, PhD thesis, Luleå University of Technology, Luleå, v-vi, 48-49.

¹¹¹ Kenny B, & Bezuidenhout A, (1999) Contracting, complexity and control: An overview of the changing nature of subcontracting in the South African mining industry, *The Journal of The South African Institute of Mining and Metallurgy*, July/August, 185-192.

¹¹² Shaw Idea (2010) *Changing Minds, Changing Mines*, Final Report to the Mine Health and Safety Council of South Africa.

¹¹³ Stewart P, Bezuidenhout A, & Bischoff C, (2019) Safety and health before and after Marikana: subcontracting, illegal mining and trade union rivalry in the South African mining industry, *Review of African Political Economy*, DOI:10.1080/03056244.2019.1679103

Another South African study examined the incidence of silicosis amongst Black contract goldminers, suggesting changes in job tenure and an ageing workforce might have a role in changes.

Unfortunately, because the workforce surveyed was almost if not entirely contract (apparently the norm in goldmining) the study didn't include comparisons with employed workers.¹¹⁴ Nevertheless, the study was worth raising in the context of the re-emergence of pneumoconiosis amongst Queensland and NSW coalminers and to indicate that differences in OHS indices between contract and employee workers might not be confined to injuries (consistent with the general research literature on contracting and precarious work discussed earlier).¹¹⁵ The importance of recognising this is reinforced by a more recent South African study pointing to the greater problems of hazard exposure/disease surveillance associated with regard to a contractor workforce.¹¹⁶

A number of studies have examined whether contractors were at greater risk of being fatally injured in mines, mainly in the USA but with some Australian and South African studies. The results of these studies are summarised below for US and Australian studies respectively in chronological order of when the study was published.

A study of fatal and non-fatal injury rates amongst operator and contractor employees in US mines (coal and non-coal) between 1983 and 2003 was undertaken by Karra (published 2005) using Mine Safety and Health Administration (MSHA, the federal US mine regulator) data.¹¹⁷ Karra used frequency rates (adjusted for hours worked) which is a more reliable indicator of relative risk than incidence rates (injuries per thousand workers) because it takes account of the amount of hours worked which may be especially important in measuring differences between contractor and operator employees because they may work different hours (similar safeguards apply to most studies discussed below). Overall, Karra found the mean injury rate declined 1.69% annually over the period and the mean injury rate for surface work was 52.53% lower than that of underground work. Compared to the Coal Operator mean injury rate the Non-Coal Contractor rate was 30.34% lower, the Metal Operator rate 27.18% lower, the Non-Metal Operator rate is 37.51% lower, the Stone Operator rate was 23.44% lower, the Sand and Gravel Operator rate was 16.45% lower, and the Coal Contractor rate was 1.41% lower. With regard to fatality rates (using Poisson regression model) Karra found the mean fatality rate declined 3.17% annually over the period and the rate for surface work was 64.3% lower compared to underground work. Compared to the Coal Operator mean fatality rate the Coal Contractor rate was 129.54% higher, the Non-Coal Contractor rate was 234.81% higher, the Stone Operator rate 8.29% higher, the Sand and Gravel Operator rate 60.32% higher while the Metal Operator rate was 5.79% lower and the Non-Metal Operator rate was 47.36% lower.

¹¹⁴ Churchyard G, Ehrlich R, teWaterNaude J, Pemba L, Dekker K, Vermeijs M, White N, & Myers J, (2004) Silicosis prevalence and exposure-response relations in South African goldminers, *Occupational and Environmental Medicine*, 61:811–816, doi:10.1136/oem.2003.010967.

¹¹⁵ For a study of subcontracting and hazardous substance exposure see Thebaud-Mony, A. (2011) *Nuclear Servitude: Subcontracting and health in the French civil nuclear industry*, Routledge, New York.

¹¹⁶ Ehrlich R, Montgomery A, Akugizibw P, & Gonsalves G, (2018) Public health implications of changing patterns of recruitment into the South African mining industry, 1973–2012: a database analysis, *BMC Public Health*, 18:93, DOI 10.1186/s12889-017-4640-x

¹¹⁷ Karra, V. (2005) Analysis of non-fatal and fatal injury rates for mine operator and contractor employees and the influence of work location, *Journal of Safety Research*, 36:413-421.

Six years later (2011) Pappas and Mark published a study. Noting that the doubling of contractors employed in underground coalmines in the USA had created much speculation about its effects on injury rates, they pointed to limitations in MSHA data which did 'not assign contractor hours to the individual mining operations where they worked' (which makes it difficult to calculate injury frequency rates of contractors).¹¹⁸ In an effort to shed more light on contractor safety the federal OHS research agency - the National Institute for Occupational Safety and Health (NIOSH) made a detailed examination of the MSHA database. The study was in two parts. The first compared overall contractor and operator trends 1983-2009 on employment, hours worked and injury rate, finding 'larger contractors tended to have higher injury rates than the smaller ones' which it recognised was surprising since safety records are typically worse amongst smaller operators (generally not just mining). The second part of the study made a detailed examination of the role of contractors in safety records of 10 large underground coalmines in 1992-2007, comparing injury rates (based on estimated contractor hours). The study found contractor injury rates were significantly higher at most of the operations studied but that industry-wide data indicated contractor and operator injury rates converged after 2005 to reach equivalence by 2009. A subsequent study by Buessing and Boden (see below) was critical of aspects of this study's methodology. This included biasing results by excluding contractor-operated mines without injuries and the failure to take full account of the size effects of operations (contractor operated mines were generally smaller and smaller mines 'tend to have higher injury rates').¹¹⁹

A study by Muzaffar et al published in 2013 used Mine Safety and Health Administration (MSHA) records (cross-sectional data on 157,410 miners employed by operators or contractors between 1998 and 2007). Operator was defined as 'an owner or other person who controls or supervises a mine, while a contractor is a person or organization that contracts to perform services or construction at a mine.' As in Australia the authors noted a shift to using contractors in the period 1997-2006 (contractor numbers increasing 41% while those employed by operators fell by 5%). The study found univariate odds of fatal accidents versus non-fatal accidents amongst miners employed by contractors were 2.8 times higher than those amongst those directly employed by mine operators while in a multivariate model 'fatality was associated with contractor, less experience at the current mine, and occurrence at more than 8 hours into the workday.' Odds of fatal accidents were higher in underground operations for metalliferous mines but the reverse applied to coalmines (overall, odds of fatal accidents were higher in surface mines). Contractors had higher odds of fatal accidents in both coal and non-coal mines. They concluded that contractors had a higher proportion of fatal injuries and fatalities also varied by mine experience, the number of hours worked prior to injury, work location and mine type.¹²⁰ The authors observed that the differences between contractors and operators warranted exploration to identify contributory factors while also expressing concern at incomplete reporting particularly among fatal cases involving contractors. Drawing on their findings the authors suggested possible interventions could include 'work hour restrictions, particularly for those working night shifts; targeted safety training focusing on

¹¹⁸ Pappas D, & Mark C, (2011) A deeper look at contractor injuries in underground coal mines, *Mining Engineering*, 63(11):73–79.

¹¹⁹ Buessing, M. & Boden, L. (2016) The Impact of Contract Operations on Safety in Underground Coal Mines, *Journal of Occupational and Environmental Medicine*, 58(9):952.

¹²⁰ Muzaffar, S. Cummings, K. Hobbs, G. Allison, P. & Kreiss, K. (2013) Factors Associated With Fatal Mining Injuries Among Contractors and Operators, *Journal of Occupational and Environmental Medicine*, 55(11): 1337-1344.

mechanisms of the most common accident types, particularly among contractors in surface mining; raising awareness of miners' rights to voice safety concerns to the MSHA and the means by which to do so; and reassessment of working conditions in higher-risk areas along with enhanced inspections and enforcement of existing safety requirements.¹²¹

In 2014 Buessing and Weil published a working paper on the impact of contracting on safety in coalmining.¹²² As a working paper the results were preliminary and findings do not warrant the weighting of peer-reviewed journal articles or academic books (proposal for which are also peer-reviewed prior to publication). As such, it is an exception to the research examined in this section but was included because it directly pertains to the issue being considered and was followed up by peer-reviewed publication including one of the authors. Like others Buessing and Weil drew on official MSHA data on injuries and fatalities for the period 2000-10 together with information on mining methods, geologic characteristics, union status, size of mine and controller, and prior history of safety-law violations. They noted contracting companies commonly performed riskier activities (like construction and blasting) and that some contractors were in riskier situations than others (like engineers). Their overall conclusion was 'preliminary results suggest increased risk exposure for contract operations and mines with high contractor utilization.'¹²³

A subsequent study by Buessing and Boden (published 2016 in the *Journal of Occupational and Environmental Medicine*) compared injury rates for operator and contractor underground coalmines in the US state of Kentucky between 1999 and 2013.¹²⁴ The authors identified mines operated by contractors from MSHA contractor data and surface reclamation permit data and estimated injury rates 'controlling for mine and controller characteristics available from MSHA and the Energy Information Administration (EIA).'¹²⁵ Given the very small number of large contractor operated mines (ie more than 60 full-time employee [FTE] equivalents) the authors were not able to compare them with large operator run mines. The authors found 'contractor-operated mines with '15 or fewer full-time equivalent workers (FTEs) had a statistically significant 57% higher covariate-adjusted reported traumatic injury rate than similar mines without contract operators. Larger contractor-operated mines did not have a statistically significant elevated rate.'¹²⁶ Buessing and Boden concluded they had identified a significant elevation of traumatic injury rates only among the smallest contractor-operated mines, though one warranting attention. They also found that unionized mines had significantly lower traumatic injury rates than non-union mines, adding that on:

¹²¹ Muzaffar, S. Cummings, K. Hobbs, G. Allison, P. & Kreiss, K. (2013) Factors Associated With Fatal Mining Injuries Among Contractors and Operators, 1344.

¹²² Buessing, M. & Weil, D. (2014) Impact of Contracting on Occupational Injuries and Fatalities in Underground Coal Mining, Boston, MA: Boston University, Department of Economics, 1–32.

¹²³ Buessing, M. & Weil, D. (2014) Impact of Contracting on Occupational Injuries and Fatalities in Underground Coal Mining,1.

¹²⁴ Buessing, M. & Boden, L. (2016) The Impact of Contract Operations on Safety in Underground Coal Mines, *Journal of Occupational and Environmental Medicine*, 58(9):952-956.

¹²⁵ Buessing, M. & Boden, L. (2016) The Impact of Contract Operations on Safety in Underground Coal Mines, 952.

¹²⁶ Buessing, M. & Boden, L. (2016) The Impact of Contract Operations on Safety in Underground Coal Mines, 952.

December 31, 2014, Kentucky's last unionized mine shut down. Without the added protection that unions offer, the risk of injury is likely to increase unless operators and regulators increase their focus on injury prevention.¹²⁷

These observations may have some relevance if as, some studies have suggested, the shift to contract labour has weakened union presence in the Australian coalmining industry. At least, the association warrants consideration.

In 2019 a study published in *Occupational and Environmental Medicine* by Friedman et al used MSHA data for the period 1983-2015 examined the effect of the shift to longer working hours (typically 10-12-hour shifts) in US coalmining on injury.¹²⁸ Examining all shifts of over 9 hours, the study found that long-hour injuries as a proportion of total injuries rose from 5.5% in 1983 to 13.9% by 2015. The study found long working hour injuries were associated with a higher odds of death (Odds Ratio or OR=1.32) and single incidents resulting in two or more workers injured (OR=1.73). Specific risk factors associated with long hours identified in the study included irregular shift starts, being newly employed (ie short job tenure), employment by a contractor, metal/non-metal operations and mines with fewer than 100 employees. Overall, the results for metalliferous mines were worse than coalmining and given the purpose of the report it is important to note the authors' observations in this regard:

The MSHA Part 50 injury and illness reports showed that employees in coal mining compared with employees of other commodities were less likely to be employed by contractors (6.9% vs 7.9%; p<0.001), have irregular shift starts (6.4% vs 10.2%; p<0.001) or involve employees with less than 2 years of experience at the mine (31.0% vs 34.4%). Coal mining employees compared with metal/non-metal employees also had more mining years of experience on average (13.1 vs 9.4 years). In addition, the increase in the proportion of long working hour-related injuries appears to be static since 1995 among coal mining employees (figure 1). While the various risk factors listed above are significantly lower among coal workers, the differences are not pronounced. This indicates that the explanation for the lower observed risk among coal mining employees is likely attributable to multiple factors including the fact that coal mines tend to employ two to three times more workers on average compared with metal/non-metal operations. Prior studies have shown that smaller operations have higher injury rates. The present study showed that mining operations with fewer than 20 employees were the most strongly associated with long working hour-related injuries. It is unlikely that coal mining is a safer mining process, but rather that it presently has fewer risk factors within the industry.¹²⁹

Friedman et al's overall conclusion was that:

¹²⁷ Buessing, M. & Boden, L. (2016) The Impact of Contract Operations on Safety in Underground Coal Mines, 956.

¹²⁸ Friedman L, Almberg K, & Cohen R, (2019) Injuries associated with long working hours among employees in the US mining industry: risk factors and adverse outcomes, *Occupational and Environmental Medicine*, 76:389-395. doi:10.1136/oemed-2018-105558

¹²⁹ Friedman L, Almberg K, & Cohen R, (2019) Injuries associated with long working hours among employees in the US mining industry: risk factors and adverse outcomes, *Occupational and Environmental Medicine*, 76: 394.

Long working hour injuries were associated with a lack of routine, being new at the mine and specific mining activities. An international shift towards using contract labour and extended workdays indicates that injuries during long working hours will likely continue to grow as a problem in the mining industry.¹³⁰

The Friedman et al study also referred to other potential risk factors related to disorganisation (see earlier discussion) notably shorter job tenure and lower experience which may also be connected to the use of contractors (if not smaller operation size too). However, again the Friedman et al study points to an association finding that should be followed up in the Queensland context, noting that amongst 'those working for operators, 34.6% injured during long working hours had been employed at the mine for less than 2 years compared with 73.3% of those employed by contractors.'¹³¹

Before proceeding to examine Australian studies two observations should be made.

First, a particular value of the Friedman study was that it examined the growth of both longer hours and contracting arrangements - a trend also to be found in Queensland and Australia more generally. It raises the potentially important issue as to whether one of the risk factors associated with contracting is its direct and indirect effects on working hours in the mining industry given that long hours have long been recognised as a risk factor for workplace injuries.¹³² There is evidence that contract labour worked longer hours in mining than direct-employees in metalliferous mining in NSW (although the cited study found the reverse applied in coalmining) and hours-worked were, on average longer in large coal and metalliferous mines. There is also evidence of flaws in the monitoring of working hours as mine-site was also identified (including some contractors moving to work at a second site after completing work at one site), which means amongst other things differences in working hours might be greater than those recorded.¹³³ While smart-cards were seen as a solution there were limitations regarding some types of contractors, with one coal supervisor stating that this 'wouldn't work for electrical contractors because they work outside the mining industry too.'¹³⁴ A coalmine manager stated:

Contractors have time sheets and a swipe on system, keeping track of hours is a function of downloading. We can do a download of the hours of contractors. We'd have to get a printout from the system. That's not been done.¹³⁵

Studies cited in the previous section on the extent of and reasons for contracting argued the association between contracting and the growth of working hours (in terms of shift lengths) is not just coincidental and this aspect warrants further investigation. The *Digging Deeper* report found

¹³⁰ Friedman L, Almberg K, & Cohen R, (2019) Injuries associated with long working hours among employees in the US mining industry: risk factors and adverse outcomes, *Occupational and Environmental Medicine*, 76:389.

¹³¹ Friedman L, Almberg K, & Cohen R, (2019) Injuries associated with long working hours among employees in the US mining industry: risk factors and adverse outcomes, *Occupational and Environmental Medicine*, 76:391.

¹³² See for example, Dembe A, Erickson J, Delbos R, & Banks S, (2005) The impact of overtime and long work hours on occupational injuries and illnesses: new evidence from the United States, *Occupational and Environmental Medicine*, 62:588-597; doi: 10.1136/oem.2004.016667.

¹³³ For evidence on hours worked and monitoring deficiencies see Shaw Idea (2007a) *Digging Deeper: Wran Consultancy Project No 1*, Vol 1 Commissioned by Mine Safety Advisory Council, NSW Department of Primary Industries, Sydney, x-xi, 91.

¹³⁴ Shaw Idea (2007a) *Digging Deeper: Wran Consultancy Project No 1*, 99.

¹³⁵ Shaw Idea (2007a) *Digging Deeper: Wran Consultancy Project No 1*, 100.

evidence of differences in working and related commute-time arrangements between contract-labour and direct-employees:

For a number of sites, rosters for contractors differed from permanent employees and were based on FIFO or DIDO. When individuals either fly in or drive in to site for an extended stay a number of issues arise. Firstly, FIFO or DIDO rosters are often associated with an increase in the number of consecutive shifts due in part to the fact that contractors do not want to stay in the area or on the site any longer than necessary. If sleep is not adequate between work periods a sleep debt accrues and with each consecutive shift the risk increases. Further, the accommodation is a major determinant of the quality and quantity of sleep obtained in these circumstances and should also be taken into account in a risk assessment of rosters and fatigue. In this light, the reported use of 'hot-bedding', where two workers working opposite shifts share one bed in such circumstances is concerning. Such an arrangement would make it difficult to set up the sleeping quarters to meet individual needs, which is critical to maximising sleep opportunity.¹³⁶

At some mine-sites coal contractors noted that reporting fatigue was encouraged.¹³⁷ Mine contractors working at multiple sites wanted more consistency regarding working rules and safety systems, a view echoed by some mine staff including a maintenance supervisor.¹³⁸ The report found employee views were significantly influenced by the degree to which mines' OHSMS including induction/training, planning of work activities, provision of equipment, communication and contractor management was proactive or reactive.¹³⁹

Second, the hour-related issues just identified indicate the collection of accurate data on working hours of direct-hire and contract labour at Queensland coalmines (both disaggregated and aggregate data) is important and a detailed audit of hours worked at particular sites and by different categories of mineworkers reported to the Queensland Department would benefit from rigorous episodic auditing if this isn't already occurring. Related to this point, almost all US research comparing contractor and operator-employee injuries in coalmining have used the MSHA database. It appears that, notwithstanding its limitations, the relatively comprehensive MSHA dataset has proved valuable in providing evidence on the connection between use of contractors and variations in injury rates. Some of the gaps have been offset using other government datasets which might also be done in the Queensland context. United States research also indicates the value of having job-tenure data and the value of tracking contract workers in terms of better charting exposure to hazardous substances is evident from South African research referred to above.

Australian and New Zealand Research

As far as could be determined there has been limited research into whether the use of contract labour has affected OHS outcomes in Australian and New Zealand mining although the issue has been debated for some time (see below). Given the limited number of studies, and to better inform the Board of research/exploration of the issue undertaken by investigative reviews and

¹³⁶ Shaw Idea (2007a) *Digging Deeper: Wran Consultancy Project No 1*, 114.

¹³⁷ Shaw Idea (2007a) *Digging Deeper: Wran Consultancy Project No 1*, 120.

¹³⁸ Shaw Idea (2007a) *Digging Deeper: Wran Consultancy Project No 1*, 160.

¹³⁹ Shaw Idea (2007a) *Digging Deeper: Wran Consultancy Project No 1*, 178-180.

commissioned reports discussion of these reports is included in this subsection along with published research.

One Australia academic study examined the transition away from contract labour and identified a disorganisation problem during the transition. Bahn undertook a study of an underground metalliferous mine in Western Australia that moved from contractor (with a mix of contractor and in-house staff on-site) to be entirely owner operated. She found that the shift led to a number of clear improvements in ‘safety culture’ including a significant drop in work-related injury statistics, clarity in supervisor roles who actively monitoring crews worked safely and staff ‘were actively addressing work-place hazards.’ At the same time, the study found using both contractor workers and ‘in-house’ workers ‘under different safety regimes was problematic. The problems don’t occur due to the contractor’s safety systems being less robust than the parent company’s or that contract workers are themselves less safe; it is the added complexity of managing multiple safety regimes and the lack of trust of the robustness of each system that create conflict.’¹⁴⁰

The long hours issue mentioned is not an outcome of disorganisation but arguably the pursuit of production. Long hours raise a series of significant OHS issues, not just the fatigue-related increased injury incidence. This review was not asked to consider the general issue of working hours and its effects on health, safety and wellbeing upon which there is a vast research literature. Rather, the focus was on any OHS issues connected to contract labour/labour hire and associated changed work arrangements. Long shift and long weekly hours are prevalent in mining and the OHS issues related to this (including fly-in-fly-out or FIFO) have been examined by a number of government reports and at least one industrial tribunal case over the introduction of 12-hour shifts at the North Goonyella mine heard by the Coal Industry Tribunal (the post-decision evaluation was not completed due to the abolition of the Coal Industry Tribunal).¹⁴¹

Another study to examine contract labour and safety was undertaken by Lamare et al with regard to the Pike River mine disaster drawing on Royal Commission findings and other evidence.¹⁴² At the time of the disaster 80 of the 200 workers at the Pike River mine were contractors or their employees working in various capacities (maintenance, support and operational) and under arrangements already identified by this report. Almost half of the 29 killed (13) were contractors. Lamare document the complex subcontracting arrangements at Pike River and the contractual

¹⁴⁰ Bahn, S. (2013), Moving from contractor to owner operator: impact on safety culture – a case study, *Employee Relations*, 35(2): 157-172.

¹⁴¹ Shaw Idea (2007a) *Digging Deeper: Wran Consultancy Project No 1*, Vol. 1 Commissioned by Mine Safety Advisory Council, NSW Department of Primary Industries, Sydney; Education and Health Standing Committee (2015) *The impact of FIFO work practices on mental health: Final Report*, Legislative Assembly of Western Australia Report No.5, Perth; Bohle P, Expert witness for the United Mine Workers Union in proceedings before the Coal Industry Tribunal concerning the health and safety implications of the introduction of 12-hour shifts at the North Goonyella underground coal mine, 1993-1994 and *Coal Industry Tribunal* (June 1994) In the matter of an industrial dispute or matter wherein North Goonyella Coal Mines Limited and Construction, Forestry, Mining and Energy Union (UMW Division) and others are parties. (No 111 of 1993) No 362 of 1993; In the matter of an industrial dispute or matter wherein North Goonyella Coal Mines Limited and Construction, Forestry, Mining and Energy Union (UMW Division) and others are parties. No 192 of 1994. See also Joyce S, Tomlin S, Somerford P, & Weeramanthri T, (2013) Health behaviours and outcomes associated with Fly-in Fly-out and Shift workers in Western Australia, *Internal Medicine Journal*, 43(4):440-444.

¹⁴² Lamare R, Lamm F, McDonnell N. & White H, (2015) Independent, dependent, and employee: Contractors and New Zealand’s Pike River Coal Mine disaster, *Journal of Industrial Relations*, 57(1):73-92.

arrangements that made these workers more vulnerable than direct-employees in terms of their job security.¹⁴³ Reviewing the management of contractor safety at the mine Lamare et al found:

Because there was an absence of effective safety management system for the contractors and their staff, there was also no auditing of contractor safety performance and no supervision of contractors underground. Although Pike's safety management system required regular audits of contractor safety performance, there is no evidence that Pike's managers audited either McConnell Dowell and VLI (two of the largest contractors) or any of the smaller contractors who lost men on 19 November 2010 (Royal Commission of Inquiry, 2012: 67). As a result of this omission, the company was missing vital information on its contractors and the hazards that their staff and/or equipment might have introduced to the mine. Furthermore, there was no formal system requiring supervisors to regularly check the safety of contractors while working underground. In practice, that was left up to the discretion of contractors to check their areas of responsibility within the mine (Macfie, 2013). There was also no system to keep track of the locations of contractors once underground, although the project team had a weekly plan that included information on where their contractors would likely be working each day. Contractors were not restricted from moving around the mine and 'pretty much looked after themselves' (Macfie, 2013). Visitors and contractors were ostensibly required to sign in and out but often it did not happen, and neither that system nor the portal tag board helped the control room or the supervisors to keep track of contractors' whereabouts underground (Royal Commission of Inquiry, 2012). It was not surprising, therefore, that there was confusion as to who were actually trapped in the mine days after the first explosion.¹⁴⁴

In legal proceedings following the disaster victim impact statements from family members referred to conditions at the mine and Lamare et al summarised some of these responses (largely those relating to the family of contractors killed) which highlighted both the human cost, the chaotic management of the mine and the vulnerability of contractors:

Brenda Rackley, the partner of another killed miner, said her husband told her the mine was disorganised and chaotic, but that he needed to complete his contract:

When he mentioned the safety issues at Pike, I became concerned for his safety and asked him to leave the mine several times. He always replied 'I'm not leaving. I'm staying till the end of the contract'.¹⁴⁵

Lamare et al also noted that the families of contractors killed at Pike River suffered financial losses as unsecured creditors of the company.¹⁴⁶ Unlike many other countries, New Zealand has a national accident compensation system covering all workers irrespective of employment status whereas in

¹⁴³ Lamare R, Lamm F, McDonnell N. & White H, (2015) Independent, dependent, and employee: Contractors and New Zealand's Pike River Coal Mine disaster, *Journal of Industrial Relations*, 57(1):77, 85.

¹⁴⁴ Lamare R, Lamm F, McDonnell N. & White H, (2015) Independent, dependent, and employee: Contractors and New Zealand's Pike River Coal Mine disaster, *Journal of Industrial Relations*, 57(1):86-87.

¹⁴⁵ Lamare R, Lamm F, McDonnell N. & White H, (2015) Independent, dependent, and employee: Contractors and New Zealand's Pike River Coal Mine disaster, *Journal of Industrial Relations*, 57(1):88.

¹⁴⁶ Lamare R, Lamm F, McDonnell N. & White H, (2015) Independent, dependent, and employee: Contractors and New Zealand's Pike River Coal Mine disaster, *Journal of Industrial Relations*, 57(1):88.

Australia most self-employed workers are not entitled to workers' compensation following injury or death at work.¹⁴⁷

In 2019 a University of Queensland mining study by Knights and Scanlan was published on the relationship between coal price variations and safety in Queensland coalmining.¹⁴⁸ Analysing Queensland coalmine fatalities between 1985 and 2016 as a function of thermal coal price variations, Knights and Scanlan noted that between 1992 and 1999 workforce numbers dropped, coinciding with a shift to contractors due to labour cost advantages, followed an increase number of fatalities about year later. Noting that the relationship between fatalities and coal prices was not linear because one to two fatalities occurred in most years irrespective of the thermal coal price, Knights did find an association and concluded that:

When the price of coal falls below AUD 55/tonne in non-inflation adjusted terms the likelihood of an incident involving multiple fatalities increases. The probability can be estimated at 2 in 18 events, equivalent to 11%. The study postulates that in difficult economic times, mining companies react by downsizing direct employees. If not carefully managed, this can result in loss of knowledge around safety systems, and a reduced effectiveness of safety supervision. Because of labour cost advantages, some jobs previously undertaken by direct employees will be replaced by contractors. Increased contractor numbers increases the risk of fatalities occurring, as contractors are over-represented in accident categories involving vehicle accidents, tyre handling and crushing incidents. Mine inspectorates, mining, and mining contractor companies need to be especially vigilant to enforce health and safety management systems during periods of low coal prices.¹⁴⁹

There were a number of significant limitations with this study, including in terms of the contract labour connection. The study doesn't demonstrate a direct association between shifts in coal prices, the use of contractors and the rise in fatalities.

Some additional Queensland research was found. In 2017 a Bachelor of Engineering thesis by Meintjes examined fatality incidents in Queensland metalliferous mines between 1988 and 2016 to identify trends and patterns of causation. The study apparently considered contractor involvement but the only reference I could locate in this regard was:

Nelson (2017) wrote a comprehensive report analysing the involvement of contractors in fatalities that occur in the industry. Nelson discovered that contractors were more likely to be involved in fatal accidents and the most likely reasons for this seems to be the fact that contractors are often employed to perform very difficult and dangerous tasks on mine sites. Additionally, contractors that transfer between sites often do not obtain an in-depth understanding and appreciation for the Safety and Health Management System that is employed at the local mine sites.

¹⁴⁷ Quinlan M, Fitzpatrick S, Matthews L, Ngo M, & Bohle P, (2015) Administering the cost of death: Organisational perspectives on workers' compensation and common law claims following traumatic death at work in Australia, *International Journal of Law and Psychiatry*, 38:8-17.

¹⁴⁸ Knights, P. & Scanlan, B. (2019), A study of mining fatalities and coal price variation, *International Journal of Mining Science and Technology*, 29: 599–602.

¹⁴⁹ Knights, P. & Scanlan, B. (2019), A study of mining fatalities and coal price variation, 599.

Nelson's comprehensive study of contractor involvement in mining fatalities meant that no new patterns or contributing causes were identified during this study.¹⁵⁰

Summary

Overall, research into the use of contract labour in mining has (with some exceptions as would be expected) reached similar findings to those undertaken in other industries or using general workforce data (like surveys). The number of studies is smaller and exploration of risk factors less developed but parallels are apparent. Most of the studies just reviewed examined whether there was an association between contract labour and increased risk of fatalities but, while job tenure and other aspects connected to disorganisation were mentioned, didn't explore the reasons for such an association in depth. The Friedman et al paper found contractors engaged more miners with short job tenure who experienced long-hour related injuries than operator engaged employees. The Knights and Scanlan proposal that it could be connected to loss of organisational memory from employees that are replaced is plausible (as are other factors) but no evidence supporting this was presented.

Regulatory Challenges and Previous Government/Independent Inquiries into Mine Safety/Serious Incidents

As in other industries, changes in work arrangements have been seen to pose significant challenges for health and safety regulatory regimes both in terms of the form of law as well as the role of inspectorates and enforcement in Australia, South Africa, the USA and elsewhere. With regard to contract labour the multiplicity/complexity this may add to on mine sites has (in addition to joint ventures) makes both regulatory oversight and detection/prosecution of breaches more attenuated.¹⁵¹ It is worth noting in passing that mining companies are aware that joint-ventures/contracting pose risks/challenges as the following excerpt from Peabody Energy's 2019 Annual Report indicates:

Where our joint ventures are jointly controlled or not managed by us, we may provide expertise and advice but have limited control over compliance with our operational standards. We also utilize contractors across our mining platform, and may be similarly limited in our ability to control their operational practices. Failure by non-controlled joint venture partners or contractors to adhere to operational standards that are equivalent to

¹⁵⁰ Meintjes L, (2017) Critical Analysis of the Queensland Metalliferous Mines Fatal Accident Record, Bachelor of Engineering Thesis, University of Queensland, St Lucia, 54. The reference cited is Nelson D, (2017), Managing Contractors in Mining – Understanding the Factors Underlying the Safety Statistics, paper presented at the Queensland Mining Industry Health and Safety Conference, Gold Coast, 6-8 August but I the correct reference may be Nelson D, & LaBranche N, (2017) Managing Contractors in Mining- Understanding the Factors Underlying the Safety Statistics, Queensland Mining Industry Health and Safety conference, Gold Coast Queensland, 6-8 August 2017.

¹⁵¹ See for example, Rakovich M. (2001) Berwind Decision: Where are we now with liability for contract miners, *Mining Engineering*, 54(4):39-44; Kenny B, & Bezuidenhout A, (1999) Contracting, complexity and control: An overview of the changing nature of subcontracting in the South African mining industry, *The Journal of The South African Institute of Mining and Metallurgy*, July/August, 185-192.

ours could unfavorably affect safety results, operating costs and productivity and adversely impact our results of operations and reputation.¹⁵²

Similarly in its 2019 Annual Report BHP noted a number of threats posed by third parties including:

Third party (including contractor) activities, including a failure to adopt standards, controls and procedures that are equivalent to BHP's, could lead to increased risk of:

- operational incidents or health and safety accidents, including fatalities;
- failure to meet remediation and compensation requirements (such as delays to community resettlements related to the Samarco dam failure, see section 1.7 for information on our response, support and commitments);
- inadequate quality of construction (for example, if contractors do not follow appropriate standards);
- reduced production (for example, from poor planning that does not align to appropriate standards);
- disengagement of the remaining workforce;
- litigation or regulatory action (for example, if a third party was in breach of a law or regulation);
- cost overruns, schedule delays or interruptions (such as in major development projects).¹⁵³

Concern with regard to the OHS implications of contract labour (including labour hire) and changed work arrangements has been expressed in government reports on mine safety in Australia for more than two decades as well as other countries like the USA.¹⁵⁴ In 1997 an official inquiry into mining fatalities in Western Australia concluded:

Recent increases in the fatality incidence have coincided with the rapid transition to contractor mine management and it appears that provisions to ensure that established occupational safety and health management systems were maintained subsequent to this change were either not made or were not adequate.¹⁵⁵

The NSW Mine Safety Review chaired by Neville Wran and Jan Mclelland (2005), covering both metalliferous and coalmining identified contractors as a significant issue requiring attention.

There appears to be a general recognition amongst stakeholders that the growing use of contractors in the mining industry has implications for OH&S that require attention. This

¹⁵² Peabody Energy Corporation, (2019) Annual Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934 for the fiscal year ended December 31 2019, 35. Later in the report [Exhibit 95] safety violations/regulatory breaches at contractor-operated mines are listed but only for US not Australian operations.

¹⁵³ Further at a later part of the report BHP identified three key HSEC risks, including tailings dams and a deep dive on the risk of blasting incidents, audit planning and reporting in relation to HSEC risks and processes, and Contractor management, *BHP Annual Report 2019*, 38, 131.

¹⁵⁴ For a US report see McAtee, D. (2001), *Report to Governor Bob Wise on Mine Safety and Health in West Virginia and Recommendations to make West Virginia Mines the Safest and Healthiest in the Nation*.

¹⁵⁵ Prevention of Mining Fatalities Taskforce (1997) *Report on the Inquiry into Fatalities in the Western Australian Mining Industry*, Western Australian Mines Occupational Safety and Health Advisory Board, Perth, iii.

view is supported by a growing body of international research on the OH&S effects of contract labour, whether they be self-employed, contractor employees or labour hire workers. For example, in the USA, a study by Rousseau and Libuser (1997) noted that contractor employees accounted for 17% of fatalities in the US mining industry, even though they made up only 10% of the total mine workforce at that time... A report prepared in 2002 (Evesson, 2002) concluded challenges were still outstripping the development and implementation of remedies for safety management of contractors in the coal mining industry. Further, there appears little recognition that increasing numbers of contractors may have cumulative effects on the capacity of mining companies to safely manage contractors. What may also be critical here is the growing number of inexperienced miners, as the older generation of miners leave the industry. The report notes that this is likely to compound "disorganisation" (a major risk associated with contract work arrangements) issues.¹⁵⁶

As was noted above, disorganisation was identified as a significant risk factor with regard to the employment of contractor/labour hire and other precarious work in other industries. Similarly the NSW Mine Safety Review also referred to economic and reward pressures as 'a critical risk factor in relation to contracting work arrangements.' Other issues identified by the Report as requiring attention included the 'the need to effectively audit contractor management systems as well as more general requirements in relation to OH&S management, such as inadequate management training, the risk of "paper compliance" and inadequate performance indicators.'¹⁵⁷ The report supported Department proposals for new legislative requirements on contractor safety management followed (in two years) by a subsequent major audit of compliance. Specific areas of concern identified by the Review included the adequacy of contractor induction and problems monitoring hours work by contractors (and the need for detailed records).¹⁵⁸

In 2013/2014 New South Wales mines experienced five fatalities (one double fatality incident) in a single financial year prompting the Wilkinson Fatality Review. Peter Wilkinson investigated the incidents, two involving contractor employees and three operator employees (one a double-fatality at an underground coalmine due to strata failure during longwall development). Both the contractor employees killed had limited mining experience (10 months and one year at the mine (plus 6 months doing similar tasks) respectively) compared to the deceased operator employees (one had 2 years 4 months, another 7 years 6 months and the other 8 years 1 month). Three of the four fatal incidents occurred at night - 2105 for the double-fatality and 2305 for two other single fatalities, while one contractor employee was killed at 0845. The numbers were too small to make any valid observations regard patterns of causation. Wilkinson concluded that 2013-14 was not an 'outlier.' The only conspicuous spike in fatalities in the past 17 years being 1999-2000 (11 deaths) but 2013-14 represented the biggest annual fatality number since 1999-2000.¹⁵⁹ Wilkinson recommended that

¹⁵⁶ Wran, N. and Mclelland, J. (2005) *NSW Mine Safety Review: Report to The Hon Kerry Hickey MP Minister for Mineral Resources*, NSW Government, Sydney, 35. Full references for the studies cited in the quote are Evesson, J (2002). Safety Management of contractors in the coal mining industry: challenges and insights from the field, ACIRRT, University of Sydney and Rousseau, D. and Libuser, C (1997) Contingent Workers in High Risk Environments, *California Management Review*, 39(2):103-21.

¹⁵⁷ Wran, N. and Mclelland, J. (2005) *NSW Mine Safety Review*, 36.

¹⁵⁸ Wran, N. and Mclelland, J. (2005) *NSW Mine Safety Review*, 37-38.

¹⁵⁹ Wilkinson P, (2014) *MSAC Fatality Review 2013-14: Report for NSW Mine Safety Advisory Council*,

the MSAC should consider how to routinely collect information on implementing controls for significant risks; draw on human and organisational factors expertise to enhance identification and implementation of risk controls; and consider if the regulator should focus on critical controls for significant risks as part of an incident prevention strategy.¹⁶⁰

One issue considered in a number of mine safety reviews and inquiries into incidents is the willingness of contract workers to raise OHS concerns. A report prepared as part of the independent inquiry into the fatal rockfall at the Beaconsfield Gold Mine on Anzac Day 2006 (which employed considerable contract workers, some engaged by a labour hire firm) found contract workers (page 151) ‘stated they felt able to raise OHS issues at toolbox meetings, and most with longer tenure at the mine had although several indicated they felt less free to do this because of a desire not to make themselves too conspicuous or “rock the boat.”’ The report concluded there was no evidence the use of contractors had compromised safety at the mine or contributed to the fatal incident. One witness stated he had had this experience at a West Coast (Tasmania) mine where the replacement of employee diamond drillers with contractors had caused considerable bitterness, making contractors reluctant to raise safety issues:

They hated contractors there, yeah... (and asked about raising safety issues) No. We just didn't there really. We only raised it through the geos...Geologists, because they were sort of – we were working for them.”¹⁶¹

Three independent audits of the Office of the Chief Inspector of Mines (OCIM) in Tasmania undertaken in 2010, 2012 and 2014 which included interviews with managers, union officials, inspectors, industry association representatives and consultants and mine-site inspections (including the Cornwall colliery) identified contractor labour as an issue requiring prioritised attention. Summarising these concerns the Third Audit stated:

Another area which should be prioritised in terms of targeted campaigns relates to the increased use of contractors in mining and other areas covered by OCIM. Both the 2010 and 2012 audits identified serious safety problems associated with the use of contractors – a point reinforced by recent fatalities in Australia, including Tasmania (see Commissioner Bell’s comment earlier in this report). The issue was also raised repeatedly in interviews (with all stakeholder groups) carried out for this audit both in relation to mining and mineral processing. Some mines make limited use of contractors (for some maintenance etc) while in others substantial operational activities are undertaken by contractors. While some mining contractors were seen to have excellent safety systems and to implement them effectively this was not always the case and interviewees also referred to a ‘disconnect’ between contractor policies and practices and those of the mine operator. One industry interview indicated that the incidence of contractors in incidents was twice as high as other

Noetic Solutions Pty Limited, 6.

¹⁶⁰ Wilkinson P, (2014) *MSAC Fatality Review 2013-14: Report for NSW Mine Safety Advisory Council*, Noetic Solutions Pty Limited, III-IV.

¹⁶¹ Quinlan, M (2009) *Report on OHS Management at the Beaconsfield Joint Venture Gold Mine, Tasmania up to and Including the Time of the Rockfall Incident at the 925 Level of the Mine that Occurred at around 9.23 pm, Resulting in the Death of Larry Paul Knight and the Entrapment of Todd Andrew Russell and Brant George Webb*, Expert Report Prepared for Greg Melick SC, Independent Investigator appointed by the Tasmanian Government, 30 August 2007, 151-152.

workers and that there were also problems with contractors reporting incidents – problems which took some time to rectify. Other concerns raised in connection with the use of contractors were that it weakened safety representative presence and activities, and that it also increased difficulties ensuring workers took proper meal breaks (and in appropriate locations) and in monitoring hours of work/fatigue amongst contract workers. These responses are entirely consistent with my experience of other jurisdictions and other industries.¹⁶²

Concerns about connections between contractors and safety were being expressed in other jurisdictions at the time. Referring to an uptick in mine fatalities, Queensland Commissioner for Mine Safety and Health, Stewart Bell warned this was an alarming trend for the current year (2013-14) especially as five of the seven fatal incidents (including one in Tasmania) involved contract workers.¹⁶³ As noted this uptick occurred in a period of falling coal prices and this association requires more careful investigation.

Turning to Queensland more specifically a number of reports and reviews have examined contract labour and changed work arrangements.

In 2011 Graham Callinan responded to the apparent over-representation of contractors in serious incidents and fatalities, noting the scope of tasks undertaken by contractors had increased significantly, by analysing seven recent workplace fatalities – six of which involved contractors and 10 High Potential Incidents (HPIs) – nine of which involved contractors.¹⁶⁴ The numbers are too small to draw any meaningful conclusions regarding relative risk between employee and contract workers, but does offer some insights into some risk factors associated with contractor incidents. Callinan's study identified elements of disorganisation (and corresponding elements in 'Ten Pathways' like failures in management systems and risk assessment) in the fatality incidents stating:

work procedures were identified as a significant factor. Four contractors utilized procedures that were not part of the mines safety and health management system. Three were unfamiliar with and/or did not follow the work procedure. A lack of risk assessment prior to the incidents was also an issue identified in the analysis. Three of the cases had no personal risk assessment performed and no risk assessment for the task was completed in three instances.¹⁶⁵

Callinan's examination of HPIs revealed similar failures:

Inadequate supervision was a contributing factor in six of the ten incidents. In five of the incidents, workers not attending the prestart meeting and therefore not receiving important information about their work area, was a contributing factor. Risk assessments not being conducted were also a factor in this group of incidents with five not completing a risk

¹⁶² Quinlan M, (2014) *Third Audit of the Mines Safety Unit and Office of the Chief Inspector of Mines, Worksafe Tasmania*, 37.

¹⁶³ Cited in SIA Professional eNews, Issue 209, 4 March 2014.

¹⁶⁴ Callinan G, (2016) Why are so many contractors involved in fatalities and serious accidents? Department of Natural Resources and Mines, Brisbane.

¹⁶⁵ Callinan G. (2016) Why are so many contractors involved in fatalities and serious accidents? Department of Natural Resources and Mines, 2.

assessment for the task, four not following the procedure for the task and four not conducting personal risk assessments.¹⁶⁶

Elaborating on these points, risk assessment failure identified by Callinan were risk assessment not or inadequate inadequately performed; failure to ensure risk assessments conducted by contractors were approved before use by a supervisor; contractor risk assessments performed by only one person who may lack appropriate skills; contractors unaware of the mine's risk management process (not covered during induction); and time pressure saw shortcuts being taken in risk management. With regard to change management Callinan noted instances where change management processes were not followed by contractors where there was a major change to the scope of work; contract employees unaware of the change management procedures; and time pressure saw shortcuts being taken in change management. Further, contractors used their own procedures not adopted by the Site Senior Executive (SSE), contractor procedures written without prior risk assessment; contractor procedures below that mine's standards; contractor procedures made reference to procedures from another mine; and contractor procedures identified controls not available at the mine. Inadequate supervision of contractors included contractors commencing a task knowing no supervisor/Statutory Official was present; contractors working in area not inspected as required by the safety and health management system; supervisors allowing contractors to conduct work that did not comply with the safety and health management system; supervisor allowing workers to work hours outside the fatigue policy; failure to ensure supervisors were assigned to the work conducted by contractors; supervisors/Statutory Officials unaware of contract workers in their area; contractors unaware they needed to inform Statutory Official they were entering their district; contract supervisors lacked required knowledge or competency to be appointed as a supervisor; and the contractor supervisor was not authorised by the Site Senior Executive. As for communication Callinan noted instances where critical safety information not passed on; Supervisor didn't convey critical safety information to the contract supervisor; contractors not invited to or included in pre-start meetings; no documented process for conducting the pre-start meeting, including who should attend and how information should be presented; no mechanism to ensure all persons attended the pre-starts; the importance of prestart meetings was not conveyed to contract employees; and time constraints affected contractor willingness to attending pre-start meetings. With regard to investigation follow-up Callinan found previous investigation findings were not implemented; investigation recommendations by contract companies not implemented; findings from investigations not passed on to the contract company and the OHS management system did not ensure that contractor investigations were closed out. In terms of management structures Callinan identified flaws, namely management structures that didn't permit effective implementation of the OHS management system; contractor management structures that weren't integrated into mine management structure; competencies hadn't been identified for contractor senior managers and supervisors; and no roles and responsibilities were developed for contract employees. Flaws in contractor management plans identified were failure to review or audit the contractor management plan; contract holders not trained in contractor management plan; contract holders unaware of safety requirements contained in contracts; audits not conducted of contractors as required by contractor management plan. Other serious areas of deficiency identified (for which the full list of examples are

¹⁶⁶ Callinan G. (2016) Why are so many contractors involved in fatalities and serious accidents? Department of Natural Resources and Mines, 2.

listed by Callinan but not included for reasons of brevity in this report) related pre-check starts, work area familiarisation and work planning.

This long listing is warranted because, notwithstanding clear requirements in mine safety legislation identified by Callinan these represent the same failures that have been identified in other mine incidents involving contractors including a number discussed (elsewhere) in this report and they also echo the failures that have fatal or catastrophic consequences in other industries including some already referred to in this report.¹⁶⁷

The issue of contractor safety has also been raised in regulatory reviews of specific hazards. In March 2016 the NSW mine safety regulator commenced a targeted assessment program (TAP) aimed at 'providing a planned, intelligence-driven and proactive approach to assessing how effectively mine operators are managing the principal hazards defined in the Work Health and Safety (*Mines and Petroleum Sites*) Regulation 2014 (*WHS (M&PS) Regulation*).'¹⁶⁸ In 2016/2017 a TAP was undertaken in relation to the risk of ground or strata failure in underground metalliferous mines, involving detailed examination of control measures in place based on desktop assessment along with on-site visits by a multi-disciplinary team of mine inspectors. In April 2017 the results for this assessment completed at six mines were published.¹⁶⁹ The general and specific findings of this review were:

General findings highlight that there is:

- inadequate risk assessments and procedures that consider all the risks associated with ground or strata failure
- incomplete training records to indicate that workers were competent in ground awareness, ground support and seismicity
- inadequate arrangements for monitoring and evaluating contractors' compliance with the health and safety requirements of the safety management system
- inconsistent processes for the identification, assessment and reporting of hazardous ground conditions.

The specific findings identified:

- inadequate management of draw points and consideration of the implications of over-break for ground or strata failure incidents

¹⁶⁷ For evidence relating to the outsourcing of heavy aircraft maintenance see Quinlan, M. Hampson, I. Gregson, S. (2013c) Outsourcing and offshoring aircraft maintenance in the US: Implications for safety, *Safety Science*, 57:283-292; Quinlan, M. Hampson, I. Gregson, S. & Russell, K. (2014) Slow to Learn: Regulatory Oversight of aircraft maintenance safety in the USA, *Policy and Practice in Health and Safety*, 12(1):71-90; Gregson, S. Hampson, I. Junor, A. Fraser, A. Quinlan, M. & Williamson, A. (2015) Supply chains, maintenance and safety in the Australian airline industry, *Journal of Industrial Relations*, 57(4):604-623; Hampson, I. Junor, A. Fraser, D. & Quinlan, M. (2016) The uncertain oversight of offshore aircraft maintenance, *Journal of Air Law and Commerce*, 81(2): 225-250.

¹⁶⁸ NSW Planning and Environment Resources Regulator, (2017) *Ground or strata failure – NSW metalliferous mines*, NSW Department of Planning and Environment.

- lack of a formal risk assessment processes to inform the procurement of plant and equipment that is fit for purpose.¹⁶⁹

In terms of responding to the problem that mine ‘operators did not have evidence to demonstrate that they had implemented arrangements to monitor and evaluate their contractor’s compliance with the health and safety requirements of the safety management system’ the report stated:

From 1 February 2017, arrangements for monitoring and evaluating contractors’ compliance with the health and safety requirements of the safety management system must be documented in accordance with clause 14(1)(f)(iv) of the WHS (MPS) Regulation. Prior to this date, the savings and transitional provisions allowed mine operators to comply with clause 29 of the Mine Health and Safety Regulation 2007 which required the contract management plan to include monitoring of contractor compliance with site health and safety requirements.¹⁷⁰

In December 2019 the Brady-Heywood Review examined injuries to contractors and direct-employees between 2000 and 2019 according to hours worked. It acknowledged the difficulties given the different role/types of contract arrangement identified at the beginning of this report, notably employees of contractors, specialist contractors (doing maintenance for example) and contractors operating mines. Total hours worked in this period were higher for contractors in the period for open cut coal mines and almost identical (minimally higher for contractors) in underground coal mines. The proportion of total hours worked by contractors relative to those of direct-employees (for all mining and quarries) had grown over time, and from 2017-18 the contractor total was significantly higher than that of employees.¹⁷¹ The Review noted:

At the onset of this review, many expressed a strong view that the increasing number of contractors in the industry was leading to a reduction in safety. There was an openly expressed view that, as was discussed above, contractors do not work in as safe a manner as employees.¹⁷²

Examining 2000-2019 fatalities by sector the Review found that 11 of the 14 fatalities in open cut coalmines were contractors followed by metalliferous underground mines (4 of 9); metalliferous underground, quarries and coal underground (all recording two contractor fatalities from a total of six); with one (contractor) fatality each in metalliferous exploration, coal exploration and metalliferous other.¹⁷³ Overall, the fatality frequency rate was highest in quarrying (especially amongst contractors at 0.15 compared to 0.09 for employees) while the rates for underground coalmining were (just under 0.04 for employees and 0.02 for contractors) and open cut coalmining

¹⁶⁹ NSW Planning and Environment Resources Regulator, (2017) *Ground or strata failure – NSW metalliferous mines*, NSW Department of Planning and Environment. 1.

¹⁷⁰ NSW Planning and Environment Resources Regulator, (2017) *Ground or strata failure – NSW metalliferous mines*, NSW Department of Planning and Environment. 5.

¹⁷¹ Brady, S. (2019) *Review of all fatal accidents in Queensland mines and quarries from 2000 to 2019*, Report prepared for the Department of Natural Resources, Mines and Energy, Brisbane, 12-13.

¹⁷² Brady, S. (2019) *Review of all fatal accidents in Queensland mines and quarries from 2000 to 2019*, Report prepared for the Department of Natural Resources, Mines and Energy, Brisbane, 14.

¹⁷³ Brady, S. (2019) *Review of all fatal accidents in Queensland mines and quarries from 2000 to 2019*, Report prepared for the Department of Natural Resources, Mines and Energy, Brisbane, 19.

(about 0.0075 for employees and 0.025 for contractors).¹⁷⁴ The Review also examined serious non-fatal ‘accidents’¹⁷⁵ over the same period. While the number of serious accidents involving employees and contractors in open cut coalmining was roughly proportional to fatalities but higher in underground coalmining it was significantly different, contractors accounting for just over half all the 200 serious accidents recorded.¹⁷⁶ The Review then examined fatality and serious incident rates for all mining and quarrying activities (no breakdown for coalmining was included). With regard to fatality rates it concluded:

Figure 47 shows the Fatality Frequency Rate split for employees and contractors. The spike in the employee rate is evident and associated with the significant number of employee fatalities in the 2018/19 year. This significant increase in the employee Fatality Frequency Rate does not support the view that employees work in a safer manner than contractors, as has been expressed by many in the course of this review.¹⁷⁷

However, this chart shows that the annual fatality rate was generally higher for contractors prior to 2011-12 after which the pattern becomes more mixed with a sharp uptick in employee fatality rates with for the year 2018-19 sufficient to affect the overall findings given the relatively small numbers of fatalities per year. If this trend were to continue it would certainly influence any conclusions that could be drawn about relative risks to contractors and employees but if 2018-19 proved an aberrant year in this regard the Brady-Heywood Review’s conclusion might require reconsideration. Serious accident frequency rates were only available for the years 2011-12 to 2018-19 and it actually shows a generally consistent higher accident rate for contractors (in only one year 2012-13 was the employee rate higher while in 2018-2019 it was 1.1 for contractors and 0.8 for employees). The Brady-Heywood Review concluded:

While the Serious Accident Frequency Rate for contractors is higher than that of employees, they still are reasonably comparable - a contractor is more likely to suffer a Serious Accident than an employee, but both are generally trending upwards. Conversely, this data does not support the view that employees work in a considerably safer manner than contractors.¹⁷⁸

The upwards trend of both contractor and employee rates is clearly important and of concern, although the difference identified doesn’t warrant being dismissed in my view. A longer time-span would obviously be advantageous both with regard to this and the overall upward trend. Disaggregated data for coalmining would too be valuable. Unfortunately, the report was unable to compare HPI data for contractors and employees. Given what is said elsewhere in this report about the value of HPIs more generally when it comes to identifying and preventing serious incidents

¹⁷⁴ Brady, S. (2019) *Review of all fatal accidents in Queensland mines and quarries from 2000 to 2019*, Report prepared for the Department of Natural Resources, Mines and Energy, Brisbane, 19.

¹⁷⁵ Using the term ‘accident’ as a synonym for injury while common can add a degree of confusion because the term ‘accident’ implies the incident was aberrant not probabilistic and further accidents may occur where no injuries are involved or at the other extreme multiple injuries.

¹⁷⁶ Brady, S. (2019) *Review of all fatal accidents in Queensland mines and quarries from 2000 to 2019*, Report prepared for the Department of Natural Resources, Mines and Energy, Brisbane, 36.

¹⁷⁷ Brady, S. (2019) *Review of all fatal accidents in Queensland mines and quarries from 2000 to 2019*, Report prepared for the Department of Natural Resources, Mines and Energy, Brisbane, 51-52.

¹⁷⁸ Brady, S. (2019) *Review of all fatal accidents in Queensland mines and quarries from 2000 to 2019*, Report prepared for the Department of Natural Resources, Mines and Energy, Brisbane, 52-53.

including fatalities it would be extremely valuable if such a differentiation was facilitated in the future.

The Review also compared lost-time-injury-frequency-rates (LTIFRs) for both contractors and employees for 2000-2019, finding that on average the LTIFR for contractors was 0.7 times that of employees. In explaining this difference the Brady-Heywood Review considered three hypotheses, namely that contractors undertook less hazardous work, contractors work more safely or that contractors are less likely to report lost-time-injuries (including being incentivised by the use of LTIFRs in the awarding of contracts). In this regard the Report observed:

Based on discussions with those in the mining industry the first 2 hypotheses seem less likely, with many suggesting the most likely reason is contractors are reporting less LTIs than employees. Discussions suggest that contractors are incentivised to do so – they are rewarded for having a low LTI Frequency Rate.

Figure 56 illustrates the injured body location due to LTIs. While both employees and contractors broadly follow the same distribution, employees have a considerably higher number, relatively speaking, of back, knee, shoulder, neck, and other back complaints. These are *hidden injuries*, which if go unreported are unlikely to be noticed by others, as opposed to, for example, hand and face injuries, which are obvious injuries.¹⁷⁹

Overall, the Review concluded:

Further, the significant increase in the employee Fatality Frequency Rate, combined with the employee Serious Accident Frequency Rate being reasonably comparable to that of contractors, does not support the view that employees work in a considerably safer manner than contractors.¹⁸⁰

The Review made limited reference to the wider research literature (an notable exception was the work of Andrew Hopkins) to discuss issues like safety culture and the limitations of LTIFRs but only one reference on contract labour and safety (a conference paper¹⁸¹) and no reference to prior studies of contractor safety in coalmining (or mining generally) including the detailed statistics-based studies in the USA or Callinan's earlier review of Queensland mine fatalities.

To try and clarify matters further, a request was made from the Department for data covering the period 2010 to 2020 for fatalities and serious accidents, both numbers and frequency rates for mining and quarrying in general but also underground and open-cut coalmining breakdowns. The Department provided this information both the period 2010-2020 and also the period 2012-2020, indicating it would be preferred if use could be 2012-2020 period because these were regarded as more reliable. Table 2 reproduces the information provided for the period 2012-2020. As with the Brady-Heywood Report these results must be interpreted with caution given problems interpreting data on severe injuries and deaths, because of low frequencies (and rates within the wider

¹⁷⁹ Brady, S. (2019) *Review of all fatal accidents in Queensland mines and quarries from 2000 to 2019*, Report prepared for the Department of Natural Resources, Mines and Energy, Brisbane, 57.

¹⁸⁰ Brady, S. (2019) *Review of all fatal accidents in Queensland mines and quarries from 2000 to 2019*, Report prepared for the Department of Natural Resources, Mines and Energy, Brisbane, 58.

¹⁸¹ Guers C, Martin C, & Wybo J, (2014) The impact of the use of subcontracting on organizational reliability and safety" 24th European Safety and Reliability Conference, HAL,1027–1035.

population of workers in the occupation or industry). Numbers are even lower than some examined in Brady-Heywood because it is broken down into the subsets of underground and open-cut coalmining – areas of most direct concern to the Board.

Table 2 Fatalities and Serious Accident Numbers and Frequency in Queensland Mining and Quarrying 2012-2020

Fatalities				
Period	Sector	Contractor	Employee	All
1 July 2012 to 13 July 2020	Fatalities for Mining and Quarrying Sectors	8	11	19
1 July 2012 to 13 July 2020	Fatalities for Underground Coal	1	3	4
1 July 2012 to 13 July 2020	Fatalities for Open Cut Coal	6	2	8
Serious Accidents				
Period	Sector	Contractor	Employee	All
1 July 2012 to 13 July 2020	Serious Accidents for Mining and Quarrying Sectors	361	281	642
1 July 2012 to 13 July 2020	Serious Accidents for Underground Coal	119	104	223
1 July 2012 to 13 July 2020	Serious Accidents for Open Cut Coal	191	104	295
Worked Million Hours				
Period		Contractor	Employee	All
1 July 2012 to 30 June 2020	Worked Million Hours for Mining and Quarrying Sectors	415.682585	415.204854	830.887439
1 July 2012 to 30 June 2020	Worked Million Hours for Underground Coal	65.095814	46.402163	111.497977
1 July 2012 to 30 June 2020	Worked Million Hours for Open Cut Coal	251.555730	209.581870	461.137600
Fatality Frequency Rate				
Period	Sector	Contractor	Employee	All
1 July 2012 to 30 June 2020	Fatalities per Million Hours for Mining and Quarrying Sectors	0.019	0.026	0.023
1 July 2012 to 30 June 2020	Fatalities per Million Hours for Underground Coal	0.015	0.065	0.036
1 July 2012 to 30 June 2020	Fatalities per Million Hours for Open Cut Coal	0.024	0.010	0.017
Serious Accident Frequency Rate				
Period	Sector	Contractor	Employee	All
1 July 2012 to 30 June 2020	Serious Accidents per Million Hours for Mining and Quarrying Sectors	0.87	0.67	0.77
1 July 2012 to 30 June 2020	Serious Accidents per Million Hours for Underground Coal	1.83	2.22	1.99
1 July 2012 to 30 June 2020	Serious Accidents per Million Hours for Open Cut Coal	0.76	0.50	0.64

I claim no particular expertise in statistical analysis but after discussing data in general terms with a colleague who has (Professor Philip Bohle, University of Tasmania and formerly a professor in the Faculty of Health Sciences, the University of Sydney) the following observations can be made:

- The frequencies of fatalities are very low in statistical terms, even though each is a significant tragedy in its own right. Almost all categories record less than one fatality per year.
- Judging from the hours worked and frequency rates, however, some differences in the table are notable. Underground coal has the biggest difference in hours worked, with contractors working substantially more hours (about 40%) but having fewer fatalities (based on very low numbers - 1 against 3). They could be expected to have around 40% more, based on their greater working hours. This discrepancy is reflected in the higher fatality frequency rate for employees in underground mines.
- The difference in risk is in the opposite direction for open cut mines, but it is of smaller magnitude after adjusting for the differences in hours worked. It is reflected in a somewhat lower difference in fatality frequency rates, but not so much in accident frequency rates.
- Expert judgement, based on wider knowledge of the industry, would be required to evaluate whether these differences are important and expert opinions may differ. Ultimately, confident interpretation of the data would require statistical tests (and the raw data to do those tests), at least on the frequencies of serious accidents. Unfortunately, the low frequencies of fatalities would preclude meaningful statistical analysis.
- Based on raw figures in the table alone, a cautious conclusion would be that the data neither establish nor refute a relationship between contractor/employee status and fatalities or serious accidents.

In addition to the Brady-Heywood report's review of statistics the 2019 safety re-set in Queensland mining and quarrying included an online survey which secured 518 responses from 110 mine sites.¹⁸² Further, 20 interviews were conducted with industry/union representatives, managers and 16 workers. Given the small interview numbers and survey respondents only represented around 1% of the workforce results must be treated with caution. With this caveat the responses tended to echo concerns raised in research and elsewhere in this report relating to workforce changes, reporting problems and improved safety management. The Ronan Analytics report identified the key themes to emerge from the survey and interviews:

1.1 Survey Themes

The four most prevalent themes linked to safety and health in the survey responses were:

1. the importance of **leadership** in addressing safety issues and the impact this had on safety culture
2. the impact of **workforce** casualisation and the importance of an experienced, well-trained and permanent workforce in improving safety culture
3. the need for improved quality of **training** and more frequent training

¹⁸² Ronan Analytics, (2019) *Queensland Safety Reset Survey Analysis and Key Findings Report*, Department of Natural Resources, Mines and Energy, Brisbane.

4. the need for more clearly defined, standardised and simplified **processes**, policies and procedures.

Other notable themes raised in the survey included:

- safety concerns could not be raised without fear of reprisal
- a focus on production over safety
- a desire for greater enforcement of existing laws and regulations including more unannounced site inspections and more independent monitoring of mine operations
- environmental hazards that impact workers health.

1.2 Telephone interview themes

The top-three issues raised by stakeholders and attendees in the telephone interviews were consistent with those from the online survey:

1. Fear of speaking out
2. Workforce casualisation
3. Inadequate training¹⁸³

When asked to nominate practical changes implemented in their workplace as a result of the Safety Reset sessions examples given included increasing permanent positions, improving vehicle/pedestrian interactions and introducing standardised safety questions into pre-starts. Thirteen attendees didn't think that these changes are enough and future changes are required while 12 attendees identified additional practical changes that they believed would encourage greater safety in their workplace.¹⁸⁴ As already indicated, these findings need to be treated with caution but are generally consistent with other evidence contained in this report.

Some specific incidents involving contract labour

To shed further light on connections between contract-labour/labour hire the investigations into four mining fatalities, two in NSW and Queensland, were examined. I already held copies of the NSW reports (but had only examined one, Ravensworth, in detail as part of giving industry presentations on failures leading to death and disaster, primarily selected to include an open-cut incident) while the two Queensland reports were selectively randomly in a web-search. Such a small sample is not generalizable but can provide more detail on casual processes that may be of value, especially as the connections between contractor/labour hire and OHS are complex and have been less explored in mining than several other industries (see above) and further, fatalities and serious incidents typically arise from multiple factors. This examination may also help offer guidance as to the strengths/value of existing investigations as well as (in the context of learning identified elsewhere in the report) aspects of incidents where investigations may develop further.

Ravensworth fatality 2013

¹⁸³ Ronan Analytics, (2019) *Queensland Safety Reset Survey Analysis and Key Findings Report*, Department of Natural Resources, Mines and Energy, Brisbane, 3.

¹⁸⁴ Ronan Analytics, (2019) *Queensland Safety Reset Survey Analysis and Key Findings Report*, Department of Natural Resources, Mines and Energy, Brisbane, 11.

The death of, Ms Ingrid Forshaw, a worker at the Ravensworth open-cut coalmine (engaged as a trainee under a fixed term contract to TESA Mining in February 2013) in November 2013 demonstrates these points but also the scope for more systematic investigation of and research into fatal incidents to identify causal patterns. At the time of the incident there were approximately 436 employed at the mine (171 of who were contractors). The death resulted from a night-time collision between two vehicles (not exceptional in open cut mines), in this case a lighter vehicle driven by Ms Forshaw and a large mine vehicle (whether this worker was labour hire or engaged directly by the mine is not identified in the investigation report). The subsequent investigation provided a number of important findings and observations.¹⁸⁵ Both workers were relatively recent appointments (within the past 12 months) and undergoing competency training at the mine and general evidence indicates workers with short tenure are at greater risk of injury (irrespective of age) than those with longer tenure at a worksite.¹⁸⁶ Further, the heavy vehicle driver had just been assessed as competent on the bigger Caterpillar 793D haul dump truck and was driving their first shift in it both at night and after rain (where water ponding/reflection affected visibility – see below). The investigation found evidence of most of the 10 pattern failures identified as repeatedly occurring in mining fatalities and disasters. The investigation found deficiencies in the 2013 Traffic management plan at the mine including windrow heights, intersection design, grades and crossfalls contributing to water ponding (vehicle lights were also significantly covered with mud-splatter) – evidence of engineering/design/maintenance failure. With regard to failure to heed warning signals the investigation found 11 prior incidents (near misses/minor collisions) between 19 January 2011 and 17 October 2013. A presentation was made on heavy vehicle interactions but this overwhelmingly emphasised behaviour/administrative controls and not engineering or other remedies - arguably also evidence of failures in risk assessment and management systems (the investigation made specific and detailed reference to the hierarchy of control). A risk assessment had been undertaken in 2013 that identified collision risk due to communication and vision issue (including some reference to wet conditions but not in combination with night conditions, perception error regarding building lights and ponding). The investigating inspector identified a number of gaps in the risk assessment. The mine had audited its systems but didn't consider higher order controls like vehicle separation (along with pedestrian/vehicle separation a major tool in managing traffic hazards). The investigation also found evidence of poor worker/management communication (another pattern failure). A safety climate survey (100% response) undertaken by the mine in 2012 found low scores for worker involvement in safety; a perception of supervisor production pressure; poor safety communication between teams; a low score re willingness to report mistake/errors; and concerns over fatigue management. The investigation referred to regulatory obligations. Although it made no reference to gaps in this regard concerns were raised by a report by the Australian Road Research Board (ARRB) Group commissioned by the investigation¹⁸⁷ about the lack of specific guidance

¹⁸⁵ NSW Mine Safety Investigation Unit (2015) Investigation into a fatal collision between a Caterpillar 793D haul dump truck and a Toyota Landcruiser at Ravensworth open cut mine on 30 November 2013, Report written November 2014.

¹⁸⁶ Breslin, F. & Smith, P. (2005) Age-related differences in work injuries: A multivariate, population-based study, *American Journal of Industrial Medicine* 48:50–56.

¹⁸⁷ ARRB Group Pty Ltd, Contract Report: Investigation into a vehicular incident at Ravensworth Open Cut Coal Mine on 30 November 2013, 9 September 2014. The report stated (in part): 'ARRB Group Ltd (ARRB) was engaged by the department to provide an independent report on road environment factors relating to the incident. ARRB conducted a desktop study of the intersection against Ravensworth mine standards and 'ARRB best practice' (best practice) based on Safe System principles (see Section 15), in lieu of a recognised national

standards for the industry to deal with the challenges posed in establishing safe traffic regimes (including use of right-hand drive vehicles). Relevant to reward/production pressure failure, the investigation noted that the 2013 Annual Report indicated a goal of substantially increased production for the mine and the mine identified challenge in this regard with regard to resources, training, systems and processes to achieve this goal. The investigation noted (at page 8):

In 2012, 103 new production and 24 new maintenance employees were engaged, taking the total site employees to about 300. The 2013 plan for the mine involved recruiting 190 new employees (including redeployments, trainees, and experienced operators) throughout the year, with 110 new employees targeted between January and March 2013. There was a staged delivery program for over 500 million dollars of mining equipment from 2012 to 2015 including 23 CAT 797 trucks and 35 CAT 789 trucks.¹⁸⁸

In its 2013 Annual Report GlencoreXTRATA noted a 9% increase in thermal and semi-soft coking coal production in Australia over 2012 which it attributed to expansion at Ravensworth and two other mines.¹⁸⁹ The OHS and environmental section of the GlencoreXTRATA report referred emphasised its commitment to zero harm, stating no fatality was acceptable and improving safety, including presenting enhanced processes and updates to every Board meeting. The key performance indicators (KPIs) identified were zero fatalities and lost-time-injury-frequency rates (LTIFRs) but while the LTIFR was reported I could find no reference to Ms Forshaw's death or any other work-related fatality in that year.¹⁹⁰ Nor was there any reference to how the OHS challenges of expanding production were being managed at Ravensworth or other mines.

standard (also discussed later in the report). ARRB observations with regard to the intersection type, geometry, control and transient characteristics at the time of the incident are summarised below.

Safe system principles

The Safe system principles adopted by ARRB in considering the road environment at Ravensworth mine was explained by the concept 'Safe Road Users driving at Safe Speeds in Safe Vehicles on Safe Roads and Roadsides', i.e. the components are complementary and considered as inputs to a system which can determine the ultimate outcome, rather than being seen in isolation. It is recognised within the safe system that:

- humans (road users) make mistakes on road networks and should not 'pay' with their life for doing so
- the human body has only limited tolerance to impact forces.

ARRB has had great success in applying both the long-standing and emerging safe system principles of road network safety and road safety engineering to a range of private sector road networks. This has included assisting many mine owners / operators to rationalise and reduce risk on their haul road networks within open cut mining operations.

Road design and construction standards and guidelines

Open cut mine sites are unique operating environments with many different functions and uses taking place, with a diverse range of vehicles (in terms of size, performance, fields of view etc.) and vulnerable road users. Their interactions and the risks associated with such interactions need to be understood, and knowledge, skills and experience applied. ARRB noted that definitive industry standards and guidelines do not currently exist in this technical area, either internationally or within Australia. Many documents have been developed, either by individual mines or mining companies which all tend to vary in terms of coverage and the level of road safety, traffic engineering and traffic management knowledge and experience displayed.

¹⁸⁸ NSW Mine Safety Investigation Unit (2015) Investigation into a fatal collision between a Caterpillar 793D haul dump truck and a Toyota Landcruiser at Ravensworth open cut mine on 30 November 2013, 8.

¹⁸⁹ GlencoreXTRATA Annual Report 2013, 69.

¹⁹⁰ GlencoreXTRATA Annual Report 2013, especially 12-13.

Both thermal and coking coal prices had been falling since 2011 due to increased global production (including Indonesia) placing pressure on higher cost producers. With regard to coking coalmines GlencoreXTRATA made a number of changes in Australia linked to this including shifting from a double longwall to a single longwall at Oakey North and placing its Collinsville mine on care and maintenance ‘following an inability to agree an appropriate enterprise agreement with the union.’¹⁹¹ Whether the production increase at Ravensworth was linked to the Collinsville closure is unclear but it was certainly aligned with a broader shift by Australian producers. In December 2013 the *Resources and Energy Quarterly* noted that:

Rather than reducing output in response to declining prices, many high cost producers have increased production in order to reduce their unit cost. Some of these producers, largely in Australia, are locked into fixed take-or-pay contracts for infrastructure services and it has been more cost effective to increase production than to close. This extra production has placed further downward pressure on thermal coal prices.¹⁹²

Whether there is a connection between falling coal prices, production pressures, the use of contractors and mine safety, especially fatalities, is not established. However, the coincidence warrants careful investigation because if there are associations this will prove valuable if not vital in measures to improve mine safety.¹⁹³

Ridgeway Mine Cadia fatality 2015

On 6 September 2015 Lee Peters, 28, was fatally injured when he was crushed in a pinch point between a Jacon Maxijet water cannon and a mine wall at the Ridgeway Mine Cadia (NSW) about 1 km underground in an extraction drive. Mr Peters had been employed for about four years by Pybar Mining Services Pty Limited (PMS, a wholly owned subsidiary of Pybar Holdings Pty Limited or PHPL, one of the largest underground mining contractors in Australia, with operations in Queensland). The following is drawn from the regulator’s investigation which noted that ‘the pinch point was created when fragmented rock flowed out of a blocked draw point and contacted the front of the water cannon, which pushed it backwards causing its left hand rear corner to impact with the western sidewall of the extraction drive.’¹⁹⁴

With regard to the labour hire agreement the investigation stated:

On 31 August 2011, CHPL and PMS entered into a contract for the provision of labour and equipment hire for general maintenance, shift coverage, shutdown and minor capital works.

¹⁹¹ GlencoreXTRATA Annual Report 2013, 69.

¹⁹² Australian Government Bureau of Resource and Energy Economics, *Resources and Energy Quarterly*, Canberra, December 2013, 16.

¹⁹³ I want to acknowledge the assistance of Ms Heather Jackson in alerting me to and helping to obtain the information in relation to Ravensworth. Ms Jackson is currently completing a PhD at the University of Newcastle (for which I am a joint supervisor) which entails a detailed examination of approximately 50 fatal, serious or high potential mine incidents, including specifically testing both ‘10 Pathways’ and socio-technical explanations of workplace fatalities. I believe her research will prove valuable in informing enhanced safety improvements in the industry. Jackson H, (in preparation) Benchmarking the performance of the NSW mining industry, PhD thesis, University of Newcastle.

¹⁹⁴ Manager Regulatory Audit and Investigation Unit (2016) *Investigation Report: Report into the death of Lee Peters at Ridgeway Mine, Cadia, NSW on 6 September 2015*, NSW Department of Industry, Skills and Regional Development, NSW Resources Regulator, Sydney.

The contract outlined PMS's health and safety obligations, in particular the contractor's obligations with regard to the provision of health and safety information and working under the NML health and safety management system.

The relationship between PML and CHPL was a relationship of independent contractor and principal.

PMS employees were expected to work under the NML health and safety management system while at work at CVO.

It was a statutory provision of PMS to ensure that their employees were working under a safe system of work. This means that PMS was expected to review the NML health and safety management system at regular periods and ensure its adequacy for supporting their employees. PMS ensured that this occurred by providing a dedicated project manager for CVO whose role included consultation, co-operation and co-ordination of activities with relevant people at the mine site.¹⁹⁵

NMLs' application for CHPL to operate the Cadia mine was accepted by the Department in 2008. The investigation incorporated NML's corporate statement on its commitment to OHS and the strategies relevant to this:

Newcrest is committed to the safety, health and well-being of all people involved in our business and recognises that we will only achieve our vision of zero injury when:

- we believe that all injuries are preventable
- we continually strive to improve our health and safety management systems and practices
- we value consultation and engagement with all personnel in improving our performance
- safe behaviour is a condition of employment
- we accept responsibility for the occupational health and safety of our people, and we all accept responsibility for our personal safety and health and that of others
- we provide effective training and the right equipment for people to work safely
- controlling risk and ensuring health and safety is a key part of every decision
- we promote off the job safety and support the wellness of our people

Our health and safety strategy is built on three key pillars – NewSafe, Critical Control Management, and Process Safety Management. The strategy builds on a strong foundation of group-wide systems and standards which have been implemented in recent years.

NewSafe is Newcrest's next step in building our safety culture. There are three components to NewSafe – NewSafe Leadership which focusses on building safety leadership at all levels; NewSafe Coaching which specifically supports our frontline supervisors; and NewSafe Behaviours which takes our employees and contractors through a process to identify the most important safety behaviours in their area, and uses a behavioural influencing model to formulate

¹⁹⁵ Manager Regulatory Audit and Investigation Unit (2016) *Investigation Report: Report into the death of Lee Peters at Ridgeway Mine, Cadia, NSW on 6 September 2015*, NSW Department of Industry, Skills and Regional Development, NSW Resources Regulator, Sydney, 10.

their own plan to enable and motivate these behaviours. Building on a solid foundation of major hazard risk assessments which Newcrest has undertaken for many years, our critical control management approach focusses on verifying the operation of the controls we have identified as being critical to preventing fatalities and life-altering injuries.

Completing our strategic approach is a continual improvement focus on Process Safety Management, an area of safety management which is primarily concerned with preventing high-consequence catastrophic events.¹⁹⁶

The investigation makes no specific observations on this statement. Notable in the corporate objectives statement from what is examined elsewhere in the report is while that process safety and catastrophic risk are certainly referred to more space is devoted to explaining the company's activities with regard to behaviour control.

In terms of operations at the mine it observed:

The NML health and safety management system master document is known as the mine safety management plan (MSMP). The MSMP identified elements of the CVO safety and health management system required for compliance with both NML corporate safety and health objectives and site specific work health and safety statutory obligations.

The MSMP applied to all areas at CVO including Ridgeway Mine.

As depicted in Figure 8 the HSMS was divided into:

- the MSMP overview
- major hazard management plans
- safe operating procedures
- safe work procedures
- workplace risk assessment
- workplace awareness¹⁹⁷

The diagram (Figure 8) is not reproduced here but included chains of responsibility and the major hazard management, emergency and other plans required by the legislation. As with the objectives statement the investigation makes no mention of if or how NML's plans affected the incident although the findings below suggest some objectives and systems were not met and the overall system did not necessarily translate into what PMS did, and it seems, what was reported back to NML in its oversight role.

The investigation identified a number of significant failures in the management of safety at the mine including:

¹⁹⁶ Manager Regulatory Audit and Investigation Unit (2016) *Investigation Report: Report into the death of Lee Peters at Ridgeway Mine, Cadia, NSW on 6 September 2015*, NSW Department of Industry, Skills and Regional Development, NSW Resources Regulator, Sydney, 4-5.

¹⁹⁷ Manager Regulatory Audit and Investigation Unit (2016) *Investigation Report: Report into the death of Lee Peters at Ridgeway Mine, Cadia, NSW on 6 September 2015*, NSW Department of Industry, Skills and Regional Development, NSW Resources Regulator, Sydney, 4-5.

The standard work procedure for operating the water cannon when it was water jetting required the operator to stand on the northern side of the machine but on the opposite side of the extraction drive to where Mr Peters was found, and to retreat downwind when a hang up let go and shelter behind the pillar separating the adjacent draw point.

However, investigators identified that some workers would instead go the opposite way, behind the water cannon, to the fresh air side (upwind) of the draw point.¹¹¹² Enquiries revealed that this was in order to get out of the dust that was released when a hang up let go. This practice exposed workers to a pinch point behind the water cannon and some supervisors knew this occurred.¹⁹⁸

In terms of 10 pathways the above would constitute failure to audit systems. The investigation also found failure in terms of safety systems as the following observations make clear:

Investigators also identified that a number of critical policies and procedures that workers were required to comply with contained inconsistent, ambiguous and/or outdated advice. Importantly, this applied to the location and size of bunds constructed in front of draw points to protect workers from the inflow of rock and material from the draw point.

Bunds were classed as a critical control at the Ridgeway Mine. A critical control is defined as 'a control that is crucial to preventing the event or mitigating the consequence of the event. The absence or failure of a critical control would significantly increase the risk despite the existence of other controls'.

The investigation identified four different directives concerning the location and size of bunds. Further, safe work procedures were not updated to reflect changing risks within the mine.¹⁹⁹

The investigation identified failures in risk assessment:

The investigation also identified that the risk profile of a block cave mine changes over time. When working in such a dynamic environment, continuous assessment of risks must be undertaken to ensure controls remain relevant and effective.²⁰⁰

Indeed, the investigation found the risks to be foreseeable:

The risks associated with working in and around open draw points and around mobile mining machinery are well known to the mining industry. Mine operators must effectively manage and control these risks to ensure the health and safety of workers.

¹⁹⁸ Manager Regulatory Audit and Investigation Unit (2016) *Investigation Report: Report into the death of Lee Peters at Ridgeway Mine, Cadia, NSW on 6 September 2015*, NSW Department of Industry, Skills and Regional Development, NSW Resources Regulator, Sydney, i.

¹⁹⁹ Manager Regulatory Audit and Investigation Unit (2016) *Investigation Report: Report into the death of Lee Peters at Ridgeway Mine, Cadia, NSW on 6 September 2015*, NSW Department of Industry, Skills and Regional Development, NSW Resources Regulator, Sydney, ii.

²⁰⁰ Manager Regulatory Audit and Investigation Unit (2016) *Investigation Report: Report into the death of Lee Peters at Ridgeway Mine, Cadia, NSW on 6 September 2015*, NSW Department of Industry, Skills and Regional Development, NSW Resources Regulator, Sydney, ii.

There were a number of previous incidents involving the inflow of rock and material at the mine that highlighted the foreseeable nature of the risk.²⁰¹

Further, to the observations just quoted there were also warning signals that were inadequately responded to, if not ignored:

The water cannon procedure in effect at the time of the incident was last updated in May 2012. Subsequently, a significant number of uncontrolled inflows of dry and wet material from draw points occurred, particularly in late 2014. These incidents were attributed to a change in the nature of the cave material.

Legislation requires that procedures are reviewed when incidents occur and proper incident analysis is performed to identify both positive and negative trends. These previous incidents were investigated by the mine operator but there were no revisions to the safe work procedures issued.²⁰²

Further, the investigation identified failures that would fit under the category of engineering, design and maintenance flaws in 10 pathways:

The use of the water cannon was considered by the mine to be an effective technique to unblock draw point hang ups. The water cannon was constructed at the request of the mine operator by modifying a purpose built machine for applying shotcrete (sprayed concrete).²¹ In order to operate effectively as a water cannon, the operator was required to stand outside the cab and use a remote control, exposing the operator to potential inflows of rock and material.

Reinforcing the point about engineering/design failures the investigation noted a number of specific remedial measures in this regard following the incident:

After the incident, the mine operator constructed a ladder and walkway across the back of the water cannon for access and egress to eliminate workers from being exposed to the pinch point between the rear of the water cannon and mine wall.

Remote control technology was also trialled that enabled the water cannon to be operated from a safe distance.

Workers were prohibited from being on foot in the vicinity of draw points and inspections of draw points were required to be undertaken from mining plant such as an underground loader.

A full audit of draw point bunds was also undertaken and further emphasis was placed on the need for well-constructed bunds designed to consistent standards.

²⁰¹ Manager Regulatory Audit and Investigation Unit (2016) *Investigation Report: Report into the death of Lee Peters at Ridgeway Mine, Cadia, NSW on 6 September 2015*, NSW Department of Industry, Skills and Regional Development, NSW Resources Regulator, Sydney, 34.

²⁰² Manager Regulatory Audit and Investigation Unit (2016) *Investigation Report: Report into the death of Lee Peters at Ridgeway Mine, Cadia, NSW on 6 September 2015*, NSW Department of Industry, Skills and Regional Development, NSW Resources Regulator, Sydney, ii.

The mine operator also identified two pieces of plant that could be substituted for the water cannon.

Neither machine required the operator to leave the enclosed cabin during operation.²⁰³

Another finding might be taken as evidence of poor worker/management communication:

On more than one occasion workers told investigators that water jetting a hang up was an ‘adrenalin rush’. Workers attributed this ‘rush’ to the sudden release of rock and material during the water jetting process. Such statements provide insight into the operational environment faced by workers involved in secondary break activities using the water cannon.²⁰⁴

With regard to regulatory failings/shortcomings, in addition to making detailed recommendations to operators in the industry as remedial measures following the incident (highlighting the wider problems identified) the investigation recommended:

1. Consider the development of a targeted assessment program focusing on draw point management.
2. Consider the development of guidance material relating to draw point control in underground metalliferous mines.
3. Consider the development of a targeted assessment program focusing on workforce exposure to dust in caving operations and associated load haul dump and crushing operations.
4. Consider the development of a targeted assessment program focussing on the interaction of workers and mobile plant in underground mining operations.
5. Review the requirements to report material movements to the regulator in the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014.²⁰⁵

The three remaining 10 pathways were either not specifically investigated or evidence didn’t warrant their inclusion in the report namely economic/production pressures compromising safety (though the water cannon limitations were consistent with using a lower cost option); regulatory failures; worker and other concerns prior to the incident; and failures in emergency/rescue procedures. With regard with the last, Mr Lee was working alone (common in many mining activities) and it is not clear from the report whether more immediate assistance would have helped.

Taken as a whole the investigation found evidence that, notwithstanding the fact that the contractor was large, specialised and experienced, there had been systemic and longstanding failures with regard to managing a well-known risk and these failures were indicative of more general failings in

²⁰³ Manager Regulatory Audit and Investigation Unit (2016) *Investigation Report: Report into the death of Lee Peters at Ridgeway Mine, Cadia, NSW on 6 September 2015*, NSW Department of Industry, Skills and Regional Development, NSW Resources Regulator, Sydney, 34.

²⁰⁴ Manager Regulatory Audit and Investigation Unit (2016) *Investigation Report: Report into the death of Lee Peters at Ridgeway Mine, Cadia, NSW on 6 September 2015*, NSW Department of Industry, Skills and Regional Development, NSW Resources Regulator, Sydney, ii.

²⁰⁵ Manager Regulatory Audit and Investigation Unit (2016) *Investigation Report: Report into the death of Lee Peters at Ridgeway Mine, Cadia, NSW on 6 September 2015*, NSW Department of Industry, Skills and Regional Development, NSW Resources Regulator, Sydney, iii.

OHS management (see the shortcomings regarding safe work procedures and failures in risk assessment for example).

The failures can also be examined in terms of Pressure, Disorganisation and Regulatory failures (PDR) which, as already indicated, has been used to examine non-standard work arrangements. PDR incorporates all the elements found in 10 pathways but is a more generic model used to examine an array of health and safety outcomes while 10 pathways focuses on the specific mechanisms leading to death and disaster at work. In terms of PDR the findings could be seen as evidence of disorganisation (see for example flaws in the management system, failure to act adequately on warning signals and failure to undertake risk assessment on a well-known risk when required to by legislation). Short tenure/inexperience identified in connection to other incidents does not appear to have been an issue (or at least not particularly significant). Mr Lee had worked at the operation for about four years, was not new to the operation and the investigation identified an array of training programs he had undertaken without making specific reference to any deficiencies. With regard to experience it stated:

Mr Peters operated a small business outside of his obligations with PMS and NML and is reported to have experience around heavy mobile earth moving equipment. This was Mr Peter's first underground mining role.²⁰⁶

This statement implies Mr Lee was still undertaking an outside role in addition to underground mining but did not examine whether there might have been any adverse interactions (most obviously, with regard to fatigue).

Newlands Mine Coal Handling and Preparation Plant fatality 2016

On 30 August 2016, Mr Ian Hansen was fatally injured by a falling deck plate that he and three other workers were in the process of removing at a chain feeder at the Newlands Mine Coal Handling and Preparation Plant (CHPP) then undergoing work as part of a general maintenance shutdown. Glencore, the operator of the Newlands Mine CHPP, had contracted UGL to undertake the maintenance work. Mr Hansen was a 55 year old trades' assistant/rigger employed by UGL who had completed, a Standard 11 coal surface induction and a Coal Assets Australia Glencore induction and held all appropriate competencies for the work he was undertaking at Newlands. The subsequent investigation revealed a number of significant failures in OHS management that contributed to Mr Hansen's death including failures in the arrangements between Glencore and UGL.²⁰⁷ The investigation summary stated:

The Mines Inspectorate investigation identified several key factors that contributed to the incident including that the contract between Glencore and UGL had requirements for safe work method statements and risk assessments that were not met, the task of removing the chain feeder deck plates was non-routine, poorly planned and inadequately supervised and

²⁰⁶ Manager Regulatory Audit and Investigation Unit (2016) *Investigation Report: Report into the death of Lee Peters at Ridgeway Mine, Cadia, NSW on 6 September 2015*, NSW Department of Industry, Skills and Regional Development, NSW Resources Regulator, Sydney, 13.

²⁰⁷ Mines Safety and Health, (2017) *Investigation report: Report into a fatality at the Newlands Mine Coal Handling and Preparation Plant, Newlands, Queensland on 30 August 2016*, Department of Natural Resources and Mines, Brisbane.

that the work crew and its supervisors took a less than adequate approach to risk assessments and safety procedures.²⁰⁸

With regard to both parties the investigation noted both were large, Glencore a multinational mining corporation and UGL provided contract workers for a wide range of engineering, construction and maintenance services (employing or contracting over 10,000 people across Australia, New Zealand and Southeast Asia). It would be presumed that such large organisations operating in a high-hazard industry would both have well-developed safety systems and oversight of their implementation.

With regard to safety responsibilities at the site the investigation stated:

Newlands has a comprehensive Safety and Health Management System which includes policies, Standard Operating Procedures and procedures that describe in detail how work is to be performed. It has also implemented SAFECOAL rules which provide for critical behaviour and actions to be maintained in the workplace.

A Newlands Surface Operations Contractor Authority to Work Permit had been completed. It specified requirements for contractors to work in accordance with the Newlands Safety and Health Management Systems.²⁰⁹

With regard to the contract between Glencore and UGL the investigation noted:

Glencore Coal Queensland contracted UGL Operation and Maintenance (Services) Pty Ltd (UGL) to undertake maintenance services at several sites including the Newlands Mine CHPP. The contract, Umbrella Agreement XCQ001551, was executed on 22 October 2013 and expired on 30 June 2016 (with option to extend). The investigation identified that the contract had apparently expired as the extension option had not been formally executed.²¹⁰

With regard to planning work and the safety system, the investigation stated:

The contract between Newlands and UGL included specific requirements related to work planning and safety and health management. The reporting of hazards, undertaking risk assessments on all tasks, the provision of Standard Operating Procedures and development of Safe Work Procedures were all required. The specific contract requirements were not known and so were not supplied by UGL nor sought by Glencore.

Newlands Surface Operations also requires a risk assessment to be completed prior to commencing work. The chain feeder work required a level 2 Job Safety Analysis. The JSA was signed-off by a supervisor that was not supervising the work which is inconsistent with the requirements of the safety and health management system. The safety and health

²⁰⁸ Mines Safety and Health, (2017) *Investigation report: Report into a fatality at the Newlands Mine Coal Handling and Preparation Plant, Newlands, Queensland on 30 August 2016*, Department of Natural Resources and Mines, Brisbane, 1.

²⁰⁹ Mines Safety and Health, (2017) *Investigation report: Report into a fatality at the Newlands Mine Coal Handling and Preparation Plant, Newlands, Queensland on 30 August 2016*, Department of Natural Resources and Mines, Brisbane, 1.

²¹⁰ Mines Safety and Health, (2017) *Investigation report: Report into a fatality at the Newlands Mine Coal Handling and Preparation Plant, Newlands, Queensland on 30 August 2016*, Department of Natural Resources and Mines, Brisbane, 5.

management system requires major changes or additions to the work to be reviewed and the JSA amended and signed-off. This did not happen.

The Newlands Surface Operations standard for lifting and craneage specifies minimum competencies to be held by persons undertaking lifting works. The lift was not considered to be complex and Mr Hansen held the relevant competency. A Work Authorisation Form, required for any lifting task, was not completed.²¹¹

To address some of the deficiencies identified prior to completion of the investigation, the Investigation Report noted that on 8 September 2016 Mines Safety Alert no 331 was issued (<https://www.dnrm.qld.gov.au/mining/safety-and-health/alerts-bulletins-search1/alerts-bulletins/mines-safety/fatality-involving-chain-feeder-at-a-wash-plant>) recommending that all sites review the application and effectiveness of work planning processes and related risk assessments, lifting management processes and contract management.²¹²

In addition to the safety system failures already identified, problems contributing the incident included poor communication and informal supervision arrangements:

Witness statements suggest different recollections about the final events surrounding the incident. It was generally accepted that as the rigger, Mr Hansen was 'in charge' of the task.

One crew member states that Mr Hansen told him to remove the bolts from the deck plate and that he did as instructed. He was assisted by another crew member and neither of them recall having checked for people under the deck plate. The crew member who removed the bolts believed Mr Hansen was behind him.

At the time, the fourth crew member was under the deck plates and states that Mr Hansen entered the area below the deck plate to tell him that they were going to remove the bolts and that he should leave the area. That crew member left through the western side railing and saw Mr Hansen bend down, as if to leave through the eastern side railing.

The crew member that had been under the deck plates did not recall hearing the rattle gun used to remove the bolts.

Shortly after exiting through the western side railing the crew member heard the plate fall and impact Mr Hansen.²¹³

The investigation made further observations about communication:

²¹¹ Mines Safety and Health, (2017) *Investigation report: Report into a fatality at the Newlands Mine Coal Handling and Preparation Plant, Newlands, Queensland on 30 August 2016*, Department of Natural Resources and Mines, Brisbane, 11-12.

²¹² Mines Safety and Health, (2017) *Investigation report: Report into a fatality at the Newlands Mine Coal Handling and Preparation Plant, Newlands, Queensland on 30 August 2016*, Department of Natural Resources and Mines, Brisbane, 2.

²¹³ Mines Safety and Health, (2017) *Investigation report: Report into a fatality at the Newlands Mine Coal Handling and Preparation Plant, Newlands, Queensland on 30 August 2016*, Department of Natural Resources and Mines, Brisbane, 7.

Pre-start meetings were held both by Newlands and UGL prior to the commencement of shifts. No documented shift handovers were utilised, rather supervisors relied on verbal reports that generally focused on areas of perceived difficulties.

UGL contractors had not necessarily worked together prior to their first shift of the shutdown. There was limited training provided in relation to team building or communications training of defining work group roles. There was no formal communication process followed to check if a work area was safe to enter or be in.²¹⁴

More specifically on the issue of supervision the investigation stated:

While no formal organisational structure was prepared for the shutdown, it was generally understood by Newlands and UGL that a form of matrix structure was in place. Within UGL, the supervisor who was involved in the maintenance shutdown planning was considered to be in charge. The UGL supervisors deferred to Newlands supervisors when decisions on work scope were required.

No other supervisors involved in the incident had been involved in planning the jobs prior to the shutdown nor fully briefed on the work scopes prior to the commencement of the shutdown. There was no formal review process to ensure adequate planning of jobs.

A reliance on the experience of the work crew was evident. There was a sense that the team had the job under control and therefore didn't require strict supervision.²¹⁵

With regard to engineering/design and maintenance failures the investigation that lighting was good, noise not a major distraction, the work area was clean (no oil or grease spillages evident and only small pieces of coal and some coal dust) and a number of protections were in place (the ROM facility had been isolated and de-energised, no conveyors, feeders or sizers were operational, the area under the chain feeder was demarcated by permanent handrails, a work platform underneath the feeder had been erected, and access to the area was restricted by handrails). However the report went onto state:

The site did not allow for a straight vertical lift of the second bottom deck plate. The plate had been rigged using the same point as the rear bottom deck plate, which had enabled a straight vertical lift. When the rear bottom deck plate dropped from its position it dropped straight down (supported by the rigging). However, utilising the same rigging point for the second bottom deck plate meant that the plate swung in an arc as it dropped. There was also no provision to support the deck plate from underneath.²¹⁶

²¹⁴ Mines Safety and Health, (2017) *Investigation report: Report into a fatality at the Newlands Mine Coal Handling and Preparation Plant, Newlands, Queensland on 30 August 2016*, Department of Natural Resources and Mines, Brisbane, 12.

²¹⁵ Mines Safety and Health, (2017) *Investigation report: Report into a fatality at the Newlands Mine Coal Handling and Preparation Plant, Newlands, Queensland on 30 August 2016*, Department of Natural Resources and Mines, Brisbane, 12.

²¹⁶ Mines Safety and Health, (2017) *Investigation report: Report into a fatality at the Newlands Mine Coal Handling and Preparation Plant, Newlands, Queensland on 30 August 2016*, Department of Natural Resources and Mines, Brisbane, 10.

Finally, the investigation found that the risks were foreseeable and identified a number of failures with regard to risk assessment/management:

The investigation concluded that there were a number of foreseeable risks in the planned shutdown work to the chain feeder.

An issue of risk was the unknown properties of the deck plates. The Original Equipment Manufacturer (OEM) manual did not contain a risk-based methodology for removal and replacement of the deck plates and there was no request made to gain such information. The investigation following the incident found a discrepancy in the mass of the deck plate. The OEM stated the mass to be 890kg but it was actually 390kg. Without a known risk-based methodology and correct information, the planning for the removal of the plates could not have been comprehensive.

Gaps in the supervision of the chain feeder work are apparent. The delineation of responsibility between Newlands supervisors and UGL supervisors, the hand-over between dayshift and nightshift supervisors and the supervision of the JSA covering the work (its development and amendment) were unclear and did not adhere strictly to policies and procedures.

The personal interactions in a work team creates a foreseeable risk. Without a known and utilised protocol for communication at stress points or action points in a task, the risk for miscommunication is present. This is ever more so when a work group is newly formed, as was the case in this incident.²¹⁷

The investigation conclusions were extremely critical of both Newlands and UGL (with a number of detailed recommendations on making improvements not detailed here):

There were a range of failures surrounding the incident including that safe work method statements and risks assessments required under the Umbrella Contract were not made, a known method for removing the deck plates was not obtained, the risk assessment for the task was not comprehensive and supervision was lax.

As the work on the chain feeder progressed there was little formal communication between the shifts or among supervisors, procedures to update the JSA reflecting changes to the task were not followed and the supervisor was not always close at hand.

The factors that contributed to the incident can be grouped into planning, supervision and communication.

There was a lack of detailed planning to guide the chain feeder work. The process for removing the plates appears to have relied on the workers' knowledge of similar structures and estimating possible outcomes. This lead to unnecessary risks in undertaking the work. The lack of planning to clearly outline the equipment to be used and the standards to be followed also lead to the use of substandard engineering practices.

²¹⁷ Mines Safety and Health, (2017) *Investigation report: Report into a fatality at the Newlands Mine Coal Handling and Preparation Plant, Newlands, Queensland on 30 August 2016*, Department of Natural Resources and Mines, Brisbane, 12.

More rigorous supervision of the process - from ensuring the Umbrella Contract was properly made to signing off on amendments to the process of removing the plates – would have provided greater opportunities to identify and mitigate risks on site.

There was an evident lack of formal communication channels and practices. Between supervisors, between work groups and within work groups, poor communication is evident. At the time of the incident there was a misunderstood communication, as the bolts were removed prior to clearing the area under the deck plates.

Some of the oversights surrounding the incident occurred due to a less than rigorous enforcement of existing safety and risk assessment procedures while some appear to have arisen due to gaps in the safety and risk assessment regimen.²¹⁸

In terms of 10 pathways the investigation found that there were failures with regard to engineering/design, risk assessment, management systems, and management/work communication which contributed to Mr Hansen's death. While system auditing was not specifically identified as a failure it seems reasonable to presume they had been flaws or a failure to act there because a number of system deficiencies were significant, appear to have been long-standing and therefore should have been picked up by rigorous auditing, including Newlands oversight of UGL procedures and practices. Evidence suggests there were no failures in emergency/rescue procedures that contributed to the fatality. The investigation didn't investigate or if it did found no evidence of prior warning signals, economic/production pressures, regulatory failures/deficiencies or if supervisors, workers others like consultants had expressed concerns prior to the event. Viewed another way, through the lens of PDR, while the systems in place purported to be comprehensive and configured such that UGL operations would sit synergistically within the overarching OHS regime, the practical reality fell far short of this, with disorganisation evident in a number of critical areas and heavy reliance on informal decision-making in a hazardous activity belying the strong focus on procedures, process safety and behavioural control enunciated in corporate OHS objectives.

Goonyella Riverside Mine fatality 2017

On 5 August 2017 Mr Daniel Springer, an employee of Independent Mining Services (IMS), was fatally injured while performing maintenance on the outside of an excavator bucket at the Goonyella Riverside Mine when during cutting an external wear plate of the bucket into smaller pieces, part of the plate unexpectedly sprang up and struck Mr Springer in the head. The key findings of an investigation carried out by the Queensland mines inspectorate were that:

Goonyella Riverside mine commissioned ESCO Corporation, an engineering company, to undertake maintenance on a number of buckets in 2014 which involved modifications to the original equipment design. The original manufacturer was not consulted on these modifications. The external wear plate was originally made up of multiple small thin plates. During these modifications the multiple small plates were replaced with two large plates.

²¹⁸ Mines Safety and Health, (2017) *Investigation report: Report into a fatality at the Newlands Mine Coal Handling and Preparation Plant, Newlands, Queensland on 30 August 2016*, Department of Natural Resources and Mines, Brisbane, 13-14.

Analysis from UQMP showed that indentations in the external wear plate were the major reason for the build-up of stored tension which caused the plate to violently spring out during maintenance work. Indentations are caused from impact with hard objects during operation. It was also concluded that having two large wear plates would cause the spring-back to occur with much greater force compared to small thin plates and the spring-back distance is magnified by the length of the wear plate.

The velocity at which the plate moved at the time of the incident was such that a person would not have had time to move out of the way. The force of the impact was such that a person in the line of movement would likely receive fatal injury.

The mine did not undertake a formal risk assessment prior to making the modifications to the bucket. While it is possible that the magnitude of the risk may not have been identified by risk assessment alone, it would have given the best possibility of identifying the hazard.

There was a lack of understanding in the mining industry generally regarding the hazards associated with stored energy in steel plates, and how that energy could be introduced. There had not been similar widely-publicised incidents in the Queensland mining industry prior to this incident.

As a result of these factors, the mine was not aware of the full extent of the hazard and level of risk. As such Mr Daniel Springer, when conducting the maintenance work, was not aware that he was exposed to a potentially fatal hazard.

The QMI made a number of recommendations to the Queensland mine industry to ensure that this type of accident does not occur in the future:

- Smaller wear plates are to be used on excavator buckets as they are safer because the stored tension and spring-back is less than a design using larger plates. The large plates have inherently higher risk and the potential of being a fatal hazard.
- All mines to ensure that they have a procedure within their Safety and Health Management System (SHMS) that requires an effective risk management process to be carried out on any modification being made to plant and equipment prior to the modification being conducted.
- If a modification to plant and equipment is changing the original equipment manufacturer's design, the mine must consult with the manufacturer and / or an appropriate technical expert prior to the modification being conducted.
- The hazard of mechanical spring-back is not limited to excavator buckets. Since the incident, it has been identified that this hazard may also be present in other equipment types due to indentation. It is recommended that a risk assessment takes place before any indented plate sections are cut for removal from any equipment.²¹⁹

In addition to the engineering/design/maintenance and risk assessment issues identified in the executive summary the investigation made a number of more detailed observations, notably:

²¹⁹ Department of Natural Resources, Mines and Energy, (2019) *Investigation report: Report into a fatality at Goonyella Riverside Mine on 5 August 2017*, Queensland Government, Brisbane, executive summary.

Management of change

At the time of the change, the mine's safety and health management system (SHMS) contained a GRM-HSE-PRO-0028 Change Management Procedure. This procedure stated that "this Management of Change Procedure shall be applied to all modifications or changes associated with Plant and Equipment – Introduction, replacement or modification of plant and equipment". The changes to the external floor wear plates conducted in 2014 should have been subjected to the six-step process for managing change as listed in the GRM-HSE-PRO-0028 Change Management Procedure, but this did not occur. In particular, a risk assessment was not conducted.²²⁰

Potential Hazard

The mine's failure to identify potential hazards associated with modifying the original design of the external floor wear plates is likely due to the following:

- The mine did not formally assess the risk associated with modifying the wear plates.
- The mine did not involve technical expertise in assessing the risk associated with modifying the wear plates.
- The mine had an insufficient knowledge or awareness of what could cause a build-up of tension in the large external floor wear plates on excavator buckets.
- Across the coal industry as a whole there is also generally an insufficient knowledge or awareness of what can cause a build-up of tension in the large external wear plates on excavator buckets.²²¹

Training and inductions

Goonyella Riverside mine's STD-0016 Hot Work Standard procedure contained a requirement that all personnel who authorise or conduct hot work must be trained and assessed in the following competencies:

- GRM-SOP-290.01 Hot Work
- Permit to Work and Sub Permit Overview
- Hot Work Competency – Relevant Trade Certificate.

Mr Springer's training records provided by the mine showed that he had not been trained and assessed in the mine's GRM-SOP-290.01 Hot Work competency.

Mr Springer did possess the relevant trade certificate required, and had been trained and assessed in the Permit to Work and Sub Permit Review.²²²

Supervision

²²⁰ Department of Natural Resources, Mines and Energy, (2019) *Investigation report: Report into a fatality at Goonyella Riverside Mine on 5 August 2017*, Queensland Government, Brisbane, 5.

²²¹ Department of Natural Resources, Mines and Energy, (2019) *Investigation report: Report into a fatality at Goonyella Riverside Mine on 5 August 2017*, Queensland Government, Brisbane, 8.

²²² Department of Natural Resources, Mines and Energy, (2019) *Investigation report: Report into a fatality at Goonyella Riverside Mine on 5 August 2017*, Queensland Government, Brisbane, 9.

The IMS workforce consisted of two boilermakers on each shift working on a continuous four panel roster. The panel crews were individually named A crew, B crew, C crew and D crew.

The mine's maintenance manager and field maintenance superintendent, both stated that the field maintenance shift supervisors were assigned the responsibility of supervising the IMS workings in the maintenance bucket shop on each shift.

Up until IMS commenced work at Goonyella Riverside mine, preventative maintenance supervisors were responsible for supervising the workings in the maintenance bucket shop. This arrangement changed on 21 July 2017 when a preventative maintenance supervisor sent an email to the mine's four field maintenance shift supervisors informing them that they were to supervise the IMS workings in the maintenance bucket shop. The field maintenance shift supervisor for the A crew, was on leave at the time of the incident (he had been away from 18 July 2017). The step-up field maintenance shift supervisor for the A crew did not receive the email and subsequently was not aware that he was responsible for the supervision of work in the maintenance bucket shop. As a result, he did not inspect the maintenance bucket shop and was not aware of the Hot Work Sub Permit and JSA.

There was much confusion about who was supervising the IMS workings on each shift because both the field maintenance shift supervisors and the preventative maintenance supervisors were signing off various Hot Work Permits and JSAs relating to the work IMS was carrying out in the maintenance bucket shop. In addition, Mr Springer and his co-worker did not attend all the Preventative Maintenance safe start meetings. This irregular attendance may have contributed to the confusion as to who was actually supervising Mr Springer and his co-worker.

Goonyella Riverside mine was also unable to provide any documented record of the step-up field maintenance shift supervisor having ever been authorised and appointed as a supervisor by the mine's site senior executive (SSE) as required under sections 26 and 56 of the Coal Mining Safety and Health Act 1999. Therefore the step-up field maintenance shift supervisor was not authorised to be a supervisor at the mine.²²³

Planning

There was no documented plan on how the maintenance on bucket #1 was to be carried out. Instructions were given to remove the external heel shoes and external floor wear plates on the bucket, and numerous cracks identified in the bucket had to be gouged out and re-welded. However, it was left to the IMS boilermakers with their trade experience to determine how they sequenced this work.

There was no evidence of whether the bucket's ALS condition monitoring report had been considered when determining the method of removing the external floor wear plates. This report had identified that most of the weld along the right hand side of the

²²³ Department of Natural Resources, Mines and Energy, (2019) *Investigation report: Report into a fatality at Goonyella Riverside Mine on 5 August 2017*, Queensland Government, Brisbane, 9-10.

left wear plate that Mr Springer was removing at the time of the accident (refer to Figure 8 below) was cracked. If this had been considered prior to the work being undertaken, it may have meant the sequential method of dissecting the large wear plate into the smaller pieces would have been different.²²⁴

Risk assessment

In the hours prior to the accident the co-worker stated that he and Mr Springer had discussed the potential of the wear plate springing out when cutting it, and Mr Springer had commented that he was aware of this and knew to keep out of the way when it was likely to happen. The co-worker stated that they had only expected the wear plate to spring out a short distance of approximately 60 mm, and nothing like to the extent that the wear plate later sprang out (600 to 650 mm). This indicates that Mr Springer and his co-worker were not aware of the extent of the risk associated with the hazard.

Despite consideration having been given to potential kickback, and workers discussing the wear plate springing out, the JSA conducted on the task on 4 August 2017 did not identify the hazard associated with the wear plate springing out.²²⁵

Individual/team actions

The co-worker stated that he heard three or four popping noises signalling kickback (springing out) of the wear plates as they were being cut. On each occasion, he received verbal confirmation from Mr Springer that he was okay. Mr Springer continued working indicating that he may have not seen the cracked vertical welds and was not aware of the magnitude of the risk if the large plates sprung back.²²⁶

Safety and health management system

Standard operating procedures

The mine's SHMS did not contain a standard operating procedure for modifying fixed and mobile plant as required by Section 68 of the Coal Mining Safety and Health Regulation 2017. This section states that a coal mine must have a standard operating procedure for modifying fixed and mobile plant, and also that the coal mine's safety and health management system must provide for the following:

- (a) recording modifications made to the plant at the mine
- (b) updating drawings of the plant held at the mine to include the modifications
- (c) assessing and managing risk associated with the modifications.

The mine had a standard operating procedure (SOP) GRM-SOP-120.01 Servicing Maintenance and Assembly of Vehicles Plant and Equipment which referred to the

²²⁴ Department of Natural Resources, Mines and Energy, (2019) *Investigation report: Report into a fatality at Goonyella Riverside Mine on 5 August 2017*, Queensland Government, Brisbane, 10.

²²⁵ Department of Natural Resources, Mines and Energy, (2019) *Investigation report: Report into a fatality at Goonyella Riverside Mine on 5 August 2017*, Queensland Government, Brisbane, 11.

²²⁶ Department of Natural Resources, Mines and Energy, (2019) *Investigation report: Report into a fatality at Goonyella Riverside Mine on 5 August 2017*, Queensland Government, Brisbane, 11.

above section 68 of the Coal Mining Safety and Health Regulation 2017. However, the SOP contained no reference to the three provisions listed above as required by the regulation. The SOP simply stated:

“There is a need to identify critical situations where modification to equipment may affect the safety of persons and/or result in damage to the equipment. Refer to the GRM-HSE-PRO-0028 Change Management Procedure for guidance on when and how to use change management”.

The GRM-HSE-PRO-0028 Change Management Procedure included a six-step process for managing change and stated that “The extent of the risk management process shall be appropriate to the nature of change as below:

- (a) Minor change – BMA Safe
- (b) Moderate Change – Job Safety Analysis
- (c) Significant Change – Facilitated Risk Assessment”.

There was no evidence that this procedure was followed or that any risk assessment was conducted prior to the modification to the external wear buckets.

In addition, the mine was unable to provide any evidence on how the above GRM-HSE-PRO-0028 Change Management Procedure was developed, or who was involved in the development of the procedure. There was also no evidence of any risk assessment having been used in the development of this procedure as required by legislation.²²⁷

Contractor management

The contract owner of the IMS contract with Goonyella Riverside mine (as listed on 21 July 2017), stated in an interview on 11 April 2018 that he did not believe he was the contract owner, and that a clerical error had been made with the documentation. Therefore there was confusion as to who the actual contract owner for IMS was.

The mine’s Contractor Management Plan requires the contract owner to ensure that the contract partner completes and updates, as required, the Contractor Management System (CMS) Checklist to ensure the information is current. The CMS Checklist was completed on 21 July 2017, but was not updated as required. For example IMS had eight employees working at the mine by 4 August 2017, however the CMS Checklist only reflected the three IMS employees who were working at the mine on 21 July 2017.²²⁸

Site Senior Executive

The investigation revealed evidence to suggest that the appointed SSE at Goonyella Riverside mine was not the most senior officer employed who has responsibility for the coal mine as required by section 25 of the Coal Mining Safety and Health Act 1999.

²²⁷ Department of Natural Resources, Mines and Energy, (2019) *Investigation report: Report into a fatality at Goonyella Riverside Mine on 5 August 2017*, Queensland Government, Brisbane, 12-13.

²²⁸ Department of Natural Resources, Mines and Energy, (2019) *Investigation report: Report into a fatality at Goonyella Riverside Mine on 5 August 2017*, Queensland Government, Brisbane, 13.

Evidence given by the maintenance manager showed that he did not report to the SSE but to the General Manager of Goonyella Riverside mine.

Since the SSE did not appear to manage the maintenance manager's routine individual development and performance review process, he could not ensure that he had the competencies required to carry out his responsibilities, and that he was effectively carrying his responsibilities as stated in the management structure.

This is contrary to section 55 of the Coal Mining Safety and Health Act 1999, which states that the SSE for a mine must develop, implement and maintain a management structure that helps ensure the safety and health of persons at the mine.²²⁹

Drawing these points together in terms of 10 pathways the investigation identified failures with regard to engineering/design/maintenance, risk assessment, safety systems, regulatory oversight (eg the SSE appointment didn't comply with legislation was undetected and need for further guidance relating to this type of hazard) and management/worker communication. As with the previous incident a number of system deficiencies were significant and systemic and should have been picked up in system auditing or if they were, were not acted on. This indicates a failure in safety systems auditing. Emergency systems do not appear to be a failure point and there is no/insufficient evidence on prior warning signals, prior expressed concerns (though the evidence presented does tend to indicate this wasn't there) and cost/production pressures (cost drivers in equipment modification perhaps warranted attention). Again, at least some of the failures can be seen as evidence of if not emblematic of disorganisation and the investigation also makes specific reference to flaws in contractor safety management.

Summary

The four cases just examined are not a basis for generalisation but rather provide more detail on a number of causal pathways associated with contractor fatalities. Although the level of detail varies, all involved at least five of the latent failures associated with miner fatalities, all involved a degree of disorganisation commonly linked to contract labour described elsewhere in this report, and in most direct mention was made of the failure of contractor safety management.

Contractor management and regulator advice

That the use of contractors can pose additional workplace health and safety risks appears to be something known to some if not most large mining corporations. This is evident in the incorporation of contractors into safety KPIs but perhaps more importantly along with particular measures to manage these risks. For example Rio Tinto's 2019 Annual Strategic Review indicated its forward plans included working 'more closely with contractors and joint-venture partners to improve our safety record' (page 22). In referring to improvements in its copper and diamond operations Rio Tinto observed that had achieved 'a significant reduction in contractor-related incidents as a result

²²⁹ Department of Natural Resources, Mines and Energy, (2019) *Investigation report: Report into a fatality at Goonyella Riverside Mine on 5 August 2017*, Queensland Government, Brisbane, 13.

of an increased focus on contractor management' (page 50).²³⁰ Maintaining strong contractor management was also identified as central to mitigating future risks (page 76).

Contractor programs within mining, and elsewhere, tend to emphasise that contractor workers and employees are treated identically and the benefits of this in terms of induction, training and the like are clear. Nonetheless, a study based on focus group interviews raised a note of caution as to the extent this approach rectified the risks associated with contract labour, observing:

Attempts to improve safety for subcontractor employees by creating uniform regulations and management systems to cover all workers will not remedy the fact that organisations deliberately enter subcontracting arrangements precisely because they offer productivity advantages. These benefits for the business translate into precarious work arrangements, which in turn mean that subcontract employees have different experiences of work.²³¹

There has been limited research into ways organisations can minimise risks with regard to contract labour. Some of those techniques include building long-term relationships between contractors and hosts that are underpinned by clear understandings of the importance of OHS, and these affect contractor selection and retention criteria in meaningful ways - not an afterthought or simply relying on contract clauses after selection and with due regard to the danger of reporting-manipulation or suppression of reporting (though this can prove difficult – see later section).

A non-mining study that examined stakeholder views (via focus group involving host and agency managers, union officials etc. held Brisbane, the Gold Coast, Toowoomba, Gladstone and North Queensland) on risk-minimisation practices related to labour hire in Queensland identified a number of practices in this regard.²³² They included the development of long-term relationships between host and agency (including close and ongoing links between managers of both with a mutual commitment to OHS as a priority); the provision of specialised services (not generalised labour hire); careful selection (physical capacities, knowledge and experience) and induction of agency workers including alignment of practices to meet OHS responsibilities by both agency and host; thorough risk assessment processes by the agency prior to placement and no short-term placements; agency managers being highly receptive to worker concerns about OHS (on a 24-hour basis] and taking these up with the host without fear of retribution measures. The study also found localised operations, where there were strong community links and informal information networks to bolster formal monitoring procedures were seen to be more effective than more generic operations. It is likely that these measures have applicability to mining (and several are already used to some degree) but as far as I am aware there are no detailed studies of their implementation and effectiveness. Nor is there evidence on how effective they have proved in reducing the hazard exposures. Finally, as yet these measures are voluntary, and for this and other reasons, most probably more an adjunct/complement to regulatory measures than a substitute for them.

Regulator Advice

²³⁰ Rio Tinto Annual Report Strategic 2019, 22, 50, 76.

²³¹ Valluru, C., Dekker, S. Rae, A. (2017) How and why do subcontractors experience different safety on high-risk work sites? *Cognition, Technology and Work*, 19, 785-794.

<https://link.springer.com/article/10.1007/s10111-017-0435-1>

²³² Underhill, E. and Quinlan, M. (2011) Beyond statutory enforcement – alternative approaches to improving OHS in the Temporary Agency Sector, *Policy and Practice in Safety and Health*, 9(2):109-131.

The Queensland mines inspectorate has issued a number of alerts and advisory notices with regard to contractor management in mines. The following examples are illustrative and date back over a decade.

In March 2007 Coal mines inspector Brian Lynne issued a Directive on Contractor Management following a coronial report:

I hereby direct that at all coal mines where contract labour is employed, the management structure required under section 55 of the Coal Mining Safety and Health Act 1999 to include sufficient senior positions that are appointed and competent to regularly monitor or have monitored:

1. the familiarisation and training of the contractors workers in implementing the relevant parts of the mine's Safety and Health Management System
2. machinery and plant used by contractors as being fit for purpose
3. compliance with the relevant parts of the mine's Safety and Health Management System
Particular attention should be given to ensure compliance with this directive in the event of persons being temporarily appointed due to the absence of the appointed senior person.²³³

In September 2008 Chief Inspector Gavin Taylor issued an alert on contractor management in underground coalmines which stated:

Coal mine - underground

Incident

After observing and talking with employees of a major contractor preparing to splice a joint on a longwall conveyor belt, a group of mines inspectors raised concerns regarding:

- the inappropriate methods of conveying and on-the-job storage of hazardous chemicals
- the lack of awareness of the appropriate personal protective equipment necessary, as well as this protective equipment not being available
- the contractor supervisor being unaware if he was appointed by the site senior executive, and also unaware of the management systems and plans applicable to the task at hand
- the general sub-standard housekeeping in the area
- electrical apparatus not appropriately secured, nor sockets protected from dust and moisture ingress
- water laying in one corner near electrical apparatus
- float coal dust present in the cut through.

Equipment

²³³ Lynne B. Directive: Contractor Management, 23 March 2007, Department of Mines and Energy, https://www.dnrme.qld.gov.au/__data/assets/pdf_file/0019/240436/directive-contractor-management.pdf

Hazardous chemicals, electrical switchgear

Hazard

The hazards include inappropriate handling, storage and use of hazardous chemicals, electrical apparatus subjected to dust and moisture ingress, and lack of compliance with the standard for incombustible content of roadway dust.

Cause

Poor contractor management and supervision by the mine, and poor management and supervision by the major contractor.

Comments and recommendations

The incident demonstrated significant deficiencies on the part of both the contractor and the mine's Safety and Health Management System. It should be noted that in March 2007 the then Chief Inspector of Coal Mines issued the following Directive to all coal mines:

I hereby direct that at all coal mines where contract labour is employed, the management structure required under section 55 of the Coal Mining Safety and Health Act 1999 is to include sufficient senior positions that are appointed and competent to regularly monitor or have monitored:

1. the familiarisation and training of the contractor workers in implementing the relevant parts of the mine's Safety and Health Management System
2. machinery and plant used by contractors as being fit for purpose
3. compliance with the relevant parts of the mine's Safety and Health Management System.

Particular attention should be given to ensure compliance with this directive in the event of persons being temporarily appointed due to the absence of the appointed senior person.'

Attention is drawn to the Coal Mining Safety and Health Act, section 43 Obligations of Contractors:

'A contractor at a coal mine has the obligation to ensure, to the extent that they relate to the work undertaken by the contractor, that provisions of this Act and any applicable safety and health management system are complied with'.

- Coal mines must ensure continuing compliance with the above Chief Inspector of Coal Mines' Directive and ensure that effective monitoring is taking place.
- Ensure that all relevant statutory officials and supervisors play their part in monitoring and maintaining standards in relation to contractor activities.²³⁴

²³⁴ Gavin Taylor, Chief Inspector of Coal Mines, Management of contractors and contractors' obligations *Mines safety alert no. 200*, 10 September 2008, Queensland Department of Mines and Energy, <https://www.dnrme.qld.gov.au/business/mining/safety-and-health/alerts-and-bulletins/mines-safety/management-of-contractors-and-contractors-obligations>.

In June 2011 Chief Inspector Gavin Taylor issued a further alert entitled 'Managing underground coal mine contractors — alarm bells are ringing!' which stated:

Underground coal mine...

Hazard

Contractors who are not competent and do not understand the underground environment or do not respect the robust safety disciplines necessary to maintain an acceptable level of risk.

Incidents

The following recent incidents have raised serious concerns about how contractors are being managed in underground coal mines:

1. Violation of a mine's A9 keys allocation and security system: In 2010 a deputy found a contractor operating an LHD in the tailgate in a gassy environment, with the methane monitor bypassed using a duplicated and unauthorised A9 Deputy key. To make matters worse, the deputy did not report the matter to the underground mine manager.
2. Violation of a mine's A9 keys allocation and security system: Recently, underground contract fitters were found with duplicated and unauthorised A9 Deputy keys, allegedly provided by their supervisor, which enabled methane monitors to be bypassed.
3. Unauthorised restart of an auxiliary fan (see Safety Alert 268): Recently, a contract electrician, unaware he was contravening any statutory regulation or site rules, reset power to an auxiliary fan and then restarted it without being authorised by the ventilation officer, or consulting the ERZ Controller or others that may have been affected.
4. Non-compliant management structures: Some mines had mining contractors reporting directly to the site senior executive rather than through the underground mine manager, which effectively undermined the latter's legislative responsibility to 'control and manage the mine'.
5. Substandard incident investigation: A mine's investigation into a recent contractor incident found the contractor guilty of major organisational deficiencies and non-compliances, yet did not recognise its own failure to effectively manage contractors according to the mine's Safety and Health Management System (SHMS).

Causes

- inadequate training
- inexperience
- poor management of contractors
- inadequate incident investigation
- non-compliance with legislation

Comments

As industry expands and strains the availability of experienced and qualified human resources, the use of inexperienced labour and of contractors is increasing. As a result, underground coal mining's corporate memory of its painful past, the evolution of robust mining legislation and the strict discipline of the underground miner are at risk of being diluted.

Mining staff and management need to realise that the underground environment will not be kinder as mines become deeper.

The first three incidents above are totally at odds with underground coal mining culture and seriously undermine confidence in the industry's ability to manage contractors effectively and maintain an acceptable level of risk. All these incidents prompt the following serious questions:

- How can a mineworker, electrician or mechanic be deployed underground without supervision and without understanding the basics of the underground environment, including the implications of starting an auxiliary fan and why it is subject to strict procedures?
- Why do we have contractors ignorant of mining legislation and minesite discipline to such an extent that they deliberately fabricate A9 keys to defeat a critical safety control?
- Why are some mines seeking to confine the underground mine manager to a 'safety compliance' role when legislation requires the underground mine manager to 'control and manage the mine'?
- How can a mine's investigation into a 'contractor incident' identify contractor deficiencies and not recognise its own serious shortcomings in managing the contractor?
- Should we re-examine the present 'one size fits all' system to make it harder for keys to fall into the wrong hands?

Recommendations

1. That the underground mine manager control and manage the mine as required by legislation as distinct from being restricted to performing a safety compliance role.
2. That all mineworkers be adequately trained to understand and respect the underground environment and the safety disciplines that apply.
3. That it be recognised that the task of managing contractor personnel, including effectively integrating their activities into the mine's SHMS, is a significant challenge that requires adequate resourcing and close attention.
4. That contractors' activities be adequately inspected, audited and controlled.
5. That Deputy bypass keys be kept strictly for deputies and not be issued to anyone else, including electricians.
6. That consideration be given to a new security system for the allocation of A9 keys.
7. That the Chief Inspector of Coal Mines' directive of March 2007—requiring that one of the senior positions in the management structure be responsible for the overall management of contractors operating at the mine—be complied with.

8. That electricians not be deployed to work underground without supervision, until they have the necessary competence and experience.
9. That contract deputies inspect and report on compliance with legislation and the mine's SHMS.
10. That mines comply with legislation.²³⁵

As noted elsewhere in this report, in March 2014 Queensland Mines Safety Commissioner Stewart Bell also issued an alert expressing significant concerns over contractor safety in light of series of fatalities. Reporting this Australian Mining quoted Mr Bell:

"Queensland mining safety and health legislation does not distinguish between mining company employee and contractor employees," Bell said.

Queensland's mining act requires that a single site specific safety and health management system (SHMS) is used for employees and contractors to ensure that risks are controlled.

Bell said site senior executives in particular must ensure the effective implementation of one SHMS that provides direct control over all facets of the operation.

"Ensuring contractors are being managed under a single SHMS is a key focus this year for the Queensland Mine Inspectorate," Bell said.

"I cannot emphasise enough that the safety of all mine worker, regardless of whether they are a contractor or mine employee, is primarily the responsibility of the mine operator and SSE."

The commissioner has previously stated he was concerned some sites were of the view that the safety of contractors was not management's problem.

"I'm concerned that some mining operations regard these risks as not their responsibility, whereas in my view they should review and approve the contractor's processes and procedures before the work begins, and integrate them into the site's safety and health management system," he said²³⁶

In 2015 the annual inspectorate report (2014-2015) issued by Acting Queensland Mine Safety and Health Commissioner Paul Harrison included further cautionary observations and remedial interventions (including changes to regulation, auditing and guidance material) concerning contractor safety:

Management of contractors

In recent years contractors have been over-represented in mining injuries and fatalities. An effective contractor safety and health management system is critical in improving

²³⁵ Gavin Taylor, Chief Inspector of Coal Mines, Managing underground coal mine contractors — alarm bells are ringing! *Mines safety alert* no. 270, 30 June 2011, <https://www.dnrme.qld.gov.au/business/mining/safety-and-health/alerts-and-bulletins/mines-safety/managing-underground-coal-mine-contractors>

²³⁶ Validakis V, (2014) Contractor mine deaths prompt safety alert, *Australian Mining*, 5 March 2014, <https://www.australianmining.com.au/news/contractor-mine-deaths-prompt-safety-alert-2/>

performance in this area. Mines Inspectors commenced a series of audits and inspections of contractor management systems during 2013–14 that will continue during 2015–16.²³⁷

A number of more specific observations were made in the body of the report, including:

Many electricians employed as contractors at small mines and quarries have a domestic electrical background, rather than an industrial electrical background. In collaboration with the IQA and other industry representatives, the Mines Inspectorate will develop a more comprehensive handbook for electricians and electrical supervisors during 2015–16.²³⁸

Understanding drill and blast practices at surface metalliferous mines and quarries

In recognition of the increase in outsourcing of drill and blast activities to contractors in surface metalliferous mines and quarries, the Mines Inspectorate and the Explosives

Inspectorate developed a one day drill and blast awareness training course. This course provides SSEs and supervisors with an awareness of the hazards and risk controls required for safe drilling and blasting activities. We will continue to deliver this course during 2015–16. In addition, the Mines Inspectorate and the Explosives Inspectorate, with assistance from IQA, will commence development of a safe drill and blast awareness field book, based on the course and a proposed industry workshop.²³⁹

The Report of Commissioner Kate Du Preez for the following year (2015-16) noted that analysis of HPIs in Central Region open cut and underground coal mines identified contractor management as one of nine common root causes, with sub-projects to address the issue.²⁴⁰ Other references to contractors included:

Safe drilling and blasting at small mines and quarries

With more and more surface metalliferous mines and quarries outsourcing their drill and blast activities to contractors, QMI recognised the need to ensure that SSEs and supervisors are aware of the hazards and risk controls required for safe drilling and blasting activities at their sites. During 2014–15, QMI and the Queensland Explosives Inspectorate developed a one day drill and blast awareness training course to support SSEs and supervisors – delivering the training during the first half of 2015. During 2015–16 six of these workshops were held.²⁴¹

The Report for 2016-17 identified contractor safety as a focal point for underground coalmines while reiterating concerns and the need to focus on the issue as the following statements indicate:

²³⁷ Commissioner for Mine Safety and Health (2015) *Queensland Mines Inspectorate Annual Performance Report 2014–15*, Queensland Government, Brisbane, 11. For reference to regulatory review see page 17.

²³⁸ Commissioner for Mine Safety and Health (2015) *Queensland Mines Inspectorate Annual Performance Report 2014–15*, Queensland Government, Brisbane, 12.

²³⁹ Commissioner for Mine Safety and Health (2015) *Queensland Mines Inspectorate Annual Performance Report 2014–15*, Queensland Government, Brisbane, 12.

²⁴⁰ Commissioner for Mine Safety and Health (2016) *Queensland Mines Inspectorate Annual Performance Report 2015–16*, Queensland Government, Brisbane, 3.

²⁴¹ Commissioner for Mine Safety and Health (2016) *Queensland Mines Inspectorate Annual Performance Report 2015–16*, Queensland Government, Brisbane, 10.

Contractor management is also an area of focus for 2017–18. SSEs must ensure contractors fully understand their obligations and responsibilities under the site SHMS.²⁴²

Contractors appear to be over-represented in coal mining to fatalities involving both vehicle interaction and tyre management; further discussion in industry is needed to understand this issue, including whether contractors are more exposed to this hazard because of the type of work they typically undertake.²⁴³

The 2017-18 report stated:

Despite the significant improvements observed in 2017, longwall move activities continue to represent the highest risk SEG in underground coal mines. While this SEG does not operate continuously, some of the coal mine workers within the SEG are contractors who potentially move from mine to mine performing multiple longwall retraction/installations, and may be subject to elevated exposure risk.²⁴⁴

Like a number of other reports it also noted a prosecution following an incident involving contracting arrangements:

On 6 February 2015, an incident occurred at a coal mine in central Queensland in which a coal mine worker was fatally injured and another suffered grievous bodily harm after they were hit with tyre components when a tyre exploded. The injured person and the deceased had been in the process of changing one of the tyres on a water truck at the time of the incident.

One defendant, a contracting company at the mine, entered a plea of guilty to the charges and was sentenced at the Rockhampton Industrial Magistrates Court on 25 August 2017. The company was fined \$150 000 and ordered to pay costs to the department of \$149 000. A conviction was not recorded.²⁴⁵

And yet again in 2018-19 Annual Report repeated concerns:

Contractor management has also been a long-term concern for the inspectorate. With an industry-wide move towards greater use of labour hire workers and contractors, we are growing increasingly concerned about how safety and health management systems at mines and quarries are accommodating this change and whether labour hire workers and contractors are being afforded the same level of safety as permanent employees.²⁴⁶

The proportion of contractors involved in serious accidents was also reported:

²⁴² Commissioner for Mine Safety and Health (2017) *Queensland Mines Inspectorate Annual Performance Report 2016–17*, Queensland Government, Brisbane, 9.

²⁴³ Commissioner for Mine Safety and Health (2017) *Queensland Mines Inspectorate Annual Performance Report 2016–17*, Queensland Government, Brisbane, 14.

²⁴⁴ Commissioner for Mine Safety and Health (2018) *Queensland Mines Inspectorate Annual Performance Report 2017–18*, Queensland Government, Brisbane, 40.

²⁴⁵ Commissioner for Mine Safety and Health (2018) *Queensland Mines Inspectorate Annual Performance Report 2017–18*, Queensland Government, Brisbane, 56.

²⁴⁶ Commissioner for Mine Safety and Health (2018) *Queensland Mines Inspectorate Annual Performance Report 2018–19*, Queensland Government, Brisbane, 8.

In 2018–19, contractors were involved in 64 per cent of serious accidents in coal mines. This is in line with the previous year (67 per cent).

In 2018–19, contractors were involved in 35 per cent of serious accidents in mineral mines and quarries. This is lower than in 2017–18 (53 per cent).²⁴⁷

Summary

Perhaps most noteworthy about these alerts and statements/reports are both longstanding and ongoing concerns about contractor safety, including references to failings identified at other points in this report. The repeated references to the issue also indicate it is not being abated. It is also worth noting that the small number of fatality investigations examined suggest the same failings were continuing to occur notwithstanding these (or any similar warnings from the NSW regulator) warnings and additional measures taken.

2.3 Overall findings/learning

Growing Use of Contractor, Temporary and Agency (labour hire) Work Arrangements and its general employment effects

Growth and reasons for

The last four decades have witnessed profound shifts in work arrangements in Australia and globally. Contract labour including labour hire and self-employed subcontracting, casual/temporary employment, fixed-term contracts and a range of other arrangements that are commonly labelled under the rubric of precarious, non-standard or contingent work have grown substantially. There has been a corresponding decline in the proportion of workers directly hired on an ongoing/permanent basis, and repeated rounds of downsizing/restructuring have increased job insecurity even amongst these workers. These shifts have affected most if not all industries but have been more pronounced in others.

While it is useful to distinguish different types of precarious/contingent work in practice the categories are complex, shifting and overlap. For this reason arrangements like labour hire need to be considered in the context of other changes, not in isolation and this is the approach taken in this report.

Mining is no exception to the general changes just described. While labour hire arrangements were slower to ‘take off’ than some other industries the growth since the second half of the 1990s has been significant. In some large mining corporations over half their global workforce are now contract-labour (including but not confined to labour hire). The use of contractors as opposed to employees varies between mines with some still relying predominantly on employees for operational activities while others are entirely operated by contractors. The mining industry has used contract labour for centuries but the recent growth has seen contractors take a greater array of tasks, including specialised companies operating mines for the owner/leaseholder. Similar arrangements involving specialist labour agencies occur in some other industries like seafaring.

²⁴⁷ Commissioner for Mine Safety and Health (2018) *Queensland Mines Inspectorate Annual Performance Report 2018–19*, Queensland Government, Brisbane, 36.

Using contract labour offers a number of advantages for host-employers but the key drivers appear to be flexibility and cost advantages, and mining appears to be no exception to this. Perhaps inspired by an earlier US shift a number of studies suggest the growth of labour hire/contract labour was primarily driven by mining companies (and reinforced by the emergence of specialist contractors) and facilitated by changes to federal industrial relations laws that provided for more flexible working arrangements and weakened clauses in enterprise agreements that had previously restricted the use of contract labour. The growth of contract labour was coincident with the introduction of extended working shifts (like 12-hour shifts) and growth of long-distance work commuting (DIDOW and FIFO).

Available research indicates labour-hire can offer a number of advantages to workers, including flexible work scheduling and skills acquisition, but that most workers opt for labour hire because it makes it easier to obtain a job or they have limited options. There is little research on mining in this regard but evidence submitted to several inquiries into labour hire (notably in Queensland and Victoria) are consistent with general research (especially the larger and more representative studies).

In sum, the growth of labour hire is more explainable in terms of organisational demand factors rather than worker demands for this type of work.

Effect on working conditions, unions and mining towns

A body of academic research and a series of government inquiries have examined the impact of contract labour, contingent work and the like on working conditions including OHS but that will be discussed in a later part of this subsection. Overall, the findings have been very consistent but this report only focused on labour hire given time constraints and the focus of the Board's request. The report was unable to examine these aspects in depth, and as the research and government inquiries into labour (a number of which reviewed academic research, the Victorian inquiry in some detail) tend to reach the same conclusions the results can be summarised together.

1. While some workers benefit from labour hire arrangements for many if not the vast majority it is associated with a diminution of/or inferior wages (lower, more irregular, unpaid), hours (longer, insufficient or more irregular) and working conditions including being treated with dignity, bullying and the capacity to raise concerns or complaints. A limited amount of evidence referred to mining but was consistent with this.
2. Many labour hire workers have fewer statutory entitlements than directly hired employees with ongoing employment because they are engaged on fixed-term or a casual basis (although there are other limits too identified by the Victorian inquiry in particular). A limited amount of evidence pertained to mining but was consistent with this.
3. Labour hire/contract labour has been linked to casualisation of the workforce and the Queensland Labour Hire Inquiry received submissions on this and it was touched on by some research.
4. Labour hire/contract labour in mining was linked to the growth of long commuting to work (DIDOW and FIFO) which in turn has adversely affected mining towns. Since mining towns

have been a hub for union activity this might have weakened unionism although this report was unable to explore this.²⁴⁸

5. Several studies examined found the growth of labour hire/contract labour weakened union bargaining power/influence. In general (ie beyond mining) this trend has also been seen to reduce union membership/density because contract workers are less likely to join unions (and may be less active when they do). Again, this report was unable to pursue this matter in depth though evidence examined later in the report is consistent with this. While union density has been declining in Australia and globally for some decades in coalmining union membership was particularly strong so the effect was perhaps more profound. The consequences of reduced union input are discussed in latter sections of this report.

The OHS Effects of contracting, labour hire and other contingent work arrangements

This section of the report then turned to the OHS effects of changed work arrangements, first examining general evidence and then that relating to mining.

General Evidence

Since the mid-1990s in particular there has been a growing body of peer-reviewed research, the bulk published in health/medicine/epidemiology, safety science, psychology, and to lesser extent industrial relations/employment studies journals on the health and safety outcomes associated with precarious/contingent work and job insecurity. Studies have been undertaken in most countries but especially rich countries comparable to Australia (like the USA, Canada, the UK, France, Germany and Sweden) and a significant number of studies have been undertaken in Australia. This body of research now totals hundreds of published studies using an array of methodologies (cross-sectional and longitudinal worker surveys; analysis of government injury, workers' compensation and others statistics, population-based studies and case control studies). While the number of studies on particular areas varies as does focal points (for example most job insecurity studies examine mental and physical health with relatively few examining injuries while this situation is reversed when it comes to studies of contract labour/subcontracting) and the extent of particular effects overall the findings of this research has been consistent – perhaps remarkably so – with the vast majority of studies finding these work arrangements are associated with adverse OHS outcomes compared to workers in secure employment or when measured over time.

In summary the research indicates that these work arrangements, and studies of labour hire fit into this broader pattern, are associated with:

- Higher incidence/frequency of injuries, including fatalities
- Poorer physical and mental health (including susceptibility to bullying and drug use).
- Poor knowledge of and access to regulatory employment rights and less willingness to raise OHS concerns.
- Contract labour/subcontracting has contributed to a number of disasters in high-hazard workplaces like chemical factories, refineries, oil-rigs, aviation and shipping.

²⁴⁸ For a Queensland study indicating these connections see Williams C, (1981) *Open Cut, The Working Class in an Australian Mining Town*, George Allen and Unwin, Sydney.

Research into the reasons behind these associations is less developed but the particular risks identified can often be incorporated under the broad labels of economic/reward pressures, disorganisation and regulatory gaps/failures. A specific model, drawing these elements together in a systematic way, has been developed and used by the author of this report and others in Australia, North America and Europe.²⁴⁹ Almost if not all the risk factors identified are not unique to contract labour et al but rather they are more likely to be found/occur where these work arrangements are in place and their consequences may also be more acute.

Concerns about the effects of changes to work arrangements, especially with regard to OHS, have prompted government inquiries and reports in many countries, including state and federal governments in Australia. This report only considered those non-mining reports that specifically focused on labour hire and most notably two recent inquiries conducted in Queensland and Victoria. Both identified OHS concerns and made some reference to mining, with the Victorian Inquiry in particular being based on a consideration of the available research evidence, statistics and a large amount of submissions and testimony. The Victorian Inquiry was unequivocal in stating that labour hire was associated with worse outcomes and like several other inquiries/investigations cited in this report identified serious issues in terms of 'worker voice', the capacity of workers to raise safety concerns without fear of retribution and to have these concerns treated seriously. This included the views of labour hire workers in the mining, oil and gas industry.

Mining

To assess the evidence with regard to labour hire/contract labour in mining a number of different sources were examined.

1. Peer-reviewed research

The review could only identify about a dozen studies specifically examining the impact of contract labour on mine safety, especially the incidence of injury including fatalities. Overall, virtually every study concluded the use of contract labour had led to a deterioration of safety in mines though the quality of studies varied considerably. Apart from an early Swedish study the most robust research was undertaken in the USA making use of MSHA data, and including studies with either a coalmining focus or presenting coalmining specific data. This research has been undertaken over a period of time using relatively large and reliable data sets and the overall trend in findings has remained consistent, with perhaps the most robust study being also the most recent. Only two Australian studies were identified, a small but relatively informative study of the shift away from contract labour at a Western Australian metalliferous mine and a Queensland study of coal prices and safety that drew connections with contract labour but failed to really establish these connections.

As an important aside, several South African studies were valuable in highlighting the greater difficulties in hazard exposure measure and disease surveillance associated with a more transitory contractor workforce.

In sum, the body of research specifically examining contract labour and safety is small but (even after discounting the weaker studies) relatively consistent in its findings and these match more

²⁴⁹ See for example Strauss-Raats P, (2019) Temporary Safety: Regulating Working Conditions in Temporary Agency Work, *Safety Science* 112: 213–222

general research on the subject. A large and well-constructed study of safety in Australian coalmining that explored the contractor issue would be very valuable even if it only ended up confirming US findings given the importance of the industry (especially in Queensland and NSW) and those who work in it.

2. Government inquiries and reports

Since the 1990s a number of state government inquiries, investigations or audits of mine safety in Western Australia, Tasmania, NSW and Queensland have identified contract labour as an issue at least warranting further attention if not outright concern. The evidence presented in this section of the report reinforced research findings, especially the regulatory oversight challenges. Though based on a handful of cases the Callinan review was valuable in identifying some factors, especially elements of disorganisation, contributing to fatal incidents involving contractors. Interviews and a survey (518 respondents) undertaken for the Queensland Department by Ronan Analytics confirmed widespread concerns about casualisation in industry as well as problematic views on reporting safety issues. The 2019 Brady-Heywood Review was primarily concerned with an uptick in fatalities but did look at the contract labour issue purely in statistical terms (to be fair this was the overall thrust of the report). Examining frequency data over an extended period, it noted some differences but concluded there was no association between contract labour and fatal or serious accidents. As there had been a major uptick in employee incidents in 2019 and in order to examine breakdowns more closely I obtained data for the period 2010-2019 and 2012-2020 from the Department, using the later as the Department deemed this more reliable. After discussing this data in general terms with an OHS researcher with considerable expertise in statistics the conclusion was drawn that while there were some differences in frequency rates (mixed) the numbers were too small to draw firm conclusions with any confidence (and more sophisticated statistical analysis might not resolve this). The cautious conclusion is that this data neither demonstrated nor refuted an association between contract labour with different (better or worse) serious injury outcomes compared to direct-employees in coalmines.

To secure larger and more robust data sets could entail combining Queensland and NSW data on coalmining fatalities and serious injuries. Another option would be ensuring HPI data can be broken down by whether contractors or employees were involved, or both. Over time, this could prove especially valuable as a larger and therefore statistically more robust data set (so long as reporting issues were addressed) and dealing with events which are commonly the precursor to serious/fatal events.

Overall, the result of this review of government inquiries, investigations and audits was consistent with the research evidence, and provided some additional insights into the effects of job insecurity/vulnerability on incident reporting and the disorganisation associated with contract labour use contributing to serious incidents.

3. Some specific investigations into fatal incidents involving contractors

A necessarily small number of investigations into fatal incidents involving labour hire workers were examined. The aim was not to develop generalizable data but provide more detailed insights into the types of failure associated with these fatalities. Each case indicated clear and significant safety system failures, and at least five of the pattern failures repeatedly identified in mine fatalities and

disasters. What was most striking perhaps in the context of the foregoing discussion is the number of failures that could be attributed to or labelled as disorganisation.

Perhaps one benefit of this exploration was also to provide guidance to future investigation in terms of ensuring these avenues of failure are all explored to assist understanding and the learning derived from them.

4. Overall, conclusion

Overall, research into the use of contract labour in mining has (with some exceptions as would be expected) reached similar findings to those undertaken in other industries or using general workforce data (like surveys). The number of studies is smaller and exploration of risk factors less developed but parallels are apparent.

Contractor management and regulator advice

The last subsection examined some lessons that could be learned in terms of better management of contract labour. It pointed out that while treating contractors and employees identically has advantages there is still a need for further measures to deal with the vulnerability of the former. A number of measures that contribute to better contractor management were also identified, some of which are already used by some mining companies and others worthy of consideration.

The Queensland mines inspectorate and the Queensland Mine Safety Commissioner issued a number of alerts/directives with regard to contractor safety between 2007 and 2019, indicative of the concern this was causing. Given time constraints the review was unable to identify alerts after this date, but even if subsequent alerts were issued, fatality incidents after 2016 indicate basic lapses were still occurring (and in NSW too) and involved large operations where sophisticated OHS management systems would be expected.

(b) the payment of production and safety bonuses to both workers and executives

This report has already made reference to production pressures influencing safety, including worker (contractor and employee) behaviour especially when combined with job insecurity and other factors (some of which are discussed elsewhere in this report). There is research that investigates associations between production and safety through the lens of how poor safety adds to production costs.²⁵⁰ On the other hand, researchers in mining and beyond²⁵¹ have pointed to connections between production pressures or cost-cutting compromising safety. For example, a recent study of metalliferous mining in South Africa found that notwithstanding post-Apartheid OHS laws enabling the employment of health and safety representatives they were being ‘captured and outdone’ by production in South African mines.²⁵² The study was based on four mine sites, including interviews with 22 full-time HSRs, five managers along four union representatives (UHSS) together with four focus groups involving 37 workers. Several quotes from the study illustrate the problems, the first from a safety manager on bonuses/production targets and the second from a gold production worker on the powerless of HSRs:

Something like the bonuses will always be an issue. The guy [WHSR] will come up and say we had a breakdown and it’s not our fault so we lost two days, but we still keep it [production target] at 500 square metres ... then he [WHSR] says I [safety manager] must go and convince the management to make the target 450, the guy [manager] is not going to be able to do that because that’s in the system, then they [workers] blame the safety rep that they asked for the help and nothing happens. (Safety manager gold)

He doesn’t have a say since they don’t even listen to him, they don’t have power whatsoever (Production worker gold)²⁵³

The study found that all parties interviewed believed production was prioritized over safety and HSRs were powerless in this:

Safety management were unanimous in their condemnation of production management, supervisors and the culture of chasing production targets. Supervisors were described by safety management as ‘tricky’, lacking in ‘trustworthiness’, ‘bullying’ and ‘disrespectful’ of

²⁵⁰ See for example Mokoena M, & Oberholzer M, (2015) Employees’ perceptions of safety control mechanisms and production cost at a mine, *Problems and Perspectives in Management*, 13(4):70-78.

²⁵¹ Reason cites a number of examples including cost-cutting/under-staffing contributing to the *Herald of Free Enterprise* ferry disaster. Reason J, (2008) *The Human Contribution: Unsafe Acts, Accidents and Heroic Recoveries*, Ashgate, Farnham Surrey.

²⁵² Coulson N, & Christofides N, (2019) How worker health and safety representatives are captured and outdone by production on South African mines, *Economic and Industrial Democracy* (on-line publication 1-25): doi/10.1177/0143831X19830491

²⁵³ Coulson N, & Christofides N, (2019) How worker health and safety representatives are captured and outdone by production on South African mines, *Economic and Industrial Democracy* (on-line publication 1-25): 12.

HSRs, especially WHSRs. The UHSS confirmed this and reported that WHSRs complained to them about the lack of respect from their supervisors.²⁵⁴

Another study tested a model on the relation production versus safety to the 2006 Beaconsfield goldmine fatality/entrapment:

A case study of a fatal rock fall accident in Tasmania, Australia was conducted based on the developed model and is used to uncover the intricate dynamics linking production pressure, risk tolerability, perception of safety margin, and protection efforts. In particular, the study demonstrates how a strong production focus can trigger a vicious cycle of deteriorating risk perception and how increased protection effort can, ironically, lead to deterioration of protection.²⁵⁵

Drawing out its wider significance the author's concluded:

Production pressure continues to be identified as a significant contributor to organizational accidents, particularly in coroners' reports. This study postulates that the influence of production pressure is complex and not immediately obvious to managers. A causal loop model for understanding the complex interactions between production and protection has been presented and utilized in a case study of a major mining accident in Australia. The study demonstrated that production pressure promotes management focus on production which can distort risk perception and lead to a further focus on production. It is argued that this vicious cycle is an important dynamic that frequently contributes to organizational accidents. In addition, the study revealed that balancing of protection and production efforts is a double edged sword: an initial increase in protection can cause over-compensation of production effort leading to higher risk. These dangerous dynamics were effectively represented in the causal loop model, which is a potentially powerful tool for management studies. The methodology adopted in this study can be applied to a wide range of empirical studies to facilitate development of evidence-based management theories.²⁵⁶

As a single-incident case study the findings must be treated with caution, but do parallel several disaster studies by Hopkins referred to elsewhere in this report. Most importantly perhaps, the authors highlight the potentially hazardous inter-connections/loops in organisational decision-making relevant to both this section and perhaps more especially the subject of corporate governance and risk examined in the next section of this report.

Further, official investigations into coalmine disasters have identified production pressures as significant factors that compromise safety in the lead up to the incident, Westray (Canada) and Upper Big Branch (USA) being two examples. Investigations into the 2010 Upper Big Branch mine explosion revealed a series of hazardous practices occurred in the pursuit of production including dangerous accumulations of coal dust and workers intimidated into not making complaints. Senior

²⁵⁴ Coulson N, & Christofides N, (2019) How worker health and safety representatives are captured and outdone by production on South African mines, *Economic and Industrial Democracy*, 11.

²⁵⁵ Goh Y, Love P, Brown H, & Spickett J, (2012) Organizational Accidents: A Systemic Model of Production versus Protection, *Journal of Management Studies*, 49(1):52-76, doi: 10.1111/j.1467-6486.2010.00959.x

²⁵⁶ Goh Y, Love P, Brown H, & Spickett J, (2012) Organizational Accidents: A Systemic Model of Production versus Protection, *Journal of Management Studies*, 49(1):72.

managers at Massey Energy (which owned the mine) and managers and supervisors at the mine also took steps to prevent the detection of unsafe practices by MSHA inspectors by obtaining warnings of impending inspections, falsifying examination record books, altering air flows during inspections, and disabling the malfunctioning methane monitor on a continuous miner (several managers were subsequently prosecuted and convicted including one who tried to destroy evidence after the explosion). The author of one of the official investigations McAteer observed:

Miners' 'rights to a safe workplace are compromised when the operator's commitment to production comes at the cost of safety. Workers should not be penalized if operators fail to follow safety requirements so that miners' interests can be separated from the operator's interest'.²⁵⁷

This present report makes reference to production and job insecurity pressures effects on safety (including incident reporting) below and in other sections. This is not exhaustive of the research and government reports dealing with this issue but illustrative. Further, there are connections between production and the type of safety programs being pursued, including the growing shift to behaviour-based safety that tend to individualise risk and were identified as challenging the activities of safety representatives dealt with in another section of this report. It has also received attention in some US research on coalmining with one ethnographic study stating:

This argument underscores the complex and contradictory tensions generated by the style of safety program that immediately preceded the shift to behavior-based ones. The supervisor, presumably acting on behalf of the company to obey safety regulations while maintaining high production levels, sought to individualize risk: he argued that it was the choice of each operator to determine the safety of equipment. Conversely, Roger sought to socialize the risk by pointing out that each supposedly individual choice impacted the entire crew. He argued that it was the responsibility of the crew family to protect the safety of the more vulnerable temporary worker, and he drew on his own previous experience to support his claims.²⁵⁸

For the purpose of this report attention, and particularly this section, attention focuses on the association between production bonuses and safety rewards and safety although the issues just identified clearly overlap.

Problematic connections between production bonus, incentive and performance-based payment regimes and safety are not new and nor are they confined to the coalmining industry. Adverse associations between piecework and associated payment regimes (including their link to low pay) and poor safety outcomes as measured by injury rates and other OHS indices (including other hazardous behaviour like working when fatigued and use of drug stimulants) have been identified in a wide range of industries including clothing manufacture, construction, trucking and other areas of

²⁵⁷ McAteer, D (2011) *Upper Big Branch: The April 5, 2010 Explosion: A Failure of Basic Coal Mine Safety Practices*, Report to the Governor of West Virginia, Governor's Independent Investigation Panel, West Virginia, 112.

²⁵⁸ Smith Rolston J, (2010) Risky Business: Neoliberalism and Workplace Safety in Wyoming Coal Mines, *Human Organization*, 69(4):331-342 at 336, 0018-7259/10/040331-12\$1.70/1.

road transport over many years.²⁵⁹ In both metalliferous and coalmining incentive based payment regimes, including contracting arrangements, have operated for centuries (including tribute and tut-work in metalliferous mining and piecework or the hewing rate in coalmining) and similarly complaints about their adverse effect on safety are longstanding. For example, in 1868, Ballarat union advocate John Trevena claimed ‘three-fourths of the fearful accidents which occur in our mines are attributable to men being compelled to work at such reckless speed in order to earn a crust.’²⁶⁰

In coalmining following mechanisation hewing rates were replaced by production bonuses. Interestingly despite the longevity of these schemes, and the potential of incentive schemes to have adverse and unintended consequences, are well-known across a wide range settings. For example the Global Financial Crisis (GFC) sparked considerable interest and research into executive reward schemes as did the 2019 Australian Banking Royal Commission). There is now a significant research literature dealing with problematic nature of the reward schemes applying to banking and other executives, including short-term decision-making encouraged by share reward schemes and concerns that intra-organisational reward schemes take insufficient account of the organisation’s wider impacts on the community, and corresponding responsibilities that should come with this.²⁶¹ A number of studies have found share/stock-option reward schemes encourage high-risk behaviour amongst CEOs. One study that looked at product-safety consequences of this observed:

Stock options are thought to align the interests of CEOs and shareholders, but scholars have shown that options sometimes lead to outcomes that run counter to what they are meant to achieve. Building on this research, we argue that options promote a lack of caution in CEOs that manifests in a higher incidence of product safety problems. We also posit that this relationship varies across CEOs, and that the effect of options will depend upon CEO characteristics such as tenure and founder status. Analyzing product recall data for a large sample of FDA-regulated companies, we find support for our theory.²⁶²

There is a considerable body of research and debate about performance payment regimes. Areas of debate include the strengths and weaknesses of different schemes like balanced scorecards, merit and recognition schemes, avoiding unintended consequences and the trade-off between

²⁵⁹ For examples of some of this research and research reviews see Johansson, B. Rask, K. & Stenberg, M. (2010). Piece rates and their effects on health and safety - a literature review, *Applied Ergonomics*, 41(4): 607–614; Premji, S. Lippel, K. & Messing, K. (2008) “We work by the second!” Piecework remuneration and occupational health and safety from an ethnicity- and gender-sensitive perspective, *Perspectives Interdisciplinaires Sur Le Travail et La Santé*, 10(1), 1-35; Williamson A, (2007) Predictors of Psychostimulant Use by Long Distance Truck Drivers, *American Journal of Epidemiology*, 166(11):1320-1326; Mooren, L., Williamson, A., & Grzebieta, R. (2015). Evidence that truck driver remuneration is linked to safety outcomes: a review of the literature, *Proceedings of the 2015 Australasian Road Safety Conference*; Thompson, J. & Stevenson, M. (2014) Associations between heavy-vehicle driver compensation methods, fatigue-related driving behaviour and sleepiness, *Traffic Injury Prevention*, 15(sup1) S10-S14 doi:10.1080/15389588.2014.928702.

²⁶⁰ *Ballarat Star* 23 September 1868.

²⁶¹ It is beyond the scope of this report to review this literature and associated policy/regulatory debate in any depth. For some examples see Zalewska A, (2016) A New Look at Regulating Bankers’ Remuneration, *Corporate Governance: An International Review*, 24(3):322–333; Srivastav A, & Hagendorff J, (2016) Corporate Governance and Bank Risk-taking, *Corporate Governance: An International Review*, 24(3):334–345;

²⁶² Wowack A, Mannor M, & Wowak K, (2015) Throwing caution to the wind: The effect of CEO stock option pay on the incidence of product safety problems, *Strategic Management Journal*, 36(7):1082-1092 at 1082.

transparency/simplicity and the complexity of schemes involving multiple performance measures. As far as could be determined, with some notable exceptions including those referred to below, there has been little research on connections with workplace safety, especially when it comes to executive rewards.

There is comparatively little research into the impact of executive reward schemes and production bonuses on safety in coalmining or of the effects of safety incentive schemes. With regard to executive packages the performance element can be large, amounting to 100% or more above base-salary. Executive/senior manager incentives can be differentiated into short-term and long-term incentive schemes. Short-term schemes typically include a balanced score-card of multiple measures covering financial performance (like production achieved, profit or unit saleable coal costs) safety (like LTIFRs, fatalities, hazard audits and controls), environment and personal/other (like project delivery and talent management) plus deferred share options. Long-term or deferred reward schemes are more typically based on share incentive plans linked to total shareholder returns. The linking of rewards to shareholding may be important given evidence relating to the unintended consequences these have been found to have, an example of which was briefly referred to above. However, as yet the existence or extent of connections between executive rewards and safety in mining has not, as far as I am aware, been the subject of systematic research. A study of serious incidents and fatalities in NSW mining that examines, amongst other things, this connection will be completed shortly.²⁶³

With regard to the relationship between bonuses paid to mine-workers to safety and the effectiveness of safety incentive schemes more is known but the research literature is limited. The *Digging Deeper* report on NSW mining in 2007 reviewed available research and found there was little and those studies that did exist were often poor in quality in terms of rigour and ambiguous use of terminology.²⁶⁴ While reward schemes have been seen to enhance safe behaviour and work practices *Digging Deeper* noted research pointing to the complexities, with Sundstrom-Frisk (1997) arguing it was critical to ensure the behaviour of all at work, ‘including managers whose decisions can critically affect safety outcomes’.²⁶⁵ Adverse effects of incentivising production included encouraging risk-taking that might be reinforced by peer-pressure in group reward situations or discourage incident-reporting.²⁶⁶ Within the wider OHS literature concerns about the adverse effects of bonus or similar reward systems and the negative/unintended effects of safety incentive schemes are both common and have almost certainly strengthened over time.²⁶⁷ Recurring concerns include incentivising excessive hours or corner cutting on safe work practices, discouraging injury and incident reporting and counterproductive injury management practices.

²⁶³ Jackson H, (in preparation) Benchmarking the performance of the NSW mining industry, PhD thesis, University of Newcastle.

²⁶⁴ Shaw Idea (2007a) *Digging Deeper: Wran Consultancy Project No 1*, Vol. 1 Commissioned by Mine Safety Advisory Council, NSW Department of Primary Industries, Sydney, 43.

²⁶⁵ Shaw Idea (2007a) *Digging Deeper: Wran Consultancy Project No 1*, Vol 1 Commissioned by Mine Safety Advisory Council, NSW Department of Primary Industries, Sydney, 44 citing Sundstrom-Frisk, Carin (1997). *The Challenge of Promoting Safety Behaviour: Why Don't They do as They are Told?* Productivity, Ergonomics and Safety: The Total Package, Gold Coast, Queensland, 31.

²⁶⁶ Shaw Idea (2007a) *Digging Deeper: Wran Consultancy Project No 1*, 44-45.

²⁶⁷ For discussion of this in a standard OHS management text see Bohle P & Quinlan M, (2000) *Managing Occupational Health and Safety: A Multidisciplinary Approach*, Macmillan, Melbourne, 133-34, 138, 159, 200, 205, 440 & 445.

Further research, but not a great deal as far as could be judged, has been undertaken since 2007. In 2018 a South African book *Production, Teamwork and Safety in Deep Mining* included a chapter on production bonuses which found:

Chapter 5 highlights the unintended outcomes of the production bonus scheme the mine had instituted to increase the productivity of the frontline mining teams. This is crucial given that the maladministration of the bonus system could lead to a range of unintended consequences such as deteriorating levels of trust between management and frontline workers, prioritisation of production at the expense of safety and hiding of accidents. There are a number of organisational, management and labour factors that can render a production bonus scheme effective or ineffective. These factors influence the nature and extent of worker reactions to the bonus scheme. This chapter examines and discusses the factors that influenced the reaction of the mining teams to the team-based production bonus scheme and the extent to which mine management fulfilled its side of the bargain in the implementation of the production bonus. The chapter highlights the manner in which the team-based bonus system influenced the production teams to engage in their informal organisational practice of making plan in order to offset the snags that jeopardised their prospects of earning the production bonus. The chapter reveals that, to a large extent, the productivity bonus generated conflict rather than consent. As a result, the incentive scheme failed to live up to expectations by not eliciting the desired levels of worker performance and productivity at the rock-face.²⁶⁸

In essence, these observations are consistent with the wider literature on bonus regimes and their often unintended consequences referred to above. In 2018 another South African study of workers in a platinum mining stope (a published conference paper) concluded:

Workers are experiencing pressure, which influences their behaviour towards health and safety. The strong focus on meeting production targets results in production activities taking priority, while health and safety activities are secondary. Role overload was found to be the immediate cause of this pressure, but poor leadership was found to be the primary underlying cause, because supervisors are failing in their duties to provide workers with the necessary resources in order to safely carry out their activities. Instead, leaders are exerting production pressures, in the form of production bonuses, while safety bonuses are lower. Workers fear missing their production bonus, and therefore spend prolonged hours underground pursuing production-related activities, in the process neglecting health-and safety related activities.²⁶⁹

In 2014 Peters and Kosmoski two researchers with the Office of Mining in the National Institute of Occupational Safety and Health (NIOSH) – the US federal agency responsible for OHS research, research-review (it periodically produces state of knowledge reports on particular issues), research-funding and interventions – published an article on why coalminers do and don't report safety-

²⁶⁸ Phakathi S. (2018) *Production, Safety and Teamwork in a Deep-level Mining Workplace: Perspectives from the rock-face*, Emerald Publishing, Bingley, 18-19.

²⁶⁹ Nelwamondo P, Mpanza M, & Rupprecht S, (2018) The influence of work pressure on worker attitudes towards health and safety in a platinum mining stope, Society of Mining Professors 6th Regional Conference 2018 Johannesburg, 12–14 March 2018 The Southern African Institute of Mining and Metallurgy, 323-331 at 330.

relevant information, which included consideration of production and safety bonuses amongst other matters. Findings were based on 1356 responses by miners to a 61 point survey and safety culture assessments at five mines. As this study pertains to a number of issues pertinent to both this and next section of the report its findings will be described in some depth.²⁷⁰ At the outset the Peters and Kosmoski noted a number of reasons commonly given for miners not reporting, notably:

- Fear of jeopardizing rewards that are based on having low injury rates;
- Peer pressure (concern that co-workers would lose a bonus or a chance to win something);
- Fear of management reprisals or retaliation;
- Not understanding rules/expectations concerning which types of events should be reported;
- Not wanting to be thought of as a complainer or troublemaker;
- Believing an injury is too minor for anyone to be concerned; and
- Believing that injuries are “a fact of life” in certain lines of work.

The survey revealed ‘significant inhibitors to reporting safety concerns, mistakes and other problems to management.

- · Only 45.7% of the survey respondents agreed with the statement: “Management does not tolerate retaliation of any kind for raising concerns.”
- · Only 55.7% of survey respondents indicated that they believed their concerns were addressed constructively.
- · Only 49.7% of survey respondents indicated that they believed they could openly challenge decisions made by management.
- · Only 49.5% of the survey respondents indicated that they believed that helpful criticism was encouraged.

The fact that roughly half of the 1,356 miners responding to the research survey did not agree with these statements suggests that many had reservations about bringing up problems and concerns to management. Although their reasons for responding this way are not entirely clear, the absence of this type of communication can detract from management’s ability to learn about problems that could result in accidents and other types of significant losses if they are not addressed.²⁷¹

The study then turned to the specific issue of bonus systems and their effects, noting that notwithstanding a prevalent belief amongst the mining companies were effective influences on worker behaviour poorly designed schemes could undermine reporting of safety concerns and even encourage unsafe behaviour. Examining three types of bonus namely injury-based, production based and time-based schemes Peters and Kosmoski identified evidence of the potential problems with regard to each based on interviews undertaken as part of the project. With regard to injury or safety bonus schemes they noted while these might seem to encourage safe behaviour they could affect reporting.

²⁷⁰ Peters R, & Kosmoski C, (2014) Why Miners Report (or do not report) Safety-relevant Information, *Engineering and Mining Journal*, November, 56-59.

²⁷¹ Peters R, & Kosmoski C, (2014) Why Miners Report (or do not report) Safety-relevant Information, *Engineering and Mining Journal*, November, 56.

As the following quotes illustrate, some of the miners interviewed during the safety culture assessments were concerned that their mine's safety bonus program was having such an effect.

"During the more than 500-day no-injury streak for one shift at this mine, there were actually injuries, including a broken leg, broken foot, and basically these people had one day to go to the doctor and then they would be back at work the next day. If they were physically unable to work, then they would still come to work, but instead of doing their job they would be in the office for the day to hang out."

"Everyone realizes management is committed to safety but sometimes guys question the methods they use. For example, the bonuses. Last year, (a co-worker) was injured and as a result I did not get the bonus. I personally don't care, but others may have an issue with this. Also, a few years back I knew someone who was injured but didn't want to report it because everyone on their shift would be mad at them for messing up the bonus."

Most of the mines' bonus plans were set up to reward groups of individuals if everyone in the group worked for a period of time without experiencing any reportable injuries. This type of bonus plan can produce a mix of both positive and negative effects on safety behaviors. As the quotes above illustrate, group-based incentive plans can create social pressure on individuals not to report injuries—especially minor injuries.²⁷²

The study found that only one of the five mines adopted a more preferred model of systematically rewarding miners for taking actions to prevent accidents, with most focusing on withholding rewards if injuries occurred, an approach not generally advocated by behavioural scientists.²⁷³ In concluding their remarks on safety incentive schemes the authors stated:

Finally, an important potential negative outcome of injury-based bonus plans is that safety incidents may go unreported, and the organization does not learn about safety problems that are likely to continue to arise unless appropriate countermeasures are taken. Based on the survey responses from the five mines in this study, the current structure of incentive programs at some mines appears to be deterring individuals from reporting safety incidents. Several programs are reactive and only reduce incentives for behaviors that are detrimental to production (e.g., extended absences, lost-time accidents) rather than also rewarding behaviors that are proactive and positive for safety (e.g., wearing PPE, identifying mistakes and hazardous conditions). It can be argued that utilizing injury rate-based incentive programs may not be encouraging employees to work safer. Instead, such programs may be rewarding employees either for taking risks but being lucky enough not to have accidents, or for not reporting incidents when they do happen.²⁷⁴

²⁷² Peters R, & Kosmoski C, (2014) Why Miners Report (or do not report) Safety-relevant Information, *Engineering and Mining Journal*, November, 57.

²⁷³ Peters R, & Kosmoski C, (2014) Why Miners Report (or do not report) Safety-relevant Information, *Engineering and Mining Journal*, November, 57.

²⁷⁴ Peters R, & Kosmoski C, (2014) Why Miners Report (or do not report) Safety-relevant Information, *Engineering and Mining Journal*, November, 58.

Turning to the question of production bonuses Peters and Kosmoski observed:

All five of the mines NIOSH assessed were offering bonuses to miners for achieving goals related to the amount of coal mined. Although NIOSH did not ask for, nor were provided with, the actual amounts of these bonuses, comments from several of the miners interviewed suggested that these bonuses were substantial at some mines. It is possible that the practice of offering substantial production-based bonuses can lead miners to take dangerous shortcuts and to perform certain tasks too fast (e.g., driving mobile equipment). Such bonus programs may also cause workers to neglect maintenance and repair of equipment if they think the equipment will keep running long enough to achieve the tonnage required to earn their bonuses.

A strict emphasis on production and the time it takes a miner to do his/her work can simultaneously decrease an emphasis on safety. When miners are focused on production, reporting safety relevant information can take a back seat to output and efficiency. This is because raising safety issues and reporting accidents takes time, and the time it takes to communicate these issues is in direct competition with his or her total compensation. In other words, safety-related communications are necessary to prevent accidents, but the time it takes to do this may be perceived as having negative consequences for production and efficiency, especially when those are the primary metrics used to determine the amount of bonus an employee receives.²⁷⁵

Finally, Peters and Kosmoski turned to the question of time-based bonuses that reward workers for completing tasks within a prescribed time, citing an example with regard to the moving longwall equipment.

For example, one of the mines visited offered a two-part bonus plan for moving their longwall equipment. The first part of the plan offered to pay everyone a bonus if the longwall move was completed within a specific number of days. The second part of the plan offered to pay everyone an equally large bonus if the longwall move was completed without a single lost time injury.

Moving longwall equipment presents several potential challenges to safety:

- Because the mine produces little if any coal during the longwall move, miners may experience pressure to work quickly to get back into coal production and keep the mine profitable. If problems arise, they may work longer hours than normal.
- Most mines with longwall equipment need to move it only once or twice a year. The rest of the time the focus is on mining coal. During the move, miners often operate equipment and perform tasks that they do not normally perform, and they may not be as familiar with the associated risks and hazards, or the habits and expectations of those working around them.

²⁷⁵ Peters R, & Kosmoski C, (2014) Why Miners Report (or do not report) Safety-relevant Information, *Engineering and Mining Journal*, November, 58.

- Longwall equipment is extremely large and heavy. Those who disassemble, move, and reassemble it often work in difficult conditions that may include uneven and muddy floors, darkness, tight quarters and close proximity to powerful machinery.

A few miners voiced concerns about being offered bonuses for completing longwall moves quickly:

- “The date they set for the goal completion date was unattainable, yet they set it so people were working fast to try to reach it.”
- “The longwall move time bonus makes people hurry and it’s gonna bite us one of these times.”
- “If someone was injured during the longwall move and reported it, then everyone would hate that person. You might as well leave the mine because you would be ostracized.”
- “I don’t think management thought they’d ever have to pay the (safety) bonus because moving a longwall without an injury is rare.”

As demonstrated by the last quote, it could be interpreted that the mine may have been attempting to discourage miners from working too fast or taking dangerous shortcuts during the longwall move by offering a “safety bonus.” However, as previously mentioned, the fact that safety bonuses were tied to not reporting any lost-time injuries may have served to discourage miners from reporting injuries. Having separate longwall move bonuses for completing the move by a certain deadline (reward for speed) and for doing it without a lost-time injury (reward for safety) presented a conflicting message to miners about the importance of working safely.²⁷⁶

Reviewing reporting and bonuses Peters and Kosmoski concluded:

Many factors play a role in influencing miners’ willingness to report safety-related information. Mine management’s receptiveness to such reports and bonus programs are two such factors over which mine management has a great deal of control. Bonus plans clearly have the potential to motivate positive changes in workers’ safety-related behaviors and attitudes if they are properly designed. The design of an effective bonus plan is a bit more complex than one might first think. Plans sometimes fail to produce the positive outcomes that had been hoped for, and they can also produce unintended negative consequences. As this article discusses, large production-based or time-based bonuses may give workers the impression that production is valued over safety and may cause miners to work in an unsafe manner just to meet production goals or tight deadlines. Further, large injury-based bonuses may cause workers to fail to report minor injuries and other incidents that are important for managers to know about in order to prevent similar incidents from occurring in the future.

Does this mean that mine bonus plans should be eliminated? No. At some mines, bonuses currently constitute a large portion of miners’ total compensation. At such mines it may not

²⁷⁶ Peters R, & Kosmoski C, (2014) Why Miners Report (or do not report) Safety-relevant Information, *Engineering and Mining Journal*, November, 58.

be wise to simply eliminate them. As the research studies reviewed by Wirth & Sigurdsson (2008) and Peters (1991) suggests, a better alternative may be to offer more modest-sized bonuses and to begin tying safety bonuses to the precursors of occupational injuries and illnesses. Specifically, miners could be rewarded for (1) performing safety-enhancing behaviors, (2) not performing at-risk behaviors, and (3) taking actions that help facilitate the rapid identification and correction of workplace hazards. Employees could also be rewarded for “working smarter”—for learning new skills and for suggesting new ways to improve their mine’s safety, productivity and efficiency.

The mining environment is dynamic and ever-changing. New hazards can emerge quickly. Therefore, it is vital that mine managers encourage everyone who works at their mine to be on the lookout for hazards and to report safety incidents and other issues affecting safety and production.²⁷⁷

As already implied, the issue of production bonuses adversely affecting safety has been addressed in a number of mine safety reviews and mine incident investigations. In 1997 the NSW Mine Safety Review raised serious concerns both about the potential adverse effects of safety performance incentive schemes and production bonus payment schemes, and recommended these should be investigated. The subsequent NSW Mine Safety Review which reported in 2005 found similar concerns about problematic effects had been raised, notably by the CFMEU and further, the recommendations of the 1997 Review had not adequately been implemented.²⁷⁸ It recommended that this deficiency be addressed and subsequently an independent review was undertaken into production bonus and safety incentive schemes, the *Digging Deeper* Report coordinated and prepared by Andrea Shaw (Shaw Idea) which entailed visits to 53 mines sites, 583 people were interviewed and 1667 people completed questionnaires.²⁷⁹ This is probably the most detailed review of incentives and safety undertaken particularly in a coalmining context (metalliferous mines and quarries were also examined). As schemes were devised and operated at a company level not at a mine-site level (some tweaking could occur at this level but was not extensive²⁸⁰), and large coalmining companies operate mines in both NSW and Queensland, it is unlikely the schemes identified and assessed in this NSW report would differ from those operating in Queensland.

Reviewing mining as a whole, *Digging Deeper* found production bonus and safety incentive schemes were most common in coal and that there were two types of safety incentive schemes – those where financial payments were made in exchange in return reaching outcome targets and those rewarding contributions to the OHS management process. Some production bonus schemes didn’t include safety components while some combined safety with production/performance criteria. The report noted most schemes applied to operational employees, with only 11 schemes including staff and managers and only two schemes included subcontractors. The report noted that a ‘surprising number’ of interviewees were unaware of schemes and that was limited consultation in determining

²⁷⁷ Peters R, & Kosmoski C, (2014) Why Miners Report (or do not report) Safety-relevant Information, *Engineering and Mining Journal*, November, 59.

²⁷⁸ Wran, N. and Mclelland, J. (2005) *NSW Mine Safety Review*, 20-21.

²⁷⁹ Shaw Idea (2007a) *Digging Deeper: Wran Consultancy Project No 1*, Vol 1 Commissioned by Mine Safety Advisory Council, NSW Department of Primary Industries, Sydney; Shaw Idea (2007b) *Digging Deeper: Wran Consultancy Project No 1*, Vol 2 Commissioned by Mine Safety Advisory Council, NSW Department of Primary Industries, Sydney.

²⁸⁰ Andrea Shaw, personal email to report author 10 July 2020.

OHS measures included in schemes. Payment-based schemes tended to cover the whole site so reported lost-time injuries, including those to subcontractors, could affect payment to all direct employees on site. On the other hand, safety incentive schemes recognising contributions to OHS management were commonly predicated on team performance.²⁸¹

The Digging Deeper report contained a wealth of detail on different types of schemes (of which there are many), common strengths/weaknesses and an array of evidence with regard to them which is far beyond the scope of this report to summarise at length. Negative aspects identified in interviews included the following illustrative example:

What the bonus does do is get the blokes to hide injuries. They take a \$100 off you if you have an LTI.... If a contractor gets injured he gets put off. They hounded me about having time off. You feel like a victim. The intent of the bonus is for us to put pressure on blokes not to go off (coal, employee).²⁸²

The report also noted that contractors, direct-employees and managers had consistently referred to a belief amongst contractors and their employees (including labour hire workers):

that reporting of LTIs would have negative consequences for their work, even where they were not formally part of the incentive or bonus scheme:

We have a lot of contractors on site. They will not report near-misses for fear of loss of jobs (coal, employee).

Contractors are under the pump. They are pressurised more (coal, employee).

This is particularly for labour hire. You wouldn't report, you feel pressured for your job. If you did report it, you'd be gone. And we don't want to blow their bonus either (coal, labour hire employee).

In particular, contractors reported that they are penalised by reduced payments or withdrawal of access to contracting work as a result of reporting incidents or injuries. We were consistently told by contractors that, as a result, they do not report such events, even when they occur. These views were expressed to us on site and in the consultations undertaken by the project with contracting companies. The consistency and strength of these reports demonstrates the impact that such views have on reporting behaviour. Whether in fact mining companies do actually withdraw access to work or reduce payments as a result of reporting incidents or injuries is to some extent less important than the strongly held belief by all contractors involved in the project that this would be the result of reporting. This belief drives the reported behaviour of under-reporting.²⁸³

The *Digging Deeper* report also found the overwhelming evidence of interviews was that production bonuses impacted on risk management with one coalmine manager stating:

²⁸¹ Shaw Idea (2007a) *Digging Deeper: Wran Consultancy Project No 1*, viii.

²⁸² Shaw Idea (2007a) *Digging Deeper: Wran Consultancy Project No 1*, 58.

²⁸³ Shaw Idea (2007a) *Digging Deeper: Wran Consultancy Project No 1*, 59.

Does the production bonus affect safety? Yes – there wouldn't be anywhere where it wouldn't.²⁸⁴

Another issue was the problematic connection between control/effort, production and bonus outcomes with a metalliferous mine manager observing:

There are few people on site who can influence the production bonus. I feel the pressure to keep the mill going so that people get their bonus. It gets used as a stick. It wears a bit thin.²⁸⁵

A coalmine manager stated:

I don't feel I have control. I get judged on the open cut's performance that I have no control over as well as the prep plant – it's a site wide thing. I have impact on these guys but not over there. I liaise with open cut but can only suggest to them. There are more incidents in open cut, so that reduces my capacity also to affect the outcome.²⁸⁶

Further, the report identified financial incentives as a risk factor in working hour arrangements, pointing to the use of higher production bonuses on mine-sites that it rated 'high-risk' in terms of shift arrangements (the categorisation was based on the length and regularity of shifts, maximum shift-times allowed, cumulative days on shift and break times). Of 11 sites rated 'high risk' (four of them coalmines) the report found:

Of those 11 sites in the high risk category, seven of them pay more than \$100 per week as an outcome of their production bonus/safety incentive schemes. Three sites in the medium risk category and only one in the low risk category make payments of this size.²⁸⁷

The *Digging Deeper* report findings on the value of production bonus and safety incentive schemes were ambivalent at best finding those where payments were made for achieving particular outcome targets 'have not proved themselves to consistently or reliably improve safety outcomes,' that the most commonly cited benefits in terms of injury management could actually represent costs to rapid responses to injury – itself a building block of OHS management – and could also discourage reporting of injuries. It noted sites reported outcome based safety incentive schemes made no difference or negative effects on incident reports, and questionnaire responses indicated this was particularly the case when large payments were made. The report pointed to other findings that effective OHS would be better driven by an ethical commitment as the 'right thing to do' (the Beaconsfield mine fatality investigation identified similar views, see below).²⁸⁸

The *Digging Deeper* report's major conclusions were:

As a result, we recommend that NSW mining enterprises should review their existing safety incentive schemes and shift them from a focus on outcome data to a focus on improvement and contribution. A guide to undertaking such a review is provided as Attachment 10 in

²⁸⁴ Shaw Idea (2007a) *Digging Deeper: Wran Consultancy Project No 1*, 63.

²⁸⁵ Shaw Idea (2007a) *Digging Deeper: Wran Consultancy Project No 1*, 64.

²⁸⁶ Shaw Idea (2007a) *Digging Deeper: Wran Consultancy Project No 1*, 64.

²⁸⁷ Shaw Idea (2007a) *Digging Deeper: Wran Consultancy Project No 1*, 114.

²⁸⁸ Shaw Idea (2007a) *Digging Deeper: Wran Consultancy Project No 1*, ix.

Volume 2 of this report. Given the potential for under-reporting and the other negative effects associated with payment schemes based on outcome measures and the lack of evidence of value from them, we recommend that such schemes should not be used in the industry. We did not find that there was necessarily a direct link between production bonus schemes and breaches of work procedures such as 'short cuts', although we did receive some reports of such problems. However, the link between roster risk and high production bonus payments needs more careful examination at those sites that make such payments to ensure that payment systems are not creating disincentives for addressing working arrangements with negative OHS consequences.²⁸⁹

In addition to recommended a review of schemes Digging Deeper also recommended the mining industry 'should no longer pay workers in the industry money or equivalent benefits as a result of achievement of particular targets for outcome data, eg LTIFR, MTIFR' and sites 'with production bonus schemes should carefully review them to ensure that the payment is not creating a disincentive to address adverse OHS consequences of current working arrangements.'²⁹⁰

Following the *Digging Deeper* Report the Mine Safety Advisory Council (the MSAC was established as a recommendation of the 2005 NSW Safety Review) MSAC committed to implementing 'a review of safety incentive schemes and the use of production bonuses by industry at company and site level.' In a 2008 keynote address to the industry MSAC chairman Norman Jennings urged industry not to fall asleep on safety, stating:

Industry leaders will need to consider carefully the following questions and, depending on their answers, act promptly and decisively...What is your company doing to manage fatigue by eliminating or reducing risk factors, improve working relationships and consultation at all levels, and review the contribution of production bonuses and safety incentive schemes to improving OHS outcomes?²⁹¹

A guidance tool was produced to assist industry in devising safety and production incentive schemes and avoid pitfalls in this respect in 2009 and periodically reproduced since.²⁹² Andrea Shaw and Verna Blewett (from *Digging Deeper*) did training with mine-site people to facilitate cultural change.²⁹³ I could not find further evidence on the MSAC follow-up to *Digging Deeper* in terms of a report detailing implementation of the recommendations regarding reviewing bonus schemes, or assessing the effectiveness of these measures. In November 2010 Andrea Shaw and a number of colleagues (many different to the *Digging Deeper* team) prepared a report on safety for the South African Mine Health and Safety Council based on methods and covering issues similar to that undertaken in *Digging Deeper* including specifically examining the role/effect of production bonus and safety incentive schemes. The findings were overwhelmingly similar to that of *Digging Deeper*

²⁸⁹ Shaw Idea (2007a) *Digging Deeper: Wran Consultancy Project No 1*, ix.

²⁹⁰ Shaw Idea (2007a) *Digging Deeper: Wran Consultancy Project No 1*, viii.

²⁹¹ "Don't fall asleep on safety...Jennings" Australian Mining, 31 October 2008,

<https://www.australianmining.com.au/news/dont-fall-asleep-on-safety-jennings/> (accessed 12 July 2020)

²⁹² NSW MSAC (2017) *Mine Safety: Reviewing safety incentive schemes*, Department of Industry, Skills and Regional Development NSW Government, Sydney

<https://resourcesandgeoscience.nsw.gov.au/miners-and-explorers/safety-and-health/topics/safety-incentive-schemes-and-production-bonus>.

²⁹³ Confirmed in an email from Andrea Shaw 10 July 2020.

including ambiguity in relation to some schemes as well as concerns as to their effects. The report noted that production bonus schemes could place particular pressures on health and safety representatives with one stating:

The crew blames you when you insist that they follow safety procedure, they sometimes say you [act as] if you do not want the production bonus. They make it difficult for me to do my job.²⁹⁴

As in *Digging Deeper* managers also expressed concerns with one general manager observing:

The production bonus motivates the workforce to work hard daily but in return it shifts workers' behaviour from safety. If workers need to blast a face and there are not enough materials, they blast as much as they can and make a plan because of the production bonus.²⁹⁵

The potential of bonus payment systems to compromise safety has also been addressed in a number of incident investigations. A report prepared for the Independent Inquiry into the Anzac Day 2006 Beaconsfield mine fatality found no evidence the bonus system had contributed to the incident but there was some evidence it compromised safety:

Of the 11 mineworkers (employees and contractors) to comment on the relationship between the bonus system and safety ten indicated that the bonus could have a negative impact on safety (a number illustrating how this occurred) and only one mineworker rejected a link. Other mineworkers attested to the capacity of the bonus to encourage poor work practices even though these didn't endanger workers. Amongst shift supervisors, one believed there was a link between the bonus and safety while two rejected this connection. The latter view was endorsed by shift supervisor and Stephen Saltmarsh, training officer Paddy Hampton and underground manager Pat Ball. It is clear management was aware of the risk that the bonus would compromise safety and sought to combat this (at least in terms of work practices). Nonetheless, there is evidence that the bonus did, on occasion, alter work practices and some of these changes entailed corner cutting in relation to safety. It seems reasonable to presume workers doing this did not seek to draw management's attention to it. Nor does it seem plausible that several workers would admit to engaging in dangerous practices to secure the bonus if this wasn't the case. Despite differences, the weight of opinion and cited examples indicates the system had the potential to compromise safety at the mine because, under some conditions, it encouraged workers to rush, cut corners/flout safe work procedures or attend work when ill. In conclusion, there is evidence that the bonus scheme was a source of division amongst mineworkers, was disliked by a significant number of mineworkers (including those not subject to it), and had a negative effect on workforce morale. There is some evidence that, on occasion (such as towards the end of the monthly bonus period), the bonus system encouraged work practices that breached safe work procedures or in other ways compromised safety. While this evidence is

²⁹⁴ Shaw Idea (2010) *Changing Minds, Changing Mines*, Final Report to the Mine Health and Safety Council of South Africa, 67.

²⁹⁵ Shaw Idea (2010) *Changing Minds, Changing Mines*, Final Report to the Mine Health and Safety Council of South Africa, 67.

limited (and entailed an element of self-incrimination) it is consistent with reviews into mining safety elsewhere in Australia.²⁹⁶

The Royal Commission into the Pike River mine disaster included considerable evidence on how bonuses designed to increase production could compromise safety. At pages 161-162 the Royal Commission noted:

27. In response to the increasing delays, in July 2010 the Pike board authorised the payment of a hydro-production bonus to staff when hydro extraction began. The bonus started at \$13,000 if hydro production (defined as 1000 tonnes of coal) was achieved, together with 630m of roadway development, by 3 September 2010. After that date the amount of the bonus reduced each week, as shown in the following table that was presented to staff...
28. The bonus, budgeted to cost Pike \$2.3 million, came when the board acknowledged internally it was facing credibility problems because of overpromising and underdelivering. In April and May 2010 Pike had raised a further \$50 million from the market, but by 24 June 2010 it was forecasting a \$5.8 million cash shortfall. In an email to directors on 5 July 2010, board chair John Dow said it was ‘worth paying [the hydro bonus] to retain short-term market credibility.’
29. At the commission’s hearings, Mr Dow suggested the bonus was a response to poor work practices and in particular a lack of productivity and efficiency by workers. He said workers were not showing up for shifts, not looking after equipment and forgetting to fuel vehicles, and the bonus was ‘about making sure people were thoughtful before they came to work. The board did not consider the potential impact of the hydro bonus on health and safety, but ‘would have considered … There would be no reason why there’d be any relaxation in health and safety attention.’ Mr Dow believed the targets were ‘modest enough and readily achievable.’
30. Three points arise from the board’s decision to implement the hydro bonus. First, the board did not give sufficient consideration to the ventilation requirements of the hydro monitor. Hydro mining began on 19 September 2010, two weeks before commissioning of the main fan started on 4 October 2010.⁴⁴ Because of the large amount of methane generated by the hydro monitor, Pike should have established robust ventilation from the main fan before starting hydro mining. Several people at Pike expressed that view. Problems with methane recurred and on Friday 1 October, following the achievement of the hydro bonus, Pike agreed to stop monitor operations until the main fan became operational in booster mode the following week.
31. Second, the board failed to address the risk that the bonus would place undue focus on production at the expense of safety. Following the bonus, the mine pulled out ‘all stops’ to start hydro mining as quickly as possible. Mr Nishioka reported that workers made

²⁹⁶ Quinlan, M (2009) *Report on OHS Management at the Beaconsfield Joint Venture Gold Mine, Tasmania up to and Including the Time of the Rockfall Incident at the 925 Level of the Mine that Occurred at around 9.23 pm, Resulting in the Death of Larry Paul Knight and the Entrapment of Todd Andrew Russell and Brant George Webb*, Expert Report Prepared for Greg Melick SC, Independent Investigator appointed by the Tasmanian Government, 30 August 2007, 168.

'strenuous effort' to produce 1000 tonnes of coal by midnight on 24 September, the due date for the \$10,000 bonus, although methane levels rose to explosive levels in the return twice in the days leading up to this deadline. It was hazardous to continue extraction in those conditions, and Mr Nishioka recommended that the operation stop until the main fan became operational. This did not happen until the bonus had been achieved.

32. Although production bonuses are common in the coal mining industry, the hydro bonus at Pike created particular risks. Pike offered the bonus when there were known problems with equipment, ventilation, staff inexperience, and a lack of effective monitoring systems.

33. Third, the bonus was introduced when the board and senior management had not been assured that Pike's systems were ready for hydro mining. In early July 2010 the company had not undertaken the appropriate risk assessments, and it did not properly complete them before beginning hydro extraction.²⁹⁷

The bonus was also used to discourage absence including those related to sickness:

In July 2010 the hydro-mining start-up bonus discussed in Chapter 12, 'Hydro mining', was instituted, although the cause of the absenteeism problem was not clear to the board. The bonus was reduced by \$200 for each non-attendance, defined as every day or shift on which an employee was rostered but did not work for any reason, including sickness or lateness. By November 2010, Pike considered that the bonus scheme had led to a 'reduction in sick leave usage'.²⁹⁸

Taken as a whole, it is clear the board gave inadequate consideration to the safety implications of the bonus system. It arguably encouraged workers to rush to meet production targets and to discourage the reporting of incidents or other actions that might affect production, something that the relative inexperience of the workforce (the high ratio of inexperienced to experienced operators that the Commission also identified, arguably contributed to in terms of 'gung-ho' work practices). In its overall findings the Royal Commission concluded that the bonus scheme was one of a range of factors that clearly demonstrated production priorities had overridden safety:

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.²⁹⁹

Overall findings/learning

This section considered the connection between production and safety reward schemes with safety.

Production pressures and safety

²⁹⁷ Footnotes removed. *Royal Commission on the Pike River Coal Mine Tragedy* (2012) Volume 2, Wellington, 161-162

²⁹⁸ *Royal Commission on the Pike River Coal Mine Tragedy* (2012) Volume 2, Wellington, 60-61.

²⁹⁹ *Royal Commission on the Pike River Coal Mine Tragedy* (2012) Volume 2, Wellington, 175.

At the outset, the wider question of production pressures and safety was briefly examined. It was noted that there is research linking production pressures to adverse safety outcomes, with a recent South African study of metalliferous mining that production overrode safety and effectively diminished the role worker safety representatives. It was also noted that production pressures has been linked to a number of coalmining disasters by the subsequent official investigation, with specific reference being made to the example of the Upper Big Branch disaster in the USA in 2010, where, as in the South African study just mentioned, the investigation also made specific reference to the combination of production pressures with the suppression of worker 'voice', their capacity to raise concerns safety concerns. And in this disaster workers held concerns prior to the disaster. Upper Big Branch was not an isolated or aberrant instance of where production concerns overrode safety. References to other mining examples including Pike River and Westray are made elsewhere in this report along with examples that illustrate this problem is not confined to mining (see for example the discussion of BP and incidents, especially Deep Water Horizon). Other examples are also cited in the next section on safety representatives.

Within the time available for its preparation for this report it was only possible to point to the significance of the issue (with some supporting evidence) and make a number of connections rather than provide a focused and extensive treatment of the issue. This is probably sufficient for the issues the report was asked to focus on but the general observations just made should be borne in mind when considering bonuses and other matters like the activities of safety representatives and the section of corporate governance etc.

Production bonuses and safety reward schemes.

Bonus and reward schemes have long been a feature of the mining industry but questioning of their adverse safety implications also dates back well over a century. The report sought to examine bonus/reward schemes operating at both executive/higher management level and those operating for mineworkers, most of which appear to have been designed at corporate level.

Executive/senior management reward schemes

Substantial performance-based reward schemes are common for corporate executives but, especially in the wake of the Great Financial Crisis, these have come in for close scrutiny in government inquiries and by researchers with a number of studies finding that these schemes, especially those involving share options or connected to stock prices, rather than aligning managers with shareholders as intended, encouraged higher risk behaviour and had other unintended consequences. The report didn't identify research specifically linking such reward schemes to adverse safety outcomes although the link is plausible if it applies to other areas of decision-making (notably financial) where such links are made.

In the mining industry substantial performance based reward schemes seem typical for executives/senior managers, either in the form of short-term schemes (using a balanced scorecard of performance measure like production, profits and safety plus share options) or long-term schemes more typically tied to share-options. As far as could be determined there is no published research into the impact of these schemes, if any, on safety or OHS more generally although the issue is being considered by PhD on mine safety nearing completion. Given what has been found

about unintended consequences of reward schemes in other industries this issue warrants investigation.

Worker production and safety reward bonuses

The safety implications of production-based bonuses and safety reward schemes applying to mineworkers, has been the subject of debate over many years. Despite this, comparatively little detailed research has been undertaken and some of earlier studies undertaken were relatively weak or their conclusions severely questioned by other researchers. A number of more recent studies were examined including two South African studies, one pointing to the unintended consequences such schemes could have (consistent with points already made) while the other argued large production bonuses overrode safety and swamped any positive effects that smaller safety bonuses might have secured. The most robust study was undertaken in the USA, involving five coalmines and a large survey of workers plus more detailed mine-site interviews. They found flaws in most schemes at the mines and concluded large production-based or time-based bonuses could give workers the impression production is valued over safety, causing them to work in an unsafe manner while large injury-based bonuses could cause workers 'to fail to report minor injuries and other incidents that are important for managers to know about in order to prevent similar incidents from occurring in the future.'

While no recent Australian research could be identified the operation and effect of bonus schemes was the subject of detailed investigation (using robust methods) following recommendations by both the 1997 and 2005 NSW Mine Safety Reviews. The *Digging Deeper* report identified common flaws in scheme design (including a focus on lost time injuries and ambiguity) and greater use of large bonus payments at mines rated as high-risk. Both mine managers and workers expressed views that production bonuses affected safety and both these and safety reward schemes discouraged injury and incident reporting. In 2010 key members of the Digging Deeper team undertook a similar study of South African mines for South African Mine Health and Safety Council and essentially reached the same conclusions.

Mine incident investigations have also raised concerns, most graphically the Pike River mine disaster where a particularly inept/dangerous scheme contributed to production pressures and behaviour that compromised safety at the mine, and contributed to the disaster.

Key learning

The safety-compromising potential of production bonus and safety reward systems has long been recognised. The evidence collected in this report, while ideally should be extended, indicates such schemes can encourage hazardous practices and decision-making and also discourage the reporting of injuries and incidents, effects that may be compounded by other practise such as the engagement of contractors (see previous section of this report and the next section). Whether production-based reward schemes are a good idea OHS-wise in high-hazard workplaces like mines is a moot point. If they are to continue as part of the mining industry attention should be given to learning of their effects (including particular types of schemes) with regard to both executive/manager and mineworker behaviour so schemes without unintended or adverse effects could be devised. Further, the influence if any of bonus schemes should be thoroughly investigated in any fatal mine incident where it may have played a role. Finally, evidence on safety reward schemes suggests those using

injury indicators can discourage reporting and may not be the best means of promoting safe behaviour. Again, this warrants further attention and moving to schemes that encourage reporting especially of HPIs and constructive safety actions.

(c) employment arrangements on the performance by Site Safety and Health Representatives of their functions

Background

Mineworker representative involvement has long been a feature of mine-safety laws in Britain, Australia and a number of other countries, predating similar but often still arguably inferior measures for workers in general by about a century. Legislative powers to enable working miners to inspect mines were enacted in the UK in 1872, soon followed by NSW (1876) before spreading to other Australian jurisdictions and other countries like New Zealand, Canada with similar measures introduced in France, Belgium and Germany from the late 19th century onwards.³⁰⁰ In Queensland campaigning for similar measures began in the 1880s but legislation was not enacted until 1910 when the:

Mines Regulation Act 1910 (1 Geo V 24) empowered miners to elect persons to carry out inspections on their behalf; to view the mine's record book (section 9(4)); to inspect the scene of accidents (section 28(2)); to be notified by the mining warden of any inquiry into fatal accidents at the mine (section 31(2)); as well as to be notified of any special rules and lodge objections to them (sub-sections 51(2), (3) and (5)).³⁰¹

This legislation that covered both coal and metalliferous mines was strengthened in 1916 and subsequently, often in the wake of disaster like Queensland's worst mine disaster at Mount Mulligan in 1921 (74-75 killed) which resulted in a separation of coalmining and metalliferous mining in recognition of the particular hazards of the former. Workmen inspectors, often known as check-inspectors, began regular mine inspections immediately after the passage of the NSW legislation in 1876 and the same applied in Queensland. Unions were pivotal to these developments and remain pivotal to their effective operation (see below). Their inspection activities were widely reported in the press, especially by newspapers in mining regions. A number of limitations in the system became evident including the need for these inspectors to be working miners, the resistance of some mining companies to their activities and their vulnerability of appointees to intimidation/dismissal. Royal Commissions into mine disasters, notably Bulli in 1887 and Mount Kembla in 1902 (respectively they killed 81 and 96 men and boys the second-worst and worst coalmining disasters in Australian history) heard evidence of these problems as well as the constructive role check inspectors could and did play.³⁰² Legislative provisions prohibiting interference in the activities of check-inspectors failed to adequately resolve these problems. In NSW and Queensland the coalminers unions had appointed district check inspectors (full-time union officials) to undertake inspections and assist

³⁰⁰ Walters D & Quinlan M, (2019) Representing workers on occupational safety and health: some lessons from a largely ignored history, *Industrial Relations Journal*, vol.50 no.4 (2019), 399-414; Walters D, & Quinlan M, (2020) An International History of Coalminers' Actions to Voice Resistance to the Appropriation of their Safety and Health, 1870-1925, *Relations Industrielles*, 75(2): 376-399.

³⁰¹ D. Walters and M. Quinlan, Voice and resistance — Coal Miners' struggles to represent their health and safety interests in Australia and New Zealand 1871-1925, *Economic and Labour Relations Review* vol.30 no.4 (2019), 522.

³⁰² D. Walters and M. Quinlan, Voice and resistance — Coal Miners' struggles to represent their health and safety interests in Australia and New Zealand 1871-1925, *Economic and Labour Relations Review* vol.30 no.4 (2019), 513-31.

those in particular mines (especially where union presence was weaker) and eventually these positions were given formal legislative recognition (in Queensland this occurred in 1938). Very similar problems and debates to those just described played in other Australian jurisdictions, the UK, Canada and other countries.

The model of both mine-site and industry representatives, performing inspection and related roles, essentially continues to operate with both site and district check inspectors (now known as site safety and health representatives or SSHR and industry safety and health representatives or ISHR). Currently Queensland legislation enables the appointment of two SSHRs at each mine and three ISHRs. The ISHHRs are paid by the CFMEU but are appointed under statute and their activities solely focused on safety and health is governed by mine safety legislation. Notwithstanding the challenges just mentioned and differences of opinion on occasion with industry or government inspectors the role and activities of check inspectors (both mine-site and industry) gained recognition and respect over time within the industry and their community. Check-inspectors conducted regular inspections, prepared reports and on occasion withdrew mineworkers from situations of imminent danger, giving evidence to inquiries/investigations (industry check inspectors were appointed as representatives on some inquiries), lobbied on safety issues, conducted joint inspections of mines with government inspectors (for example after the Collinsville state mine disaster).

The safety representative regime was secured by unions and union involvement remains integral to their operation. For example, the CFMEU undertakes training and mentoring of SSHRs and ISHRs are paid for by the CFMEU. Unions have played a long and critical role in promoting safety and health in the coalmining industry, readily attested to in some of the studies of the history workmen/check inspectors already cited and a much wider literature. It is also evident in recent US research that has found non-union mines had significantly inferior safety records to unionised mines, including the Buessing and Boden study referred to in an earlier section of this report along with the study by Stanford University professor Alison Morantz.³⁰³ The findings with regard to coalmining are also echoed by wider research into the relationship between union presence and safety. For example, in 2018 Harvard University researcher Michael Zoorob published a study of declining unionisation in USA, accelerated by so-called right to work (RTW) legislation using two-way fixed regression models to estimate the effect of unionisation on occupational mortality per 100,000 workers over the period 1992–2016, controlling for state policy liberalism and workforce composition. Zoorob found the ‘Local Average Treatment Effect of a 1% decline in unionisation attributable to RTW is about a 5% increase in the rate of occupational fatalities’ and that overall ‘RTW laws have led to a 14.2% increase in occupational mortality through decreased unionisation.’³⁰⁴ Concluding his study Zoorob argued:

These findings illustrate and quantify the protective effect of unions on workers’ safety identified by other scholars. In the USA, collective bargaining agreements secured by unions have been documented to provide numerous workplace hazards protections, such as shift restrictions (to prevent fatigue) and safety equipment provision, along with other potential benefits to health such as more generous employer-provided medical insurance. Studies

³⁰³ Morantz, A. (2013) Coal mine safety: do unions make a difference, *Industrial and Labor Relations Review* 66:88–116.

³⁰⁴ Zoorob, M. (2018) Does ‘right to work’ imperil the right to health? The effect of labour unions on workplace fatalities, *Occupational Environmental Medicine*, 75,736, doi:10.1136/oemed-2017-104747.

suggest that unionised workplaces receive more health and safety inspections from the federal agency OSHA, and the threat of union organising may impel employers to improve workplace safety. Though worker fatalities have declined in the last two decades in the USA, this decline has been steeper in states with higher levels of unionisation. Moreover, this study shows that RTW legislation, under consideration in many state legislatures and nationwide, may lead to greater workplace mortality through decreasing the percentage of unionised workers. Indeed, worker fatalities have climbed somewhat since 2008, a reversal from previous years, during the same period that several states adopted RTW. In light of these findings, policymakers in the USA and other countries might consider how declining unionisation rates may impact worker safety.³⁰⁵

In the USA, unlike Australia, there are no regulatory requirements regarding worker representatives in mining or more generally for that matter. As far as I am aware there have been few if any comparable studies of the association of union presence and occupational fatalities in Australia. The role and effectiveness of SSHRs and ISHRs has, however, been the subject of detailed research and these arrangements haven been compared to those in a number of other countries. The next subsection examines this evidence.

Evidence on the role and effectiveness of SSHRs and ISHRs

In 2013-2014 the Mining Division of the CFMEU funded a study by British and Australian academics of the role, activities and effectiveness of mine safety representatives in Queensland. The CFMEU provided funding and logistical support (access to records and facilitating interviews and focus groups and attendance at the annual SSHR training conference) but had no (and nor did it ask for) input to the content, analysis or findings of the report.³⁰⁶ Evidence, analysis and findings were subsequently published in three international and peer-reviewed academic journals (and the following observations are principally drawn from these).³⁰⁷

The study used a number of methods. First, the inspection reports of SSHRs, ISHRs and government mine inspectors were examined for the period 1984-2013 at 19 mines (12 open-cut and seven underground), most medium to large. Union density was greater than 75% in the majority but in four mines 33-50% of miners were union members and in three there was no significant union presence. Although reports from 1984 were examined most inspection reports (75%) were written between 1998 and 2013, the vast majority (and all SSHR reports) as a result of a site visit/inspection while the remainder pertained to follow-up reviews/reports after an investigation/incident at that mine or a

³⁰⁵ Zoorob, M. (2018) Does 'right to work' imperil the right to health? The effect of labour unions on workplace fatalities, *Occupational Environmental Medicine*, 75: 768, doi:10.1136/oemed-2017-104747.

³⁰⁶ The CFME did supply ad recommend photographs on the long and short versions of the report (underground miners for the long version and open-cut for the shorter version). Walters D, Wadsworth E, Johnstone R, & Quinlan M, (2014) *A study of the role of workers' representatives in health and safety arrangements in coal mines in Queensland: Final Report*, Research supported by the Construction, Forestry, Mining and Energy Union (CFMEU) Mining and Energy Division.

³⁰⁷ Walters D, Quinlan M, Johnstone R, & Wadsworth E, (2019) Representing miners in arrangements for health and safety in coalmines: A study of current practice, *Economic and Industrial Democracy*, 40(4):976-996; Walters D, Johnstone R, Quinlan M, & Wadsworth E, (2016) Safeguarding Workers: A Study of Health and Safety Representatives in the Queensland Coalmining Industry, 1990-2013, *Relations Industrielles*, 71(3):418-441; Walters D, Quinlan M, Johnstone R, & Wadsworth E, (2016) Cooperation or resistance? Representing workers' health and safety in a hazardous industry, *Industrial Relations Journal*, 47(4):379–395.

similar mine elsewhere. In total 1164 reports were examined, 473 (41%) by ISSHRs, 50 (4%) by SSHRs, 605 (52%) by government mine inspectors plus another 37 (3%) from other parties (such as correspondence between ISHRs and mine managers or mine-plans/maps included in these files). Each report/document was examined to identify what was recorded in relation to inspections, including why an inspection was made, what was inspected and the outcome and how these activities related to the fulfilment of functions defined in the *Coal Mining Safety and Health Act 1999*. To gain particular insights on how SSHRs and ISHRs used their statutory powers with regard to safety risks the study concentrated its attention on eight hazards known to kill miners - the mechanisms of fatality as well as serious injuries (and where near misses or other precursors are notifiable as HPIs) notably:

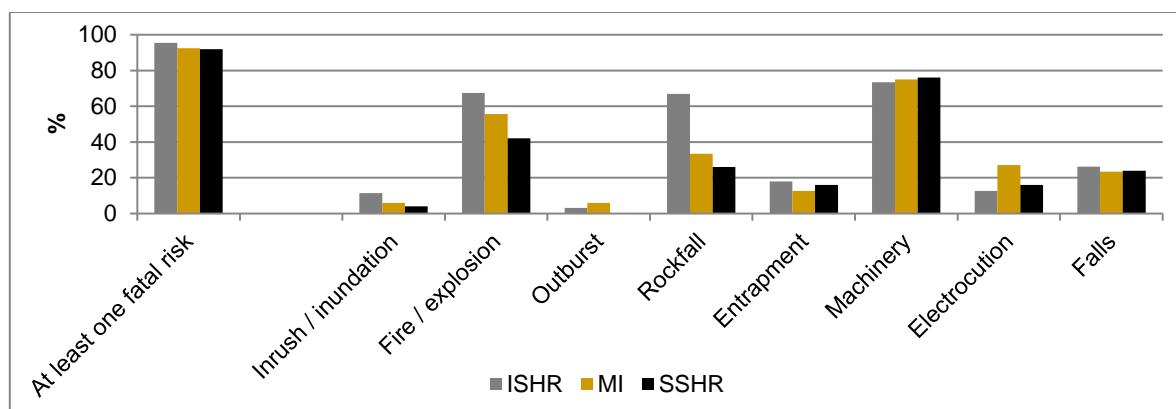
- Fire and explosions including machinery fires as well as methane and coal dust fires.
- Inundation/inrush of water, mud-rushes and failure of tailings dams
- Falls of ground including materials being spat from walls due to pressure
- Outburst of poisonous gas (or dangerous accumulations of toxic gas in confined spaces)
- Machinery incidents, including contact with moving machinery, catastrophic machinery failure, and traffic incidents
- Electrocution through contact with live cables, water or machinery
- Falls from height including failure of winding gear in underground mines, falls from platforms or machinery or falls associated with trucks and tipping over inclines.
- Entrapment in confined spaces underground or in open-cut workings (maybe associated with crushing, fire, toxic gases, lack of oxygen or rising water levels)

The second method used was 24 detailed (average one to 1.5 hours) interviews, 23 with current and former safety representatives (14 SSHRs at mines covered in the documentary analysis, 4 SSHRs at other mines, 3 current ISHRs and 2 former ISHRs) and the remaining interview with a senior mines inspector. The interviews sought to explore representatives' experiences in safety and ill-health prevention activities, perceived outcomes, balance of activities, and their relations with workers and managers. Interviews also explored the extent representatives used their statutory powers; how they balanced tensions between safety and industrial issues; the supports and constraints under which they operated; their perceived needs; and how they supported one another. Finally, interviews explored representative relations with sub-contractors and their liaison with the mines inspectorate. The interview with the senior mines inspector covered the same issues.

Third, one of the research team attended and observed sessions at two annual five-day training courses for site representatives provided by the CFMEU. Industry representatives provided much of the training in both, and attending the courses allowed researchers to observe in detail the support site representatives received from them in this respect, the subject matter of training, the pedagogic methods involved, and to observe interaction between representatives.

The Queensland study found inspections by representatives (both SSHRs and ISHRs) and mine inspectors overwhelmingly examined fatality risks and that this issue also exercised the mind of representatives in interviews. Figure taken from the original report summarises the types of fatality risks and the proportion of inspections by SSHRs, ISHRs and mine inspectors (MI) relating to each.

Figure 1 Inspection of Fatal risks by ISHR, SSHR and Mine Inspectors 1984-2013



The focus on particular hazards differed between underground and open-cut mines reflecting the relative importance of specific hazards. Overall, there was an alignment between the issues examined by SSHRs/ISHRs and mine inspectors but with some differences, which might be viewed as a strength of having two independent inspection processes occurring.

Most site visit reports, regardless of whether they were undertaken by representatives or the mines inspectorate, referred to inspection of at least one fatal risk (94%). Machinery, fire or explosion and rock fall were most commonly reported. There was some variation between industry representative and mines inspectorate reports: more of the former referred to inrush/inundation, fire/explosion and rock fall, and more of the latter referred to outburst and electrocution. Binary logistic regression showed most of these differences were significant independent of mine type, with industry representative reports more likely to refer to inrush/inundation, fire/explosion, rock fall and entrapment, site representative reports more likely to refer to inrush/inundation and entrapment, and mines inspectorate reports more likely to refer to electrocution. In addition, mine type was independently associated with all fatal risks except electrocution. Underground mines were more likely to have reports referring to inrush/inundation, fire/explosion, outburst, rock fall and entrapment, while open-cut mines were more likely to have reports referring to machinery and falls.

Interviews suggested representatives were aware of the potentially serious nature of the hazards they were there to prevent:

Because it frightens you at 2 o'clock in the morning when you get a call, you think what's going on, this is bad. And to wake up out of a sleep, you know, my worst fear is a fatality, you know, and ... I don't want that to occur, you know what I mean? And that to me is a failure, you know what I mean? Where I've failed, in the role, because I haven't been able to stop it. (Industry representative).³⁰⁸

Another critical aspect of ISHR and SSHR inspections were with regard to high potential incidents (HPIs). This aspect of their activity could only be alluded to briefly in the limited space available in

³⁰⁸ Walters D, Quinlan M, Johnstone R, & Wadsworth E, (2019) Representing miners in arrangements for health and safety in coalmines: A study of current practice, *Economic and Industrial Democracy*, 40(4):983.

published articles but was dealt with at some length in the original reports. Given the relevance of HPIs to other sections of the report a number of ISHR and SSHR inspections reports relating to HPIs extracted from files and reproduced in the Queensland study are worth reproducing to illustrate the important and constructive role played in this regard. The following extract from an underground report is typical:

Prior to going underground discussions were had [with managers and the SSHR] ... in relation to what has been occurring at the mine with the recent HPI's [SIC] and the proposed process the mine is considering with review of HPI's and SHMS. There has been a number of HPI's [SIC] on site in recent times and some of these have caused concerns to the coal mine workers at the mine and management. With the employment of [a Safety Superintendent] one of his main focuses at this time is working thru [SIC] a process in relation to the HPI's. There has been a flow chart developed to assist with this process and it is hoped that by applying a process like this is it will look at the main contributing factors involved. The following are the main factors to consider in this review: look at the control measures both what are currently in place and also long term controls and strategy for these with the aim being effectiveness of them; the current SSHR will be taken off the current shift roster to be involved in the process with [the Safety Superintendent]; the review is to break the areas down looking at operational, technical and maintenance related issues. Included in this would also be the equipment, training, processes and people factors; remind all coal mine workers of their obligations under the Coal Mining Safety & Health Act 1999 and in particular S39 requirements; remind all coal mine workers of their roles & responsibilities under the CMSHA 1999 and in particular Explosion Risk Zone Controllers (ERZC) who needs to understand that their first responsibility is the health & safety matters prescribed under the Coal 10 These reports are not always the result of a site visit. Mining Legislation; going to reinforce the importance of the CMSH legislation and the mines Safety & Health Management System to all workers; carry out weekly reviews of the HPI's that may occur at the mine; a meeting has been held with senior management & workers representatives on a way forward to correct the problems at the mine. These discussions looked at the critical issues and a strategy to move forward with all involved; I look forward to the outcomes of this process and the implementation of the action plan to move forward to assist in controlling the issues on site. The importance of this process is the involvement of the work force and all CMW understanding their roles & responsibilities in this. In my view it applies to all people at the mine from the SSE down to worker at the coal face (ISHR report).³⁰⁹

The Queensland report went onto note several 'ISHR reports also indicated that they were passing on details of HPIs elsewhere to mines they were inspecting – the following extract is from an open cut mine:

Informed those present of the HPI incident which had occurred at [another] open cut coal mine involving a sling breaking while being used to tow another dozer out which became stuck which resulted in a flying metal object going through the back window of a D11Dozer just missing the operator (ISHR report).

³⁰⁹ Walters D, Wadsworth E, Johnstone R, & Quinlan M, (2014) *A study of the role of workers' representatives in health and safety arrangements in coal mines in Queensland: Final Report*, Research supported by the Construction, Forestry, Mining and Energy Union (CFMEU) Mining and Energy Division, 62-63.

However, a number of the ISHR reports refer to disagreement between a mine manager and the representative about whether or not an incident should be classified as an HPI. As this extract from an ISHR report on an open cut mine shows, this was also an area of concern among the mines inspectorate and the views of the ISHR and MI inspector were usually in agreement:

Discussions were held over a HPI incident that occurred at the mine on the 8th of June which involved a light vehicle rolling over on the back access road. I was informed by those present that the SSE at the time did not believe that this light vehicle roll over was reportable HPI. The SSE at the mine had put out a document titled “[Mine] HPI Guideline” the purpose of this document was to provide a consistent interpretation of what is a HPI. I was provided with a copy of this document and after viewing it find that it actually is a cut and paste of the legislation requirements but has not included the full abstract of S 17 of Coal Mining Safety and Health Act 1999 which defines what HPI is as defined below. After some discussion between those present on this particular incident, we could not agree and in the absence of the SSE it would be easier to discuss the issue with the SSE (ISHR report).

HPIs were also often ongoing issues at particular mines which had very frequently also been flagged up by SSHRs, as is clear from this ISHR report extract from an underground mine:

The reason for the inspection was twofold, firstly to inspect the site of the latest HPI at the mine and secondly to raise question with the mine’s Site Senior Executive (SSE) as to the mine’s Safety and Health Management System being adequate and effective. On traveling to the mine, I received a phone call from the mine’s SSHR to inform me that there had been yet another incident at the mine. This latest incident ... [resulted] in the injured coal mine worker being sent to hospital to receive stitches to his head. Once again, the mine failed to inform the Site Safety and Health Representatives, Industry Safety and Health Representative (ISHR) and the DNRM Inspectorate as per Queensland Coal Mining Safety and Health Act 1999 –Sections 106 & 198. This issue of not informing the relevant people was raised on my last visit to the mine and assurances were then given by the mine to ensure that compliance to the mines procedure and legislation was adhered to. A mine record entry was also made by the mine’s SSHR’s regarding same, prior to my last visit. Discussion was held regarding the unremitting failure to adequately inform the mines SSHR’s and Inspectors of High Potential Incidents. The Health and Safety Manager assented that once again there had been a failure in the mine’s Safety and Health Management System. I enquired as to the information of the latest incident and was informed that there had been two incidents on the same shift. With this information presented to me, the extremely high frequency of HPI’s and Serious Incidents, and the mines inability to curb the rising amount of incidents, the non-compliance with legislation regarding notification and also the UMM statement that the majority of incidents occurring where related to contractors it is my belief that the Safety Health Management System ... is inadequate and ineffective (ISHR report).

The focus of ISHR references to HPIs in their reports was predominantly on fatal risks. For example, after visiting an underground mine following an HPI in which a continuous miner unexpectedly intersected a methane drainage bore hole, the ISHR includes mention in his report of a similar event in his report which was not classified as a HPI and so had not previously been reported:

It was also raised that a similar issue had previously occurred in this panel with the ERZ Controller and the shift supervisor not classing the incident as a HPI ... above 5% CH4 was released in an uncontrolled and unexpected manner definitely classes as a HPI. If this had been then an investigation would have been investigated and implemented controls that may have prevented this reoccurrence ... (ISHR report)³¹⁰

It is worth noting that the several of the above reports refer to methane levels and contractor issues. The Queensland report went onto state that similar 'accounts of involvement in the investigation of HPIs were given in interviews with both the SSHRs and ISHRs:

Yes and also you take the HPI notifications at 2 o'clock in the morning at 3 o'clock in the morning, coming from a mine that, you'll be woken up out of sleep and you'll have to take that call, you know what I mean, it's just part of the role, we understand that, we understand that before we took the role up (7120027 - ISHR).³¹¹

Almost all inspection reports referred to examining areas and potential hazards physically (work areas, machinery and the like). At the same time, the study also examined the extent to which representatives examined safety systems as part of these activities. The legislation requires site representatives to inform the site senior executive if they believe the mine's health and safety management system to be ineffective and to advise an inspector if they feel the site senior executive's action to remedy this is unsatisfactory. Similar requirements are placed on industry representatives under section 121. Just over half ISHR inspections (54%) referred to examining documentary material (risk assessments, records, etc.). Both ISHRs and mine inspectors focused more on health and safety management system documentation than site representatives. Mine inspector and ISHR patterns of documentary inspection were similar (and both made increasing use of over time), the main difference being that more ISHR reports referred to inspecting documents relating to emergency response, training, representatives, records/monitoring, the match between documentation and practice, and the effectiveness of the health and safety management system.³¹² Inspection reports for underground mines were more likely than open-cut mines were more likely to involve both physical and document inspection especially in the case of ISHRs.

This may reflect the belief among those interviewed that underground mines had more elaborate and complicated OHS management documents setting out procedures on the

³¹⁰ Walters D, Wadsworth E, Johnstone R, & Quinlan M, (2014) *A study of the role of workers' representatives in health and safety arrangements in coal mines in Queensland: Final Report*, Research supported by the Construction, Forestry, Mining and Energy Union (CFMEU) Mining and Energy Division, 63-64.

³¹¹ Walters D, Wadsworth E, Johnstone R, & Quinlan M, (2014) *A study of the role of workers' representatives in health and safety arrangements in coal mines in Queensland: Final Report*, Research supported by the Construction, Forestry, Mining and Energy Union (CFMEU) Mining and Energy Division, 64.

³¹² Walters D, Quinlan M, Johnstone R, & Wadsworth E, (2019) Representing miners in arrangements for health and safety in coalmines: A study of current practice, *Economic and Industrial Democracy*, 40(4):984.

greater and more complex risks associated with underground mining. Consequently, a visit by an industry representative, whether prospective or to support the site representative, was likely to involve more scrutiny of documented procedures in underground mines simply because there was more to scrutinise.³¹³

As discussed elsewhere in this report incidents that could have serious/fatal consequences but didn't (sometimes referred to as 'near misses' or 'near hits') have proved one of the best warning signals of a disaster or serious event and as a result they (or associated types of indices like higher methane readings) have long been subject to notification requirements under coalmining legislation.

Reporting/notification requirements have expanded over time, along with the actions required with regard to specific types of indices, in line with increasing risk focus of legislation. Under Queensland legislation these are referred to as high potential incidents (HPIs) - incidents judged to have a high potential to lead to serious harm - and mines are required to report HPIs to site and industry representatives and the mines inspectorate. The study found that HPIs were a recurring theme in representative's reports (and this was growing over time) and demonstrated involvement in investigations and subsequent learning processes:

In the documents examined, fatal risks were the main focus of the industry representatives' references to HPIs. HPIs were also often part of ongoing issues at particular mines, which had been flagged by site representatives. However, a number of the industry representatives' reports referred to disagreements between a mine manager and the site representative about whether an incident should be classified as an HPI.³¹⁴

With regard to risk assessment the study found:

The inspection records did not include that of formal risk assessment, although it was clear from many interviews that site representatives considered this part of their activities. They were involved both directly in undertaking assessments with managers and indirectly in reviewing existing risk assessment documents when following up complaints from miners. For example, one representative said:

A lot of those complaints can involve the review process, so going back and reviewing procedure and then coming with some information and saying to them well look this is how I interpret this or whatever you know. (Site representative)

Another added:

They might come up and say look, has there been a risk assessment done on this? And I will say look I wasn't involved in it but I will find out and get back to you. (Site representative)

However, interviews also revealed that managers sometimes marginalised representatives' involvement. For example, while most representatives talked of their engagement with identifying and assessing risks on an everyday basis, some suggested managers attempted to

³¹³ Walters D, Quinlan M, Johnstone R, & Wadsworth E, (2019) Representing miners in arrangements for health and safety in coalmines: A study of current practice, *Economic and Industrial Democracy*, 40(4):986.

³¹⁴ Walters D, Quinlan M, Johnstone R, & Wadsworth E, (2019) Representing miners in arrangements for health and safety in coalmines: A study of current practice, *Economic and Industrial Democracy*, 40(4):987.

exclude them from formal risk assessment procedures, preferring to select workers they wished to consult:

But you sometimes find that the company will select people to do [the] risk analysis and they're not always people on the job, fully relevant to what's going on. (Site representative)³¹⁵

With regard to statutory powers the study found representatives made careful and selective use of them. Industry representatives deemed health and safety management system inadequate and served a formal notice in 5% of their reports (applying to around half of the mines covered) and rarely stopped work. Twenty four or 5% reports referred to the suspension of operations in 11 mines, varying from one to five per mine. On four occasions, operation of particular plant was suspended because of faulty equipment causing an incident at another mine. Another two reports, made on consecutive days, referred to the same incident (in this case risk of inrush); and for two mines identical suspension notices, issued within days of each other, referred to a fume incident. Suspension of all operations, as opposed to those confined to particular areas or using specific equipment, was even rarer: there were six (26% of the 24 suspension reports and just 1% of all industry representative reports). All but one suspension order referred to at least one of fatal risks (see above, the exception referred to the mine's Fitness for Work policy covering fatigue, drug and alcohol and other physical or psychological impairment) and were broadly consistent with the CFMEU's own suspension analysis for all Queensland coalmines. Only three (6%) and 10 (2%) of the site representative and mines inspectorate reports respectively referred to suspending operations and all these referred to at least one fatal risk. Use of other formal notifications (those not relating to a stoppage or suspension) were relatively rare too (37 or 8%), four (11%) of these ISHR reports made referred to or supported site representative. Many identified weaknesses and required corrections to the health and safety management system.³¹⁶

In sum, use of formal notifications was selective and targeted significant OHS risks (like inadequacies in emergency response procedures and equipment, ventilation, gas monitoring, machinery hazards) and were also generally used to identify the link between the risks posed by these failings and the health and safety management system. The study observed the link of specific risks to inadequacies in the management systems that should ameliorate and control them was the kind of feedback or procedures widely accepted as good practice in OHS management and risk prevention:

Therefore, documentary evidence supports the conclusion that representatives used their suspension powers responsibly in relation to serious OHS management systems' failings. Moreover, there is no evidence in the documentation that referral of these matters to the mines inspectorate has resulted in them being deemed to have been issued irresponsibly or in the integrity or motives of the representatives being questioned by the inspectorate. It was also clear from interviews that representatives were aware of the significance of these powers to stop work and used them sparingly:

³¹⁵ Walters D, Quinlan M, Johnstone R, & Wadsworth E, (2019) Representing miners in arrangements for health and safety in coalmines: A study of current practice, *Economic and Industrial Democracy*, 40(4):987-988.

³¹⁶ Walters D, Quinlan M, Johnstone R, & Wadsworth E, (2019) Representing miners in arrangements for health and safety in coalmines: A study of current practice, *Economic and Industrial Democracy*, 40(4):988-989.

I know I very, very rarely have to wave a big stick just shutting the pit down, having said that I have at times had to say I'm sorry but until you do this correctly your pit's closed, and let me tell you every time it's been fixed within the hour. (Site representative)

Generally, interviewees indicated they used these powers when there was no other recourse – often in situations where they had previously engaged with management concerning specific risks but found the response had failed to remedy the situation:

Look, as our powers and functions to stop stuff, we will give the mine the option to first. So we will go up and say we believe this is unacceptable, you need to do this, this and that and then we will go and see them or document it, send them an e-mail and then they usually, 99.9% of the time, say yeah we will fix this or give me an action plan of what you gonna do, we will be happy with that and we will check up on them and see that they are doing it or if they don't then we will just stop it. (Site representative)

On other occasions, they were used when representatives believed there was an immediate risk of serious harm if the process or operation continued:

Yes, we don't take it lightly. ... It has got to be a high-risk area and a high-risk task, like if it is strata. If you are working a high-risk area, if you are going backwards and forwards, if you are going past something like a rib that is not bolted well, you get clobbered with it and that is the end of you, you know, so that is high risk. (Site representative)

It was further clear from the interviews that the representatives were very aware of the strictures placed on their powers to serve notices or suspend operations by the regulatory requirements on them not to 'perform a function or exercise a power ... for a purpose other than a safety or health purpose' or 'unnecessarily impede production'. At the same time, possessing these powers considerably strengthened perception of their own legitimacy, a perception reinforced by positive feedback from colleagues:

I see the workforce gains a fair bit of confidence from what we do, if we're happy or if we consider it safe, they accept, that yeah, we've got the risk as low as is reasonably achievable, if we're not confident or happy with what's been decided or the controls, they know we've got the power to go further. (Site representative)

Possessing such powers also enhanced their confidence that they would be taken seriously by senior managers in their pursuit of actions that were in the main consultative and cooperative in part because they have the potential to use powers that would seriously inconvenience senior management. There are parallels between these findings and studies of the powers of health and safety representatives to stop dangerous work in other industries and countries. For example, in Sweden, where such representatives have a similar power to order the suspension of work, researchers found it was used very sparingly but

greatly valued by representatives, for the legitimacy and for the respect for their role that it conferred (Frick, 2009).³¹⁷

Interviews with SSHRs provided future insights into their functions, the important mentoring role played by ISHRs, the particular value of the training conferences organised by the union, the time put into the job outside work-hours and fears of victimisation amongst mineworkers, both direct employees but more especially contractors. Highlighting the latter points in particular the Queensland study observed:

Interviews with SSHRs suggested that these formally reported instances of responding to worker complaints probably understated the amount of time they spent on this activity. They also suggested that what might originate as a reactive response to a complaint quite often led to a more fundamental investigation of wider procedural issues and subsequent further proactive actions on the part of the SSHR. Interviews further revealed evidence that SSHRs both received and responded to issues raised outside their time at work. Sometimes this was because of the number of issues they needed to deal with; at other times, because a supervisor or manager had not properly addressed a matter when raised at work:

Oh look, I don't finish work when everyone else finishes work, I go home, I have a meal at night, you go and sit down for dinner, I get three, four people sometimes, I've had them stand in line, to talk to me. They all come to me with an issue, this happened today, this. I say well, what you really need to do is rather than wait until now to tell me about it, talk to your supervisor, yes I did, but that supervisor doesn't want to know about it, alright, well leave it to me, I'll go and speak to your supervisor, and I do, and the next morning. (7120025 - SSHR)

There were further indications that these approaches sometimes occurred off-site because workers feared retribution if they were observed making a complaint:

Yeah so it's only those that are willing to speak up sort of, and the others that don't speak up, some of them come up and see you, you know, or I'll hear it second or third hand and you've got to get back to the source and investigate it... a lot of people are intimidated to speak up, and that's the culture that (names mining company) has created. (7120022 - SSHR)³¹⁸

While all workers (contractors and permanent employees) at some mines feared retribution, representatives interviewed indicated the problem was most common amongst contract workers. Given contractors' greater job insecurity, this is not surprising and has been identified in other research (Bowden, 2003; Waring, 2003). But this observation suggests a further element of vulnerability in the fear of raising OHS concerns even with workers' representatives.

³¹⁷ Walters D, Quinlan M, Johnstone R, & Wadsworth E, (2019) Representing miners in arrangements for health and safety in coalmines: A study of current practice, *Economic and Industrial Democracy*, 40(4):989-990.

³¹⁸ Walters D, Johnstone R, Quinlan M, & Wadsworth E, (2016) Safeguarding Workers: A Study of Health and Safety Representatives in the Queensland Coalmining Industry, 1990-2013, *Relations Industrielles*, 71(3):433-434.

Other SSHRs reinforced the points just made (like fear of repercussions and coming to the SSHR outside work-time) but also referred to the individualised behaviour approaches to safety management promoted at some mines:

...you've got this massive culture of people that are scared or intimidated to raise concerns... Contractors and permanents as well. There's the culture if you speak up...you'll be given crap jobs or you know, you'll be put in the corner...a lot of people are intimidated to speak up, and that's the culture that [company] has created.
(7120022—SSHR)

This quote further illustrates the pervasive effects of individualised behavioural approaches to safety management, which contribute to feelings of insecurity and mistrust in managers, especially among workers in already insecure work arrangements (see Gunningham and Sinclair 2102: ch 4).³¹⁹

The findings of the study concluded that representatives contributed significantly to the operation of statutory arrangements for the systematic management of mining risks, but also pointed to a number of complexities and challenges. First, while declining injury and fatality rates were largely coincident with the introduction of the 1999 Act there is evidence this trend began before the Act and seemed to have stalled in more recent years (this is discussed elsewhere in the report). The possible reasons for this canvassed in the study included a number of mining company strategies to increase managerial control over work regimes, some of which may make systematic OHS management more difficult to achieve (as it had in other industries), notably the increased use of:

contractors and non-union contract labour as well fly-in-fly-out arrangements to disconnect employment from the social communities that traditionally provided strong support for miners' unionism...gained momentum in the 2000s... Corporate organisational strategies also encourage considerable movement among senior managers, resulting in regular turnover of those responsible for OHS which, as representatives in the present study pointed out, helped undermine the continuity of relations between representatives and senior managers...Analysis indicates such practices to have played a part in major disasters in coalmines elsewhere, such as in Pike River, New Zealand (Lamarre et al., 2015), where 29 miners died in 2010 and in Soma, Turkey, where 301 miners died in 2014 (Ensor, 2014)... It highlights the combined effects of work organisation, management and labour relations strategies, and suggests that precarious employment, contracting and sub-contracting and the reduced presence of organised labour, while giving greater freedoms to modern business nostrums concerning the achievement of price, production and delivery efficiencies, may in turn act to increase the fragmentation of safety management and serve to remove or downgrade the effectiveness of workers' voice in warning of its consequences. These changes take place alongside corporate attempts to introduce OHS systems in which workers' behaviour, accountability, auditing and paper compliance feature strongly and where a more unitary 'worker engagement' is preferred to the more pluralist forms of 'worker representation' on OHS matters that are the subject of statutory provisions... Studies of recent health and safety management practices in Queensland mines suggest a

³¹⁹ Walters D, Quinlan M, Johnstone R, & Wadsworth E, (2016) Cooperation or resistance? Representing workers' health and safety in a hazardous industry, *Industrial Relations Journal*, 47(4):387.

similar trajectory. In a series of publications, Gunningham and Sinclair (2009, 2011, 2012) pointed to the limitations of management-based enforced self-regulation in achieving improved OHS outcomes. They suggest this to be especially so where corporate governance attempted to impose external regulation of OHS management across different mines and where hostility in labour relations had already engendered a climate of mistrust between workers and their management.³²⁰

Drawing these points together the study concluded:

The Queensland experience, therefore, suggests something of a paradox. On the one hand, there is good evidence that the operation of the pluralist system of workers' health and safety representation, that is required by regulation, has made a significant contribution to systems for preventing injuries and ill-health and that the representatives themselves have played a substantial part in this achievement. On the other hand, there is evidence of only limited managerial support for its operation and indications of a corporate preference for a different system of worker engagement in OHS in coalmines generally in Queensland, in which autonomous representation is replaced by more behaviour-based systems of direct participation in corporate safety systems, implemented and controlled by managers.³²¹

The Queensland study just examined was succeeded by five country study (Australia, Canada, India, Indonesia and South Africa) of representative arrangements in coalmining, drawing on interviews and case studies, and funded by the Institute of Occupational Safety and Health (IOSH) the UK body representing OHS professionals. This study was published in 2018 and included the authors of the Queensland study plus other international scholars (from Canada and the UK).³²² With regard to Australia the study examined both Queensland and NSW. The central issues explored were similar to the Queensland study namely:

- the evidence for the effectiveness of arrangements for worker representation on safety and health in coal mining
- what determines this effectiveness in different national contexts, and what are the factors that limit it
- what is the role of organised labour, regulatory inspection and managerial commitment in supporting effectiveness
- and what does the research suggest concerning the role of global institutions and interests in supporting the sustainability and transfer of good practices in relation to worker representation on safety and health in mining.³²³

³²⁰ Walters D, Quinlan M, Johnstone R, & Wadsworth E, (2019) Representing miners in arrangements for health and safety in coalmines: A study of current practice, *Economic and Industrial Democracy*, 40(4):991-993.

³²¹ Walters D, Quinlan M, Johnstone R, & Wadsworth E, (2019) Representing miners in arrangements for health and safety in coalmines: A study of current practice, *Economic and Industrial Democracy*, 40(4):993.

³²² Walters D, Wadsworth E, Johnstone R, Lippel K, Quinlan M, Bhattacharya S, & James P, (2018) *The role and effects of representing miners in arrangements for safety and health in coal mining: a global study*, Volumes 1 & 2, IOSH and Cardiff University, Cardiff, <https://iosh.com/coalmining>.

³²³ Walters D, Wadsworth E, Johnstone R, Lippel K, Quinlan M, Bhattacharya S, & James P, (2018) *The role and effects of representing miners in arrangements for safety and health in coal mining: a global study Volume 1: A comparative analysis of findings from five countries*, IOSH and Cardiff University, Cardiff, 13.

By examining worker representation in coalmining in countries representing a range of economic, regulatory and labour relations settings the IOSH report sought to shed more light on these questions. It is beyond the scope of this report to consider the two-volume report in detail. Rather, attention will focus on the main findings and evidence pertaining to the use of contract labour. In summarising its main conclusions the report stated:

Four overarching conclusions have emerged from this research. First, our research and findings in this project provide strong indications that, given an appropriate level of support, worker representation and consultation on safety and health in coal mines makes a significant contribution to improving the arrangements and outcomes for managing these matters effectively in mines. Second, it shows that such support and the preconditions that determine effectiveness are present far more obviously in coal mining in some countries than in others, although in all countries they have the potential to be both present and effective. Third, it demonstrates that the theoretical propositions that informed the understandings of our previous study can be extended globally and provide an appropriate way of understanding what makes representation and consultation effective as well as what constrains it. Finally, it suggests that there is a global dimension to policy and practice on safety and health in mining in which nationally based state, corporate and individual actors are not the sole players, but where it is essential that global regulatory bodies, such as the ILO and global workers' organisations, also have a role. Support from these bodies is important to ensure that representation and consultation of miners on safety and health remains as central to the implementation of preventive strategies for safety and health in mining, wherever it takes place in the world, as the study shows it to have been in the history of these strategies in advanced market economies.³²⁴

With regard to the knowledge and activism of representatives the report state:

But it was clear that the representatives who participated in the study in Australia, in Canada, and, to some extent, in South Africa, were considerably more conversant with the nature and range of their possible engagement with safety and health in the mines in which they were active, as well as with the strategies at their disposal to ensure that their actions would have some chance of impact on the matters of safety and health at which they were directed, than were representatives in other places.³²⁵

On the question of legislative rights and functions the IOSH report found:

As we have already indicated, these requirements were most developed in Australia, where they had enjoyed a long history and, as well as creating both full-time industry representatives and part-time site representatives for safety and health, they included provisions enabling them to undertake autonomous inspections and investigations, review arrangements made in the mine for safety management, make representations to their

³²⁴ Walters D, Wadsworth E, Johnstone R, Lippel K, Quinlan M, Bhattacharya S, & James P, (2018) *The role and effects of representing miners in arrangements for safety and health in coal mining: a global study Volume 1: A comparative analysis of findings from five countries*, IOSH and Cardiff University, Cardiff, 132-133.

³²⁵ Walters D, Wadsworth E, Johnstone R, Lippel K, Quinlan M, Bhattacharya S, & James P, (2018) *The role and effects of representing miners in arrangements for safety and health in coal mining: a global study Volume 1: A comparative analysis of findings from five countries*, IOSH and Cardiff University, Cardiff, 137.

employers on matters arising from such activity and, if deemed necessary, order the cessation of dangerous processes. Although provisions were qualified with caveats to ensure they were used responsibly, only for safety and health purposes, and were not used to interfere with production, examples showed that the representatives could, if necessary, even call a halt to the production of the mine if addressing serious risks warranted this. A similar set of rights were enabled in Canada as a result of the legal status of institutions and procedures of labour relations, in which bipartite arrangements carried some force of law. The mining unions in British Columbia were able to show how they had used negotiated standards in collective bargaining agreements to improve on the rather generalised provisions for worker representation and consultation in coal mines with specific details addressing their rights to autonomous actions similar to those seen in Australia.

These observations led to the conclusion that the detail of the regulatory steer was an important support for the activities of worker representatives in our study.³²⁶

In addition to the critical role of regulatory steer and the commitment of the regulatory agency in ensuring compliance with them the IOSH report identified other determinants of the effectiveness of worker representation and consultation on OSH included:

employer/management commitment to participative arrangements for safety and health, the competence of the representatives themselves (something strongly influenced by their training), and good communication and support from their constituents — the workers on whose behalf they make representations. The present study found abundant evidence of all of these in the examples of effective representation it explored, as well as their conspicuous absence from situations in which worker representation and consultation struggled to achieve influence on arrangements and outcomes for safety and health in mines. As we indicated in Chapter 7, miners' representatives utilised not only the regulatory steer, but also the role of regulatory inspectors in its delivery, along with arrangements employers and their managers made to facilitate and support representative participation in OSH.³²⁷

On the other hand, trends in corporate strategies, including a growing emphasis on behaviour-based safety, represented a challenge to the effectiveness of these regimes:

Looking somewhat more widely, we have noted that support from employers and their managers was also problematic because the pluralist basis of autonomous workers' representation and consultation was often at odds with the main direction of corporate strategies to deliver OSH arrangements. Such approaches were evident in both publicly and privately-owned mines in our study, where corporate strategies with a highly unitary character had been adopted to deliver arrangements for safety and health in mines in which behaviour-based approaches to safety were among the main means of doing so. We found much evidence of the effort of representatives and their local trade union organisations to

³²⁶ Walters D, Wadsworth E, Johnstone R, Lippel K, Quinlan M, Bhattacharya S, & James P, (2018) *The role and effects of representing miners in arrangements for safety and health in coal mining: a global study Volume 1: A comparative analysis of findings from five countries*, IOSH and Cardiff University, Cardiff, 138-139.

³²⁷ Walters D, Wadsworth E, Johnstone R, Lippel K, Quinlan M, Bhattacharya S, & James P, (2018) *The role and effects of representing miners in arrangements for safety and health in coal mining: a global study Volume 1: A comparative analysis of findings from five countries*, IOSH and Cardiff University, Cardiff, 140.

continue to operate effectively in such scenarios, and of various strategies they had adopted to combat the marginalising effects of these corporate approaches. But it remains deeply disturbing that these approaches enjoy such traction among both mining companies and their safety personnel, bearing in mind the very limited evidence of their effectiveness and the various ways they serve to undermine the determinants of the effectiveness of the systems of representation and consultation on safety and health that can demonstrate a somewhat more solid basis of evidence to support conclusions about their effectiveness.

While these systems were a challenge to representation and consultation in all the countries we studied, where strong trade union and regulatory support for representation and consultation was evident, such as in Australia and Canada, workers' representatives and their trade unions were able to point to success in offsetting some of their effects on arrangements for representation and consultation. However, as we discuss in Chapter 7, their effects were far more pernicious in the mines of countries where the union and regulatory presence were weaker, such as in India and Indonesia, as well as in South Africa. In these countries, participants recounted how the dominant safety arrangements in the mines emphasised prescriptive compliance with safety rules from miners and attempted to incorporate their representatives into encouraging behavioural change among their constituents, as well as monitoring compliance. This responsibilisation and deflection of their role as representatives, overall served to marginalise and weaken the position of representation on safety and health in the mine, as well as quite frequently threatening the employment prospects and job security of representatives themselves if they attempted to act as representatives in the legal meaning of the term.³²⁸

The observations about corporate strategies are salient to the later section on corporate governance and OHS. Overall, the findings with regard to Australia (actually NSW and Queensland but these are the overwhelmingly dominant coalmining states) essentially reinforced those of the earlier Queensland study.

As with the Queensland study, the IOSH study found the increased use of contract-labour and associated changes in work arrangements were seen as a major problem both in terms of weakening representative involvement mechanisms and undermining OHS more generally. In India union representatives pointed to the vulnerability of contract labour and their difficulties in helping them on OHS as these two quotes from a local interviewee and senior official illustrate:

The contract workers can't be seen to demonstrate, complain or even show any form of dissent especially with our help. If they are found with us they would lose their jobs the very next day. We can help them in some areas but not on health and safety.

The senior union representative who sat on the CIL Safety Board essentially confirmed this experience, saying:

We have now moved on to a new phase in which CIL has started going down the road of outsourcing therefore the use of several levels of contractors is increasing

³²⁸ Walters D, Wadsworth E, Johnstone R, Lippel K, Quinlan M, Bhattacharya S, & James P, (2018) *The role and effects of representing miners in arrangements for safety and health in coal mining: a global study Volume 1: A comparative analysis of findings from five countries*, IOSH and Cardiff University, Cardiff, 140-141.

*and this is undermining the achievements of health and safety. It is because of the privatisation of the operations that the contractors and the workforces were not effectively aligned with the structures of joint consultation. This is because the contractors are not regulated or managed. Also, this undermined employment security, making them unable to speak up on health and safety issues by those suffering.*³²⁹

The official added that companies used new mines to introduce more flexible work arrangements. Mine inspectors also held concerns:

The senior official of the Mines Inspectorate also indicated concern with the health and safety practices of contractors, saying that contract workers were underprivileged and overworked and, in his view, they routinely worked for 12 hours or more every day. He suggested that decisions taken by the management of the mines concerning the awarding of contract for work in the mines were made largely on the basis of price. He went on to suggest that, while in theory procurement requirements should specify the arrangements made by contractors on health and safety matters as part of the written terms of the contract, in practice they were seldom adhered to. Apart from inspection by mines inspectors, who could ask to see the terms of the contract before undertaking an inspection of work undertaken by contractors, he was unaware of arrangements that the mine management made to monitor contractors' practices on safety and health in relation to the terms of the contract. Generally, he declared himself to be unhappy with the practices involved with the monitoring of contractual requirements for safety and health, but seemed to regard the range of problems encountered to be endemic to the practices of contracting and subcontracting and largely unresponsive to intervention.³³⁰

Despite this awareness 'there were few, if any, examples of effective strategies to represent these workers on matters of their safety and health.'³³¹

The IOSH report found contract labour was also an issue in Indonesia:

The organisation of work and employment in mining involves substantial use of contractors. They are used by the mine operator to undertake support work in relation to mining, logistics, catering, accommodation and so on. But they are also used to undertake mining activities. The trade unions appear to have little to no involvement or influence on the terms of contracts drawn up between mine operators and their contractors, and union representatives at the national level were themselves quite unsure about the details of the arrangements for contracting and subcontracting at the level of the mines. Union representatives at the mines confirmed the multiple presence of both contractors and sub-

³²⁹ Walters D, Wadsworth E, Johnstone R, Lippel K, Quinlan M, Bhattacharya S, & James P, (2018) *The role and effects of representing miners in arrangements for safety and health in coal mining: a global study Volume 2: Case studies in five countries*, IOSH and Cardiff University, Cardiff, 92.

³³⁰ Walters D, Wadsworth E, Johnstone R, Lippel K, Quinlan M, Bhattacharya S, & James P, (2018) *The role and effects of representing miners in arrangements for safety and health in coal mining: a global study Volume 2: Case studies in five countries*, IOSH and Cardiff University, Cardiff, 92-93.

³³¹ Walters D, Wadsworth E, Johnstone R, Lippel K, Quinlan M, Bhattacharya S, & James P, (2018) *The role and effects of representing miners in arrangements for safety and health in coal mining: a global study Volume 2: Case studies in five countries*, IOSH and Cardiff University, Cardiff, 93.

contractors. They also made clear that, as well as having a presence among the directly employed mine workers, union membership often extended to parts of the contractor workforce. However, the capacity of these membership patterns to influence OSH outcomes for the contractor workforce varied considerably and this situation was made more complicated by the presence of more than one trade union at the mine site.³³²

The examination of Indonesia went on to identify some specific OHS issues and the situation of contractors:

Related issues which some of the representatives raised and suggested contributed to the problem of fatigue, were the travel times and arrangements for travelling to the mines. In addition, participants felt inadequate provision for rest between travelling and beginning a shift was normal practice. They went on to explain that this greatly increased fatigue and significantly multiplied the risk of accidents and incidents, as already fatigued miners were required to perform unfamiliar tasks in unfamiliar surroundings when they started their shifts in this manner. Poor living conditions in some of the work camps in which miners stayed while working, and which some representatives likened to 'barracks', were mentioned by several participants. They indicated that conditions of overcrowding, poor physical design and inadequate nutritional and recreational facilities meant that, for the many miners who were obliged to stay in this type of accommodation, it was 'impossible to get proper rest'. Those representatives who were employed by contractors suggested that these conditions were even poorer in the case of the allocation of accommodation to the contractor workforce.³³³

In Canada too contract labour raised serious concerns with regard to representing workers OHS:

Again, the issue of outsourcing and OSH was a common concern among the participants. Contractors and their workers were a presence in all of the mines studied. From a regulatory perspective, the general manager of the mine was responsible for the health and safety of contractors, although contractors sometimes had their own health and safety managers on site. Union representatives we spoke to told us that the OSH committee of the mine included the protection of contractors' OSH and there were no separate committees for the contractors. Sometimes the union denounced dangerous practices of contractors and stopped work if it was unsafe. In one mine, the union had an eight-month strike to reduce the number of contractors. This was only partially successful, perhaps because it coincided with a downturn in the industry. It was hard for contractors to unionise, and the mining company that operated the mines was said to intimidate those who signed cards. One informant said that contract labour was less well trained and less aware of health and safety issues. In the third mine, the OHSC was also responsible for contractors and was involved if there was a dangerous occurrence involving contractors. It was said that here the OHSC had

³³² Walters D, Wadsworth E, Johnstone R, Lippel K, Quinlan M, Bhattacharya S, & James P, (2018) *The role and effects of representing miners in arrangements for safety and health in coal mining: a global study Volume 2: Case studies in five countries*, IOSH and Cardiff University, Cardiff, 105.

³³³ Walters D, Wadsworth E, Johnstone R, Lippel K, Quinlan M, Bhattacharya S, & James P, (2018) *The role and effects of representing miners in arrangements for safety and health in coal mining: a global study Volume 2: Case studies in five countries*, IOSH and Cardiff University, Cardiff, 115.

a love/hate relationship with the contractors because the contractors did not want to have their practices interfered with by the committee.³³⁴

And later:

As one representative who worked for a contractor at a mine site said of his members:

*They are very afraid because safety means punishment for them Union representative, contractor, East Kalimantan.*³³⁵

Summarising some of the problems of mines engaging multiple contractors the IOSH report stated:

These included poor communication of information on safety and health to the workers of contractors; greater fear and job insecurity among the contractor workforce making them reluctant to speak out on OSH issues; perceptions of ‘the policing of the safety behaviour’ of the workers of contractors by the main mine operator and sanctions for rule-breaking more punitive than for the employees of the main operator; pressures on contractors to get work done to deadlines leading to workers taking ‘safety shortcuts’; weaker union presence among contract workers; poor relations between the unions organising contractor workers and those of the main mine operator, making concerted action on safety and health issues more difficult; and limited contact between workers and their representatives working for contractors and regulatory inspectors except after accidents have already occurred. Not all of these difficulties were present among all contractors, but generally both the union representatives who worked for contractors and those who were employed by the main mine operator each cited experience of at least some of them.³³⁶

The IOSH report cited one union attempt to address these issues:

Some of the approaches to addressing the challenges outlined in the previous section were particularly innovative. In one of the union locals, there had been concern that various managerial practices such as their hiring strategies, the use of BBS systems, and the prevalence of contractors, had contributed to apathy towards OSH among the workforce. It was hard to organise those workers who lived outside the region, and even the local workers did not have time for meetings because of long shifts. The activists in the union local had taken a number of organising actions in their efforts to mobilise workers’ engagement around representation and consultation on OSH. They started by ensuring access for all the safety and health representatives, and then recruited workers through these representatives. They conveyed a message encouraging workers to ‘talk to your supervisor,

³³⁴ Walters D, Wadsworth E, Johnstone R, Lippel K, Quinlan M, Bhattacharya S, & James P, (2018) *The role and effects of representing miners in arrangements for safety and health in coal mining: a global study Volume 2: Case studies in five countries*, IOSH and Cardiff University, Cardiff, 60.

³³⁵ Walters D, Wadsworth E, Johnstone R, Lippel K, Quinlan M, Bhattacharya S, & James P, (2018) *The role and effects of representing miners in arrangements for safety and health in coal mining: a global study Volume 2: Case studies in five countries*, IOSH and Cardiff University, Cardiff, 122.

³³⁶ Walters D, Wadsworth E, Johnstone R, Lippel K, Quinlan M, Bhattacharya S, & James P, (2018) *The role and effects of representing miners in arrangements for safety and health in coal mining: a global study Volume 2: Case studies in five countries*, IOSH and Cardiff University, Cardiff, 124.

talk to your safety rep'. And they actively sought to remove the political content from their messages, arguing that:

[whether you are] pro-union or anti-union, you are interested in the facts about your safety.

Participants from this union local suggested they had:

successfully used this strategy to change policy on significant health and safety issues.

One example of the techniques they had used to regain the initiative on OSH was to develop a text alert system on health and safety, a strategy with which they promoted interest in occupational health and safety issues and ensured that the union was seen to be proactive in health and safety. Messages were sent to workers' phones, timed to be received a few minutes before the bus arrived to take men up to the mine. In this way, 40-50 miners would look at their phones at the same time and learn of incidents that jeopardised the health of miners in their mine on the previous shift. Thus, miners were fully informed as to what was going on by the next shift. Management at first tried to undermine the system, but the union then used text alerts to inform miners that management was failing to comply with the legislation, and this seemed to deter management's attempts to prevent the new OSH communication mechanism. Now even the managers of other mines and members of the inspectorate subscribe to the text alert, and there is interest from local management, who sometimes ask if the union can send out information on their behalf. Health and safety now belongs to the union, a form of resistance to the message from the BBS system used in the mines.³³⁷

With regard to Australia the IOSH study essentially echoed findings of the earlier Queensland study:

The mining industry in Australia has for several decades favoured employment policies that have encouraged greater use of contractors as well as the use of fly-in-fly-out forms of employment related mobility for mine workers. While these strategies have been, to some extent, driven by corporate interests in improving flexibility and cost efficiency, as other researchers have pointed out, in combination with a neo-liberal wider political climate, they have also assisted in the reduction of trade union density and influence in the industry (Bowden and Barry, 2015). This has had a number of effects. As is commonly the case, unionisation among the contractor labour force is much lower than among the directly employed workers. Fly-in-fly out (and drive-in-drive out) arrangements are less developed in Queensland and NSW than in mining in other parts of Australia, but they are nevertheless both present and increasing, especially in Queensland. They have served to both disconnect work in mining from traditional mining communities that grew up around the coal mines in the past, as well as to encourage the use of shift patterns that are known to contribute to work intensification and increased fatigue among miners. All these changes serve to both increase and complicate the risks to safety and health for the workers concerned, while at

³³⁷ Walters D, Wadsworth E, Johnstone R, Lippel K, Quinlan M, Bhattacharya S, & James P, (2018) *The role and effects of representing miners in arrangements for safety and health in coal mining: a global study Volume 2: Case studies in five countries*, IOSH and Cardiff University, Cardiff, 61.

the same time making it much more difficult for trade union safety and health representatives to be elected and to effectively represent the health and safety interests of a growing proportion of mine workers.³³⁸

Finally, the study of OHS representation in South African coalmining in which contractorisation had also occurred repeated the findings of other countries in terms of its effect in undermining these mechanisms:

All the representatives acknowledged that there were problems dealing with contractors. They talked at length about the effects of the outsourcing strategies applied by the larger mining companies that, in the interests of achieving perceived business benefits in price and production efficiency, increasingly adopted practices involving the contracting out of work activities in the mines which led to the presence in the mines of large numbers of contractors and their employees. They included many smaller contracting organisations that the representatives felt possessed neither the will nor the capacity to follow the health and safety requirements in place in the mine. They reported many examples of poor health and safety practices adopted by the contractors, as well as examples of poor welfare provisions for the contractor workforces that were the result of the ways in which the contracting companies went about meeting the demands of the price and delivery requirements of the purchasers of their services. These experiences, they suggested, occurred despite the presence of health and safety management strategies in the mine that ostensibly applied to all those who worked there, whatever the nature of their contractual arrangements. They suggested that this showed that such management strategies were at best only partially effective, but also at a more fundamental level they suggested that the process of outsourcing contradicted these strategies to a degree that resulted in the procurement of services from organisations without the proper capacity to be able to meet their requirements and with a work culture that disproportionately penalised their employees for the failings of management practice. They discussed the difficulties this presented them with as representatives of labour. On the one hand, like the health and safety management arrangements in the mine, in their representational activities on health and safety they did not distinguish between workers who were directly employed in the mine and those who were the employees of contractors, and were prepared to intervene in both. On the other hand, they found that differences between the two were often both obvious and quite extreme. This was true not only of the differences in the health, safety or welfare conditions in question, but also in the culture and security of employment in the different organisations, with the contractor workforce being more vulnerable in all these respects. They illustrated the problems this created with examples of where far poorer facilities for welfare were available for the employees of contractors, or where unsafe practices among these workers were condoned and even encouraged by contractors. Sometimes interventions by the representatives had resulted in improvements for the contractor workforce, but in other cases they could lead to harsh discipline being meted out to contractor employees, or to their removal altogether from the mine.

³³⁸ Walters D, Wadsworth E, Johnstone R, Lippel K, Quinlan M, Bhattacharya S, & James P, (2018) *The role and effects of representing miners in arrangements for safety and health in coal mining: a global study Volume 2: Case studies in five countries*, IOSH and Cardiff University, Cardiff, 34.

Among the representatives interviewed there was little, if any, experience of involvement with the mine management in agreeing the health and safety conditions and standards required of contractors at planning stages prior to their appointment, or in agreeing in advance procedures for monitoring their performance while undertaking their contracted tasks. Indeed, the representatives were unable to provide any examples of their engagement with health and safety aspects of the planning of the organisation of work and employment of contractors in the mine. These matters remained the sole prerogative of the mine management. As a result, opportunities that such engagement might offer the trade union representatives to influence the conditions under which the employees of contractors might be expected to work in the mine prior to their appointment could not be acted upon and the representatives were left with little choice but to play a reactive role in relation to the monitoring of health and safety matters once the contractors were already on site. In these situations, the normal procedures for resolving problems was through raising the matter in question with their own mine management, who would then address the contractor directly, if they saw fit to do so. This could be a circuitous and potentially lengthy process and the representative had little opportunity to exert any direct influence on its outcomes. However, several of the examples that the representatives gave of their own efforts to influence contractors' OSH and welfare practices, which they felt had been moderately successful, had clearly involved them in more direct actions. Again, this may be further illustrative of the ways in which, in practice, the circumstances and personalities involved in the resolution of particular issues might serve to circumvent set procedures.³³⁹

Other research on South Africa has identified similar problems. The 2010 Shaw Idea report on South Africa already noted that while views on the value of consultation were generally positive problems included difficulties with contractors, with one representative at a poorly performing operation (the review rated safety performance across all sites visited) stating:

Safety reps have authority but are limited to exercise their power, I once stopped a subcontractor for not working safely and afterwards I was in deep trouble.³⁴⁰

Another South African study (using mixed methods study conducted at 14 mines, including a survey of 293 workers, 6 focus groups and 11 in-depth interviews) found health and safety representatives played a significant part in workers exercising their legislative right of withdrawing from dangerous work situations with 56% of workers reporting they had been asked to leave a dangerous place by a representative:

Thus the formal exercise of the right is very important for workers and worker H&S representatives made an important contribution to this.³⁴¹

³³⁹ Walters D, Wadsworth E, Johnstone R, Lippel K, Quinlan M, Bhattacharya S, & James P, (2018) *The role and effects of representing miners in arrangements for safety and health in coal mining: a global study Volume 2: Case studies in five countries*, IOSH and Cardiff University, Cardiff, 164-165.

³⁴⁰ Shaw Idea (2010) *Changing Minds, Changing Mines*, Final Report to the Mine Health and Safety Council of South Africa, 106.

³⁴¹ Coulson N, Stewart P, & Saeed S, (2019) South African mineworkers' perspectives on the right to refuse dangerous work, *The Journal of the Southern African Institute of Mining and Metallurgy*, 119:8, <http://dx.doi.org/10.17159/2411-9717/2019/v119n1a3>.

The study was able differentiate employee and contract worker responses to dangerous work and in this regard stated:

Forty-five per cent of workers, represented by employees (48%) and contractors (34%), reported that they had personal experience of a dangerous workplace in which they did not want to work (refer to Figure 3), with 76% of these incidents having occurred in the last three years. It is noteworthy that contractors were less likely to report personal experience of a dangerous workplace than full-time mine employees, which suggested contractors were less equipped to make this call. Worldwide, it is well established that contractors are vulnerable with respect to workplace hazards OHS (Tucker, 2013; Gunningham, 2008), as has been reported on South African mines (Loewenson, 2001; Bezuidenhout and Kenny, 1999; Hermanus, 2007). As the employment of contract workers increases, specifically on South African platinum mines (Forrest, 2015), the finding that they are less equipped to respond to a dangerous workplace is of concern.³⁴²

The evidence of the problematic relationship between contact labour and systems of worker representation just examined are not unique to coalmining but have been identified in other industries and in wide-ranging surveys conducted for bodies like the European Agency for Occupational Safety and Health at Work.³⁴³

Safety Representative Relations with Inspectors

A particular strength of existing arrangements in Queensland warrants mention. This is the practice of the inspectorate and the CFMEU ISHRs exchanging copies of their inspection reports electronically. This practice facilitates ready communication of information (beyond emails, phone conversations and meetings) and means it easier for both inspectors and ISHRs to keep abreast of issues and learning at particular mines. Both documents form part of each mine's official record and are viewable so the information is obtainable by either party in case but this practice makes it much easier. It has to my knowledge occurred over a considerable period of time. The last time I checked NSW didn't follow the same arrangement and I believe that is unfortunate.

Regular contact between SSHRs and mine inspectors during mine visits is vital to enable regular exchanges of information at the site and to ensure any pressing issues are examined and discussed during visits. Some deficiencies were identified in this regard by a 2005 Review of the Queensland mines inspectorate including visit protocols emphasising contact with site management and not SSHRs (Senior Site Executives [SSE] were obliged to notify SSHRs of an inspectors visit but verifying this had been done resided with the inspector). It was not uncommon for inspections to occur without the SSHR's presence or even knowledge. The report added that inspectors 'should also insist on meeting with the SSHRs without management present and arrange to make site inspections with the SSHRs. This has not happened with any frequency or consistency.'³⁴⁴ A number of measures

³⁴² Coulson N, Stewart P, & Saeed S, (2019) South African mineworkers' perspectives on the right to refuse dangerous work, *The Journal of the Southern African Institute of Mining and Metallurgy*, 119:5-6.

³⁴³ Walters D, and Wadsworth E, (2017) *Worker participation in the management of OSH Qualitative evidence from the second ESENER of new and emerging risks*, European Risk Observatory Overview report, European Agency for Occupational Safety and Health at Work, Bilbao especially 8, 13, 100-101, 112-113, 118-119.

³⁴⁴ ACIL Tasman, New Horizon Consulting & Shaw Idea, (2005) *Final Report on the Queensland Mines Inspectorate Review*, 47.

were introduced after this report to address the deficiencies identified. My review of mine inspections records as part the 2011 study of SSHRs and ISHRs indicated that that visits by mine inspectors where the SSHR wasn't or couldn't be contacted were not uncommon. While issues with their presence due to shifts mismatching with the visit could be addressed for scheduled visits and with some notification even some unannounced visits. It is also critical as the ACIL Tasman report identified for inspectors to meet SSHRs off-site on occasion. The same point can be made more strongly with regard to mineworkers, especially contractors/labour hire workers who may feel uncomfortable about raising concerns on site. In this regard the ACIL Tasman report stated:

Equally, direct contact with precarious workers is imperative to assess the extent of compliance with contractor management obligations. As previously described, precarious workers are unlikely to voluntarily report OSH issues and are generally excluded from site systems such as reporting and representation. Given the type of work usually performed by such workers, without direct contact by the inspectorate critical data about compliance is lost.³⁴⁵

The ACIL Tasman report recommended inspectors should conduct interviews with key stakeholders on site, including SSHRs, OSH staff and contractors, should be conducted during visits and the inspectorate 'should develop a site visit protocol for announced and unannounced visits that includes access to SSHRs and the permanent and contingent workforce.'³⁴⁶ Reports on mine safety in other jurisdictions already cited in this review also make specific reference to the difficulties that can pose to safety representatives by the presence of contract labour that tend to weaken the regime and the need for targeting interventions by inspectors.³⁴⁷

Overall Findings/Learning

Legislative powers for coalminers' representatives to inspect mines in order to help safeguard their health, safety and wellbeing originated in the UK (1872), quickly followed by NSW (1876) before spreading to other Australian jurisdictions (Queensland in 1910), New Zealand, Canada, France and Belgium and later other countries like Germany prior to world-war 1. In essence, these arrangements pioneered worker in OHS (now a well-accepted global principle, see ILO convention 155), a century before similar powers were extended to other workers. As elsewhere the legislative framework in NSW and Queensland was built through coal mine union campaigning, the powers and activities of workmen inspectors (then known as check inspectors) to undertake their role independent of government mine inspectors (though often collaborating) was progressively extended as the value of this was accepted and in response to deficiencies revealed (for example the victimisation of check inspectors) and major mine disasters (like Mount Mulligan, Queensland's worst mine disaster in 1921). Unions appointed industry check-inspectors in part to deal with the vulnerability of those at particular mines and in the 1930s this became a formally legislated part of the scheme although the miners' union (now CFMEU) continued to pay their salary. While the

³⁴⁵ ACIL Tasman, New Horizon Consulting & Shaw Idea, (2005) *Final Report on the Queensland Mines Inspectorate Review*, 47.

³⁴⁶ ACIL Tasman, New Horizon Consulting & Shaw Idea, (2005) *Final Report on the Queensland Mines Inspectorate Review*, 48.

³⁴⁷ Quinlan M, (2014) *Third Audit of the Mines Safety Unit and Office of the Chief Inspector of Mines, Worksafe Tasmania*, 37.

system continued to evolve these essential elements remain and the Queensland and NSW systems (almost identical) were regarded as essential elements of best-practice mine safety legislation in the New Zealand review that followed the Pike River disaster and subsequent Royal Commission, serving as a model for the new mine safety laws adopted (the earlier New Zealand provisions had been abolished during a general reform of OHS laws in the 1990s notwithstanding union opposition).

Role and Effectiveness

As background to assessing the impact of changing work arrangements on safety and health representatives (SSHR and ISHR) this report reviewed evidence on their role, activities and effectiveness (and influences on this). To do this it was able to draw on two studies safety representatives in coalmining, one of Queensland coalminers funded by the CFME (with large elements of the report being subsequently published as articles in three international peer-reviewed journals) and other a five-country study the examined both Queensland and NSW and was funded and published by the UK OHS professionals body, the Institute of Occupational Safety and Health.

In essence both studies found SSHRs and ISHRS were actively engaged (SSHRs for example meeting workers outside of mines in part so their concerns could be raised in private) and used their powers responsibly and to good effect. A review of inspection reports they prepared demonstrated that like government mine inspectors both SSHRs and ISHRS overwhelmingly focused on hazards and systems (more so ISHRS) that could result in serious injury and especially fatalities. In terms of preventing serious incidents, this was a real strength of their activities and the focus was reinforced by interviews with representatives. The studies found the CFMEU played a strong supportive role in holding regular (and costly) training programs for SSHRs and that ISHRS performed a vital mentoring role with ISHRS as well as covering mines with little or no union (and often SSHR) presence. A particular strength of the Queensland scheme was the practice of electronically exchanging SSHR/ISHR inspection and government mine inspection reports, enabling ready exchanging of information to identify and resolve problems. The suspension powers of SSHR and ISHRS were used guardedly and seldom overturned by government inspectors, but their existence made it easier for representatives to carry their role out effectively and use persuasion wherever possible. Representatives also made good use of HPIs. Strong legislative steer and union support were amongst those factors determining effectiveness, even when management was not supportive.

One problem identified relevant to the next section of this report was a growing corporate practice of moving mine managers on a more regular basis which was seen to undermine communication with SSHRs in particular because these took some time to build. Another problem also relevant to the section of the report was increasingly unitarist HR and OHS strategies being employed by mining companies. Regular contact with government inspectors during their visits also sometimes proved problematic – an issue also identified in a review of the Queensland inspectorate in 2005 (with follow-up measures to address it helping but not entirely resolving the issue).

While safety representatives were seen as valuable in all countries, the five-country comparison found the Australian arrangements represented best-practice exemplars followed by Canada.

Impact of labour hire and contract labour

Contract labour was identified as a problem in both the CFMEU and the Australian component of the five-country IOSH study. A major element of this was reported fear of contract workers to raise OHS issues, the greater production/performance pressures contractor were under and their job insecurity which was seen to have chilling effect on their engagement in OHS activities and problem solving. Other problems identified included a lack of alignment between contractor and mining company policies and practices – misalignment or disorganisation referred to earlier sections of this report. Essentially similar issues were identified as weakening representative or union activities on safety in every other of the countries examined in the five-country study (India, South Africa, Indonesia and Canada). Similar findings have been reached by another South African mining study and a more general survey of safety representatives in the European Union. In sum, available evidence consistently indicates that the growing use of contract labour weakens safety representatives in mining. This finding about the weakening effect of changed work arrangements on safety representatives is not confined to mining nor Australia. A Norwegian study of the oil and gas industry found that interactions between safety representatives and contractors were problematic, especially amongst more transitory contractors.³⁴⁸

The report was able to draw no conclusions on the situation where contract/labour workers were SSHRs because no evidence on this was uncovered. Nonetheless, it seems plausible to suggest that based on what is known about these workers more generally their situation could be more vulnerable than their direct-employee counterparts. What can be said is that evidence on the challenges posed by a greater contractor workforce for the SSHR and ISHRs is consistent and of concern in a hazardous industry like coalmining.

³⁴⁸Hovden J, Terje L, Karlsen J, & Bodil A, (2008) The Safety Representative under Pressure. A Study of the Occupational Health and Safety Management in the Norwegian Oil and Gas Industry, *Safety Science*, 46 (3):493-509. For an Australian study on this see Johnstone, R. Quinlan, M. & Walters, D. (2005), Statutory OHS Workplace Arrangements for the Modern Labour Market *Journal of Industrial Relations*, 47(1): 93-116.

(d) Learning on issues such as the role of corporate governance in health and safety, normalisation of risk, identifying harbingers of an accident, potential causes of lapses in regulatory oversight and other factors that are corrosive of safety

Corporate Governance

The term governance was coined in political science to describe the multitude of actors (governments, economic players, scientific experts and civil society) and processes that lead to collective binding decisions. The growth of governance as a concept and practice since the 1980s has been viewed as associated with globalization, neoliberalism, growing corporate power and changes in private sector (like complex and dynamic corporate structures) and the growth of risk-system based regulation. There is a large literature on governance but some key principles in governance when comes to risk are communication and inclusion, integration and reflection.³⁴⁹ Key elements of communication and inclusion include sharing risk management information, building/sustaining trust among stakeholders; involving people in risk related decisions to build support, including different stakeholders to consider their concerns and legitimate decisions; Critical evaluations needed to learn how communication and inclusion can be effectively organized in various contexts (social learning). Key elements of integration include collecting/synthesizing all relevant knowledge and experience; transcending disciplinary boundaries and involve knowledge and experience; recognising risk governance is not a linear, sequential three-stage process of risk assessment, management, and communication, but dynamic and requires interlinked and iterative processes; and to recognise the interconnections between various risk-related activities. Key elements of reflection include recognising risk governance cannot be routinized and entails a balancing act to secure prudent precautions.

Within the corporate context governance refers to the decision-making rules, accountabilities and safeguards (like audit review bodies) designed to exercise control and authority within organisations. Boards of directors are responsible to their shareholders and have a stewardship function for the governance of the company. The responsibilities of Boards include setting the company's strategic goals, providing the leadership to put those goals into effect, supervising the management of the business, reporting to shareholders and considering significant areas of potential risk that might impact on the organisation (including their workforce, government oversight and other stakeholders). Some codes/guidance material for boards and directors explicitly cite risk management as a key board responsibility, indicating companies should assess risk on a regular basis and be capable of responding to it, procedures should exist to ensure that important risk matters are reported to management and companies should report on the process in place to manage risk.³⁵⁰ A

³⁴⁹ See for example OECD (2014), *Risk Management and Corporate Governance*, Corporate Governance, OECD Publishing; Renn O, & Schweizer P, (2009) Inclusive Risk Governance: Concepts and Application to Environmental Policy Making, *Environmental Policy and Governance*, 19:174–185; COSO (2018) *Enterprise Risk Management Applying enterprise risk management to environmental, social and governance-related risks*, The Committee of Sponsoring Organizations of the Treadway Commission (COSO) and World Business Council for Sustainable Development (WBCSD), <https://www.coso.org/Documents/COSO-WBCSD-ESGERM-Guidance-Full.pdf>.

³⁵⁰ For an examination of some key debates surrounding corporate governance see Kiel, Geoffrey & Nicholson, Gavin (2003) Board composition and corporate performance: how the Australian experience informs

number of mining companies already referred to this report like Peabody Energy and Glencore make reference to the company and board's responsibilities in terms of governance and identifying and managing risks.³⁵¹ The same probably applies to other mining companies whose annual reports I was unable to peruse for the purpose of preparing this report.

In terms of governance, at board level risk management could be seen to entail:

- direct and influence business and risk activities through policies and limits;
- ensure compliance with risk measurement and reporting as well as audit processes
- create a strong culture that encourages desired business behaviour by implementing compensation programmes that reward risk-adjusted performance
- Approving a business risk inventory, including the ranking methodology and company's risk appetite and tolerances as part of the annual business plan;
- Setting guidelines regarding the company's risk policy and ensuring that it is enforced by an effective disciplinary system;
- Setting a risk-adjusted corporate strategy and ensuring adequate metrics to track executive performance;
- Monitoring the quality of the program implementation and execution, including significant expenditures made in relation to it

As well as ensuring the organisation pursues goals of maximising returns to shareholders/owners governance should also ensure corporations and other large organisations make their decisions and conduct operations in an ethical and legal manner that gives due regard to their customers/clients, workforce and the wider community. This includes safeguarding the health, safety and well-being of their workforce (not just employees) and those coming legally onto their worksites (like suppliers).

Corporate annual reports and other corporate statements of general objectives and performance, especially those of mining/resource companies, invariably refer to their commitment to safeguarding their workforce – employee and contractor – typically expressed in terms of a goal of zero harm. Mining conglomerate annual reports typically include a section on OHS (often in conjunction with environmental performance) that discusses performance and initiatives in broad terms, KPI's generally consisting in recording any fatalities in operations (and sometimes fatal injury frequency rates), lost-time-injury-frequency rates (LTIFR) and medically treated injuries (or a total of lost time and medically treated injuries) and sometimes the number of occupational disease cases.³⁵² The adequacy of injury KPI measures when it comes to serious (ie low frequency high impact) events will be examined below. The sections dealing health and safety examined included a number of generic statements about objectives/commitments, general trends in fatalities, LTIFRs and MTIFRS, sometimes the discussion of specific incident or development (like the re-emergence of pneumoconiosis) and significant regulatory changes.

contrasting theories of corporate governance. *Corporate Governance: An International Review*, 11(3), pp. 189-205.

³⁵¹ See for example *Glencore Annual Report 2019*, 42.

³⁵² For example the key safety indicators in the Glencore Annual Report 2019 were LTIFR and Total Recordable Injury Frequency Rate (TRIFR) per million hours worked (both for employees and contractors) which includes fatalities and is in essence all injuries requiring medical treatment beyond first aid. Glencore also reported 17 fatalities that year, *Glencore Annual Report 2019*, 39, 65. See too *Rio Tinto Annual Report Strategic 2019*, 22.

Some of the reports examined had detail on the specific planning/processes being implemented to address serious/fatality risks. BHP made direct reference to the importance of process safety, with a section on occupational process safety that stated (in part)

Why is this important to BHP?

All our sites may be subject to operational accidents, including fires, explosions, road, vehicle, port, shipping, railroad, aircraft or airport incidents, rock fall incidents, loss of power supply, environmental pollution, mechanical equipment failures, mine-related accidents, personal conveyance equipment failures, loss of primary containment of hazardous materials, or loss of well control (involving an uncontrolled flow of well fluids or formation fluids from the wellbore to the surface).³⁵³

In terms of managing occupational and process safety the Annual Report added:

We employ a number of measures designed to detect, eliminate, prevent and mitigate operational and process safety incidents, including:

- BHP's standards on aviation, health, safety, the environment and community, crisis and emergency management;
- compliance with quality assurance standards (for example, the Drilling and Completions Quality Assurance Standard for Petroleum offshore drilling and completion activity);
- selection and design of mine plans, wells and equipment to prevent incidents (including slope design and underground support systems);
- inspection, maintenance and improvements of infrastructure to protect our people and assets (for example, cyclone resilience);
- inspection, maintenance and improvement of key equipment designed to prevent or mitigate an occupational or process safety incident (for example, pressure vessels designed to contain fluids or gas at pressure and emergency response equipment);
- training and qualifications for staff and contractors (including drill rig contractors and aircraft operators);
- influencing joint venture partners to align with BHP standards;
- monitoring adverse weather conditions, ground stability and pressure/temperature of materials;
- continuity plans and crisis and emergency response plans;
- self-insurance for losses arising from property damage, business interruption and construction.³⁵⁴

In a section dealing with eliminating fatalities Rio Tinto stated (in part):

In an effort to move further towards leading indicators, we expanded critical risk management to include the safety maturity model (SMM), also adding it to the Group's 2019 short-term incentive plan. SMM is a tool that captures the key elements of our safety management system, including CRM, and builds a roadmap that describes a fully mature

³⁵³ BHP Annual Report 2019, 34.

³⁵⁴ BHP Annual Report 2019, 34.

safety culture. Our model was introduced in 2019 and each site was assessed using the tool and given a baseline score, which averaged 3.4 across the Group, using a 9-point scale. Group performance measures were then set at 3.4 for threshold, 4.4 for target, and 5.7 for outstanding. At the end of the year the sites were reassessed by our internal auditors and an operations line leader. All sites involved showed strong improvement, and across the Group, the average score advanced from the baseline of 3.4 to the end of year 4.5, demonstrating SMM helped each site strengthen its focus on proactive actions to improve safety.³⁵⁵

Another section on managing major hazards stated:

Running a safe, responsible and profitable business requires us to manage major hazard risks and do everything we can to prevent catastrophic events, including those involving tailings and water storage facilities, chemicals, underground mining and process safety. We identify major hazard risks (low probability, high consequence events) and manage them by verifying controls, conducting external reviews and requiring compliance with standards and procedures – such as our tailings and water storage facilities' management standard. Standards and procedures provide a consistent approach that is then implemented across our managed operations around the world. We audit every operation against our standards, and require our businesses to meet their health and safety performance requirements and targets. We remain committed to the reduction of our process safety risks and continue to run our Occupied Buildings Programme, which will eliminate, or mitigate, the total process safety exposure to our people occupying buildings.³⁵⁶

The section on risk in the 2018 Anglo American Annual Report also made reference mitigating catastrophic risks:

We are exposed to the following risks we deem as potentially catastrophic: tailings dam failure; slope wall failure; mineshaft failure; and fire and explosion.

Root cause: Any of these risks may result from inadequate design or construction, adverse geological conditions, shortcomings in operational performance, natural events such as seismic activity or flooding, and failure of structures or machinery and equipment.

Impact: Multiple fatalities and injuries, damage to assets, environmental damage, production loss, reputational damage and loss of licence to operate. Financial costs associated with recovery and liability claims may be significant. Regulatory issues may result and community relations may be affected.

Mitigation: Technical standards exist that provide minimum criteria for design and operational performance requirements, implementation of which is regularly inspected by technical experts. Additional assurance work is conducted to assess the adequacy of controls associated with these risks.³⁵⁷

³⁵⁵ Rio Tinto Annual Report 2019 Strategic, 63.

³⁵⁶ Rio Tinto Annual Report 2019 Strategic, 63.

³⁵⁷ Anglo American Annual Report 2018, 44.

A separate section dealt with fatalities and made the following observations on failure and mitigation:

Failure to eliminate fatalities.

Root cause: Inability to eliminate fatalities will result from management interventions and training initiatives failing to translate into behavioural change by all employees and contractors. Non-compliance with critical controls is a common failure in safety incidents...

Mitigation: All operations continue to implement safety improvement plans, with a focus on: effective management of critical controls required to manage significant safety risks; learning from high potential incidents and hazards; embedding a safety culture; and leadership engagement and accountability. An elimination of fatalities taskforce is assessing safety risks at all operations to establish further actions necessary to improve safety performance.³⁵⁸

What is notable in the statements of all three (BHP, Rio Tinto and Anglo American) companies is the focus (both in terms of root causes and mitigation) on process safety including engineering controls with regard to catastrophic incidents like tailing dam failures and explosions. In contrast, behaviour control assumes prominence when dealing with the risk of individual fatalities in the case of Anglo-American (the situation is more ambiguous with regard to Rio Tinto which talks about systems but doesn't detail the components so as to identify the focus). Fatalities are still low frequency high impact events and there is a growing recognition they require particular attention as do catastrophic events where multiple fatalities occur. The limitations of behaviourally focused programs (especially with regard to serious/fatality risks) has been at least implicit (notably evidence on the importance of other controls) in earlier sections of this report. This point will be amplified by the examination of process safety below.

Mining companies also have mechanisms for employees to raise concerns (often web or phone-based), some generic and some safety focused. For example, referring to its code of conduct reporting scheme in 2019 Glencore stated:

In 2019, we received a total of 500 reports (2018: 215 and 2017: 183) regarding situations in which Group policies appeared to be breached and which were brought to the attention of the Raising Concerns programme. Of these, 37% related to Human Resources concerns, 42% to business integrity concerns (of which 78 matters were related to potential conflicts of interest) and 9% to health, safety or environmental matters. The substantial increase in the number of concerns received by the Raising Concerns programme year-on-year are attributable to increased awareness of the programme and the roll-out of new reporting platforms for both web and phone submissions.³⁵⁹

Similarly in its 2018 Annual Report Anglo American made reference to its Speak Up scheme:

Whistleblowing

³⁵⁸ Anglo American Annual Report 2018, 45.

³⁵⁹ Glencore Annual Report 2019, 44.

Our independently managed Speak Up facility is a confidential and secure means for our employees, contractors, suppliers, business partners and other external stakeholders around the world to report concerns about conduct that is contrary to our values and integrity standards. We do not tolerate any form of retaliation against employees raising concerns in good faith. Any allegation of harassment or intimidation by others as a result of contacting Speak Up is investigated and, if required, appropriate action is taken. During 2018, 325 alerts were received, covering a broad spectrum of concerns, including ethical, legal, supplier relationship, health and safety and human resources issues.³⁶⁰

There is a large literature on corporate governance (including issues like CEO rewards, audit review processes, risk minimisation and corruption, corporate social responsibility (CSR). This report will focus on those aspects that pertain most directly to workplace safety, especially in high-hazard settings like mines. From the 1980s arguments were made that corporate governance in conjunction with 'light touch' regulation was a more effective and innovative way of shaping corporate behaviour and safeguarding the community than 'command and control' regulatory regimes. Subsequent events, like the GFC and 2019 Banking Royal Commission demonstrated the paucity of these claims as even elaborate corporate governance regimes and light-touch regulation failed conspicuously.³⁶¹ With regard to mine safety regulation there was some wind-back in this period with the removal or all or most mine specific regulation and placing mining within general OHS legislation under the post-Roben's overhaul of OHS laws by some jurisdictions like New Zealand and Tasmania. This also entailed a reduction of mine specific inspectoral resources and expertise (in New Zealand there was no Chief Mines Inspector). Post-Roben's OHS laws were not 'light-touch' regulations but general requirements (for example the role and powers of safety representatives) were less stringent in their requirements than mine safety laws, especially those in Queensland and NSW (in NSW OHS and mine safety laws were aligned but mine legislation remained while in Queensland the laws remained separate but mine laws were aligned in the sense of including general duty provisions) and didn't contain the level of specific with regard to particular hazards (especially those known to cause fatalities) as mining. The limitations of the 'total integration' model (never risk-assessed as far can be determined) became manifest in Tasmania as a result of the investigation into the 2006 Beaconsfield fatality and the same lessons became clear in New Zealand following the Pike River mine disaster. Both jurisdictions changed direction and increased/upgraded mine specific regulation and inspectorate resourcing (including a Chief Inspector of Mines in New Zealand).³⁶²

Without gainsaying the benefit of good governance several observations can be made.

First, corporate structures can have significant if unintended effects. Corporations in high-hazard industries typically have a centralised control structure and reporting system to minimise the risk that high-risk decisions will occur at local levels or go unreported if they do occur. Another fashionable management idea in the 1980s was devolving responsibility within large corporations

³⁶⁰ Anglo American Integrated Annual Report, 39.

³⁶¹ Hayne K (2019) *Royal Commission into Misconduct in the Banking, Superannuation and Financial Services Industry: Final Report*. Canberra, ACT, Australia: Commonwealth of Australia.

³⁶² The evolution of mine safety legislation including these changes is reviewed in Quinlan, M. (2014) *Ten Pathways to Death and Disaster: Learning from fatal incidents in mines and other high hazard workplaces*, Federation Press, Annandale.

into a series of separate profit-centres or assets that were run independently and whose performance was judged in the capacity to earn returns for the corporations. The approach valued generic management principles over content specific knowledge and led to more fractured corporate structures. The approach especially appealed to large corporations with a diverse array of activities (often widely dispersed geographically). In *Disastrous Decisions*, his examination of the Gulf of Mexico Blowout, Andrew Hopkins traces how BP, unlike Shell and Exxon abandoned its previous matrix model of aligning functional and asset responsibilities within management and embraced these ideas by adopting a decentralised and streamlined structure with minimised head office staff.³⁶³ Hopkins argues the change ‘was a commercial success, but the seeds were sown for both Texas City and Macondo (aka Deepwater Horizon) disasters.’³⁶⁴ Both a Chemical Safety Board (CSB) and the Baker chaired review (referred to elsewhere in this report) found BP’s decentralised organisational structure contributed to Texas City and in response (2008) BP recentralised oil drilling operations but the exploration drilling group (that drilled Macondo) was excluded and drilling teams still reported directly to a single drilling operations engineer.³⁶⁵ Analysing the decision-making process:

So in the end, the exploration group remained decentralised *because its productivity was good*. This meant that well integrity issues did not get the same level of scrutiny of higher-level control as was the case in other drilling groups. Putting it bluntly, safety took a back seat to productivity although the decision-makers would not have realised this.³⁶⁶

Given the limited centralisation of engineering decision-making Hopkins identified tensions/potential conflicts between ‘asset management’ and engineering:

First, the drilling engineer manager for the Gulf of Mexico was subordinated to a Gulf of Mexico asset manager, with all that this entailed. For example, the remuneration of the engineering manager was affected by whether drilling operations in the Gulf of Mexico met their cost reduction targets. Second, it meant that the engineering standards used in the Gulf of Mexico were not necessarily the same as those used in BP operations in other parts of the world. The structure, in other words, allowed for global variation in the standards that BP used. The increased the likelihood that BP’s operations in some parts of the world might be, in a sense, “substandard”.³⁶⁷

Hopkins noted that it wasn’t just Texas City and Macondo. Following the decentralisation decisions North American operations experienced series of disaster from 2005 – Texas City, the collapse of the Thunderhorse platform (Gulf of Mexico), major oil leak from the Prudhoe Bay Alaska pipeline, and the Macondo Blowout (recentralisation was underway by then but too late). Hopkins concluded it

³⁶³ Hopkins A. *Disastrous Decisions: The Human and Organisational Causation of the Gulf of Mexico Blowout*, CCH, especially 97-110.

³⁶⁴ Hopkins A. *Disastrous Decisions: The Human and Organisational Causation of the Gulf of Mexico Blowout*, CCH, 101.

³⁶⁵ Hopkins A. *Disastrous Decisions: The Human and Organisational Causation of the Gulf of Mexico Blowout*, CCH, 102.

³⁶⁶ Hopkins A. *Disastrous Decisions: The Human and Organisational Causation of the Gulf of Mexico Blowout*, CCH, 105.

³⁶⁷ Hopkins A. *Disastrous Decisions: The Human and Organisational Causation of the Gulf of Mexico Blowout*, CCH, 105.

was ‘hard to escape the conclusion that BP’s decentralisation, aimed at maximising profits, is somehow related to this string of disasters.’³⁶⁸

At least some global mining corporations appear to have used the decentralised profit centre/asset model. For example in 2010 XTRATA’s Annual Report stated:

Devolved authority and accountability Xstrata’s highly decentralised business model is a key differentiator and focuses accountability and responsibility at the local level ensuring decisions are made where the best information exist. This model creates a strong sense of ownership at the local level and, within a defined governance structure, empowers operational management to take pro-active and prompt decisions on operational, community, environmental and people issues and to build meaningful partnerships with local stakeholders at a site or divisional level. Xstrata’s commodity business units have responsibility for all aspects.³⁶⁹

XSTRATA subsequently merged with Glencore and I am unaware as to whether this approach continued after the merger. Further, whether decentralised strategies have entailed compromises to the overall management of safety in mining companies the way or to the degree that occurred at BP is unknown but may warrant investigation, especially if the practice has become widespread.

A not unrelated problem is decision-making silos and corporate annual reports often imply decision-making is occurring in silos. For example, reports will refer to goals/measures to reduce costs or boost production at particular mines but there is little or no explanation of how this will be done while not compromising safety or the planning and processes in place that will provide critical and effective oversight in this regard (see earlier discussion of the Ravensworth incident for example). A number of fatal incidents in mines have been linked to corporate and other changes (see for example the Cornwall Colliery fatality described below). There are other areas of decision-making where there may be OHS implications of decisions but it is not clear these have been considered. For example, in reviews of the activities of SSHRs and ISHRs in Queensland and NSW concerns were raised about the growing corporate movement of managers between different mines. For example the second study observed:

At the mine level, aside from these challenges and those posed by changes in the structure and organisation of employment, several managerial approaches also serve to undermine the role of worker representation on OSH. For example, as indicated above, a recurrent theme in the testimony of representatives in both the present and previous study concerned ways in which corporate organisational strategies encouraged movement among senior managers, resulting in regular turnover of those responsible for OSH. Representatives in both states at mine and industry levels talked of the amount of effort expended in establishing working relations with these senior managers and their frustration with having to repeat this process regularly because of the turnover of the persons in this role. Indeed, on average it appeared that the miners’ representatives held office far longer than their managerial interlocutors did, making them a great deal more familiar with the everyday

³⁶⁸ Hopkins A. *Disastrous Decisions: The Human and Organisational Causation of the Gulf of Mexico Blowout*, CCH, 109.

³⁶⁹ XSTRATA Annual Report 2010, 24.

issues of safety and health in the mines than were the senior managers who held the main legal responsibility of these matters.³⁷⁰

While such movements in managers may have advantages for the corporation (in terms of broadening manager experience for example) some SSHRs believed it disrupted/weakened communication and understanding on site, which took some time to develop. This concern is not insignificant as such communication is critical in a high-hazard industry like mining and it is worth noting that a number of mine fatalities/disasters occurred shortly after a change of manager.

One example was a death at the Cornwall Colliery where the changeover was also associated corporate changes that reduced the mine managers' time on site. The Coronial Inquest into the death of from a rockfall of Adrian Hayes pointed to the significance of a change of management prior to the incident which resulted in some critical differences which contributed to the failure to recognise and respond to clear warning signals or serious concerns expressed by the shift supervisor. The previous manager had kept a keen oversight over day-to-day activities as well as the corporate requirements that partly dictated this:

The situation changed upon Mr Mellow's retirement. "Hands on" management was not Mr Morall's modus operandi and he assigned to Mr Miller several important tasks which denied him that day-to-day familiarity with the mine's operations and its workforce. Further, unlike his predecessor, Mr Morall had additional duties which obligated him to be absent from the mine for in excess of 25% of its operating time. As a result he was unable to carry out daily underground inspections during extraction and there was not any other person at the site, including Mr Miller, with adequate qualifications and experience to properly perform this task.³⁷¹

The Pike River mine disaster affords more evidence of this type of disruptive disorganisation in the lead up to a fatal incident. Reviewing the disaster particularly regard to contractors, Lamare et al noted:

Throughout 2010, the management team faced planning and operational challenges, including improving coal production, establishing the hydro panel, commissioning the new main underground fan, upgrading the methane drainage system and resolving problems with mining machinery. These coincided with the drive to increase coal production. There were also constant management changes over the years. In the 26 months preceding the explosion, there were six mine managers. The last mine manager at the time of the explosion was Doug White, former deputy chief inspector of mines in Australia, who was appointed in September 2010. A month later, the formal reporting structures changed and all managers were required to report to Doug White as site General Manager. Technical service was provided by Peter van Rooyen, who had been a technical service manager at PRCM since February 2009, but resigned on 3 November 2010, a week before the explosion. Technical services were responsible for mine design including underground ventilation,

³⁷⁰ Walters D, Wadsworth E, Johnstone R, Lippel K, Quinlan M, Bhattacharya S, & James P, (2018) *The role and effects of representing miners in arrangements for safety and health in coal mining: a global study Volume 1: A comparative analysis of findings from five countries*, IOSH and Cardiff University, Cardiff, 34.

³⁷¹ Chandler R, (2010) *Findings, Recommendations and Comments Following a Coronial Inquest into the Death of Adrian Bryan Hayes*, Magistrates Court of Tasmania Coronial Division, Launceston, 25 August 2010.

surface, underground exploration, strata control, scheduling, surveying and geotechnical functions, but they were not responsible for gas monitoring. It is important to note that evidence given at the Royal Commission of Inquiry focused on failures in the ventilation system as well as scheduling.³⁷²

Second, in practice if not law corporate management are largely immune from being held personally accountable for the OHS implications of their decisions (some may resign or be punished by shareholders but not by regulators). With rare exceptions the only times the owners of businesses are charged with serious OHS offences are instances where the organisation is small and the owners are managers. With large corporations, those making decisions (CEOs and Boards) are often not substantial owners but appointed representatives. Few Boards to my knowledge (mining might be a partial exception) include members with OHS expertise (as distinct from persons with general HR expertise) to help inform their judgements on risk and decision-making in that area as distinct from financial risk (where expertise is DE rigour). This and related critical technical knowledge gaps have been identified with regard to mining. For example, in a paper on this subject Atkins and Ritchie argued

There are gaps in board assurance on technical and operational risk in mining. There are gaps in current environmental social governance (ESG) and enterprise risk management, especially for geotechnical risk.

Chief risk officers (CROs) and audit teams who report to the board's audit and risk committee are often staffed by accountants and lawyers who provide an essential service, but may not appreciate the science, technology, engineering and maths (STEM) aspects of mining, including its technical complexity, variability and uncertainty. This demography tends to focus on commercial, financial and legal risk. Their skill sets mean they may have a blind spot on how STEM mining risks have an impact, including on company performance and innovation (opportunity risks). Additionally, with the digital transformation of mining underway, there is a risk the disrupting 'digital natives' (i.e. deep domain experts on digital technology) also lack an understanding of the technical and operational risks of mining and may inadvertently create new risks.

Understanding risk in mining requires technical and operational expertise in mining engineering, life-of-mine planning, geotechnical engineering, geology and metallurgy. These professionals need to work alongside traditional risk practitioners and auditors to develop new ways to provide transparency, accountability and assurance to mining company boards.³⁷³

Turning specifically to the issue of mine disasters they state:

Many mine accidents and disasters are due to geotechnical engineering issues, including:

³⁷² Lamare R, Lamm F, McDonnell N. & White H, (2015) Independent, dependent, and employee: Contractors and New Zealand's Pike River Coal Mine disaster, *Journal of Industrial Relations*, 57(1):83.

³⁷³ Atkins A, & Ritchie M, (2019) Improving board assurance of technical and operational risks in mining, in J Wesseloo (ed.) *Mining Geomechanical Risk 2019*, Australian Centre for Geomechanics, Perth, ISBN 978-0-9876389-1-5, 97-110 at 97.

- Tailings dam failures, e.g. Samarco 2015 (Morgenstern et al. 2016).
- Rockfalls, e.g. Beaconsfield 2006 (Chandler 2009).
- Inrush, e.g. Bronzewing 2000 (DMP 2000a; Hope 2002).
- Seismicity, e.g. Cadia 2017, 2018 (Dyson 2017; Newcrest Mining Limited 2018).
- Airblast, e.g. Northparkes 1999 (SIMTARS 1999; DMP 2000b; Bailey 2003; Hebblewhite 2003).

Non-geotechnical engineering issues, such as poor ventilation, fire and explosion, also feature highly in mine disaster literature (e.g. Pike River, 2010 (Panckhurst et al. 2012) and Moura, 1994 (Hair 2016)) and many more including inundation/inrush, machinery incidents, electrocution, falls from height and entrapment in confined spaces (Quinlan 2014, pp. 12 and 84).

As part of a concerted national effort to protect and enhance the Australian mining industry's reputation for world's best practice in terms of productivity, safety, health, environment and communities (HSEC) performance, Australian mines safety legislation was to be harmonised, but harmonised safety legislation is yet to eventuate (Atkins et al. 2016). The only thing that is relatively standard across the country is compliance with (non-mandatory) international standards for safety and risk management and the industry's requirement for itself and its service providers to be certified for:

- ISO 18001:2007 Occupational Health and Safety Management System (International Organization for Standardization (ISO) 2007) (or AS/NZS 4801:2001 (Standards Australia 2001)) – which on 12 March 2018 was superseded by ISO 45001:2008 Occupational Health and Safety Management Systems -- Requirements with Guidance for Use (ISO 2008).
- AS/NZS ISO 31000:2018 Risk Management (ISO 2018).

This certification is achieved by successful compliance, as validated by ISO audits, which must be carried out by certified practitioners. These ISO audits can be merged with technical compliance audits, such as the WA Department of Mines, Industry Regulation and Safety's (WA DMIRS) high impact function audits (see Atkins & Webster-Smith 2011) to create technically specific assurance. But as many safety auditors are not mining STEM professionals, this is a rare practice.

According to UQR!SK (2018):

"Baselining and benchmarking exercises done to date have identified that a range of approaches are being used in different industries to measure the effectiveness of risk controls that are critical in preventing or mitigating catastrophic events. These approaches range from qualitative to quantitative. However, there is currently no consensus in the Australian mining sector on how to do it. It is also unclear what methods from other industries will translate to the mining industry."

Stacey et al. (2007) argued that board members and executive teams do not have to understand the technical details of mining as long as they are provided with advice from technical experts in terms they understand Improving board assurance of technical and

operational risks in mining AC Atkins and M Ritchie 100 Mining Geomechanical Risk 2019, Perth, Australia (i.e. probability of failure, monetary terms). But how do boards and management know what assurance to request if 'they don't know what they don't know'?³⁷⁴

They go on to consider existing audit and assurance standards before concluding:

Moving forward, corporate governance thought leaders (e.g. AICD and proxy advisers) need to be educated. Understanding risk in mining requires technical and operational expertise in mining engineering, life-of-mine planning, geotechnical engineering, geology and metallurgy. These professionals need to work alongside traditional risk practitioners and assurance providers to develop new ways to provide transparency, accountability and assurance to mining company boards.³⁷⁵

Some mining corporation boards do include engineers and mine engineers but, even here, given divisional responsibilities (the silo effect) and their background it is not clear whether they make active input into decisions with OHS implications (it would be hoped so). As well as having representation and access to additional technical expertise (which is utilised) mandating that there must be an OHS risk assurance process, possibly via a committee but requiring board deliberations and sign-off might help address this. As incidents like Pike River, Deepwater Horizon and Westray amply demonstrate workplaces disasters can have huge financial implications but it is not at all clear that knowledge of these inter-connections has always influenced decision-making. Mining may be better than other high-hazard industries in this regard but I am unaware of research demonstrating this.

The Royal Commission into the Pike River coalmine disaster which included an entire chapter on governance and management identified a number of serious failings on the part of the board. No-one on the Pike board was familiar coalmining, the safety data reaching the board was principally routine injury data (LTIFRs), the board's Health Safety and Environment (HSE) Committee had not met in the 13 months prior to the disaster, the board didn't review/consider a series of audits that raised serious safety and regulatory compliance issues at the mine, notably the Hawcroft risk surveys of 2009 and 2010 and the Minserv legislative compliance audit in 2009 conducted by experienced mine engineer Dave Stewart.

33. In August 2009 Mr Dow had been approached by a professional colleague who expressed concern about aspects of the Pike River mine, including training and culture. Mr Dow discussed this with Mr Stewart. Mr Stewart said that Mr Dow was concerned about the turnover of senior managers, difficulties in recruiting good managers, morale and the failures to meet production targets.

³⁷⁴ Atkins A, & Ritchie M, (2019) Improving board assurance of technical and operational risks in mining, in J Wesseloo (ed.) *Mining Geomechanical Risk 2019*, Australian Centre for Geomechanics, Perth, ISBN 978-0-9876389-1-5, 99-100.

³⁷⁵ Atkins A, & Ritchie M, (2019) Improving board assurance of technical and operational risks in mining, in J Wesseloo (ed.) *Mining Geomechanical Risk 2019*, Australian Centre for Geomechanics, Perth, ISBN 978-0-9876389-1-5, 108.

34. Mr Stewart told Mr Dow that the management team needed help from someone entirely familiar with New Zealand regulations and conditions, and the starting point should be a legislative compliance audit. Mr Dow referred Mr Stewart to Mr Whittall.³⁷⁶

Mr Stewart's reports identifying deficiencies in safety critical systems (including ventilation) were not seen by Mr Dow.³⁷⁷

Reviewing board deficiencies Lamare et al state:

The Royal Commission of Inquiry's report into the disaster noted that the board did not verify that effective systems of risk management had been put into place. Nor did the board properly hold management to account, but instead assumed that managers would draw the board's attention to any major operational problems. The Royal Commission of Inquiry (2012: 8) report also noted that: 'The board did not provide effective health and safety leadership and protect the workforce from harm. Instead it was distracted by the financial and production pressures that confronted the company.'³⁷⁸

As with the Westray mine disaster mining conditions at Pike River proved more difficult than anticipated (though initial geological reports had been less than effusive³⁷⁹) and the mine struggled to reach production goals. Disturbingly, an industry insider warned the board that there were safety issues at the mine warranting an audit.³⁸⁰ The Royal Commission identified a series of seriously flawed decisions as production took precedence over safety and voices of concern within the mine itself were ignored – two of the 10 pathways to disaster identified repeatedly in fatal mine incidents. Again, Lamare et al usefully summarise Royal Commission findings here and in the interests of brevity reproduced here:

Against a backdrop of significant delays and spiralling costs, the attention of the executive management and the board was focused on increasing the hydro coal production level with little or no assessment of the associated risks. It should be noted that it was common knowledge that the use of hydro mining may exacerbate the levels of methane gas. After hydro mining began, high methane gas readings – many dangerously high – were recorded most days. The company also made the decision to place the main ventilation fan underground, which was unprecedented in any gassy coal mines in the world. The Royal Commission of Inquiry (2012: 9) report stated that 'putting the fan underground was a major error. The decision was neither adequately risk assessed nor did it receive adequate board consideration. A ventilation consultant and some Pike staff voiced opposition, but the decision still was not reviewed'. Not only was the main ventilation fan incorrectly positioned,

³⁷⁶ Royal Commission on the Pike River Coal Mine Tragedy (2012) Volume 2, Wellington, 54.

³⁷⁷ Royal Commission on the Pike River Coal Mine Tragedy (2012) Volume 2, Wellington, 5

³⁷⁸ Lamare R, Lamm F, McDonnell N. & White H, (2015) Independent, dependent, and employee: Contractors and New Zealand's Pike River Coal Mine disaster, *Journal of Industrial Relations*, 57(1):83.

³⁷⁹ This was well documented by Rebecca Macfie's book on the disaster which was based on detailed research (interviews and documents) rare for a journalist-authored work. Macfie R, *Tragedy at Pike River Mine: How and why 29 men died*, Awa Press, Wellington.

³⁸⁰ In addition to the Royal Commission journalist Rebecca Macfie wrote a book on the disaster which was based on detailed research (interviews and documents) relatively rare for a journalist-authored work. As far as I am aware her key findings have not been challenged or disproven which is why it is the only source of this type I have cited. Macfie R, *Tragedy at Pike River Mine: How and why 29 men died*, Awa Press, Wellington.

but at the time of the explosion there were too few gas sensors. Many of the sensors were not working or positioned incorrectly and others were not fit for purpose. Critical information regarding the use of hydro mining, the levels of methane gas, the lack of sensors and poor ventilation was not properly considered and the response to warning signs of an explosion risk was either not noticed or given no response.

It is a regulatory requirement that electrical equipment and cabling must be protected and incapable of sparking an explosion in restricted and dangerous areas of gassy mines. However, in the PRCM mine, electrical equipment and cabling were unprotected and the risk of unprotected equipment and cables was never assessed (see Health and Safety in Employment (Mining – Underground) Regulations 1999, Regulation number 2 and Chapter 11 of the Royal Commission of Inquiry, 2012). A number of variable speed drives (VSDs) were located underground. VSDs were used to control power supply to the fan and water pumps. There were problems with the VSDs, one of which was replaced and a number of which were removed for repair. The extent of these problems underlined the need for a comprehensive risk assessment of the electrical installations underground at PRCM (Royal Commission of Inquiry, 2012).³⁸¹

Importantly, even in mining if a serious incident occurs, the most likely persons to be at risk of being prosecuted for any regulatory breaches detected are members of the mine management team. The problem here is that corporations can make decisions that place managers under pressure if not an outright invidious position but it is only the mine managers that will bear the consequences – the proverbial meat in the sandwich. This situation probably contributes to the angst/opposition amongst managers and their representative bodies about industrial manslaughter legislation like that enacted in Queensland.

Third, with notable exceptions like the Pike River Royal Commission relatively few investigations/reports on mine safety that I am familiar with make explicit and detailed reference to governance and board/corporate responsibilities and the intervention measures that may be required to rectify problems/improve outcomes in the future in this regard. Another exception was a coronial inquest into rock-fall fatalities at the Renison mine in Tasmania where the coroner documented how board decisions to cut costs following a fall in tin prices impacted safety. Coroner Jones found financial difficulties in 2001-2003 arising from the low price of tin and unsuccessful hedging arrangements led to a disruption in geotechnical input from a consulting firm (AMC) as well as reductions in the mine's own technical staff. Though aware of the safety issues arising from this, management at the mine lacked the power to cease operations and failed to persuade the company's board of directors of the urgent need to fund adequate geotechnical support.³⁸²

The Brady-Heywood Review into mine fatalities contains repeated references to safety culture but as far as I could see no direct reference to governance and a few references to corporate

³⁸¹ Lamare R, Lamm F, McDonnell N. & White H, (2015) Independent, dependent, and employee: Contractors and New Zealand's Pike River Coal Mine disaster, *Journal of Industrial Relations*, 57(1):84.

³⁸² Jones, D (2008) *In the Matter of the Coroners Act 1995 and in the Matter of Inquests Touching the Deaths of Jarrod Keith Jones, Mathew David Lister and Sidney Thomas Pearce*, Coroners Court of Tasmania, Burnie, 50-56.

responsibilities.³⁸³ To be fair the references to corporate responsibilities reinforce observations already made. For example, one of three reasons posited for why the industry was heavily reliant on administrative controls (60%) than hard higher order controls (elimination, substitution and engineering controls, 30%) was:

It may be that mining companies are not provided with the right support and funding from higher up in the organisation in order to deal with these hazards in a more effective way - higher order controls can be costly to implement during operations and may not be attractive to management at site or corporate head office.³⁸⁴

The Brady-Heywood Review also referred to the issue of corporate complexity, stating that with regard to the mining industry:

It is also driven by organisational complexity, with decentralised and fragmented corporate structures devolving key responsibilities (in practice, but not necessarily from a legislative perspective) to subsidiaries, contractors and subcontractors. Such decentralisation can result in siloed independent businesses with different incentives, procedures and specialties appropriate to their function within the complex system.³⁸⁵

Other issues central to the Review's concerns would seem to be corporate level decisions, notably the focus on lost-time injuries and LTIFRs as KPIs and the key measure in some if not many bonus schemes. As noted elsewhere, the Review was highly critical of the value of focusing on lost-time or medically-treated injuries related measures in terms of informing actions to prevent fatalities, views made in other reviews for over a decades. The Brady-Heywood Review also noted that incentivising injury measures, especially LITFRs, in terms of rewards encouraged manipulation and didn't address the risks leading to death – again echoing points long-known in the OHS field (something the Review itself acknowledged).³⁸⁶ It pointed to the wider effects such a focus can have:

A management focus on reducing LTIs can have the effect of encouraging under-reporting of incidents. Or consider how commodity prices not only drive the hours worked in the industry, but also the contractor/employee mix of hours, which in turn drives the number of HPIs and LTIs reported to the Regulator.³⁸⁷

The Review found beliefs that LFIFRs were a poor measure of safety were evident in the interviews conducted within the industry. This raises an obvious question. Given such views why has it proved so difficult to transition to or at least add a better or more effective suite of performance measures, both quantitative and qualitative? The issue here is not that other measures aren't collected (some are) and presumably examined. However, it is unclear whether measures that are better-suited to preventing serious incidents have been systematically assessed, the combination tailored to those most appropriate to coalmining selected and implemented, and why these indicators then don't

³⁸³ Brady, S. (2019) *Review of all fatal accidents in Queensland mines and quarries from 2000 to 2019*, Report prepared for the Department of Natural Resources, Mines and Energy, Brisbane.

³⁸⁴ The two other reasons suggested was the failure of mining companies to see the value of HPIs in terms of identifying and remedying hazards (considered unlikely) and lack of regulator engagement. Brady, S. (2019) *Review of all fatal accidents in Queensland mines and quarries from 2000 to 2019*, 45.

³⁸⁵ Brady, S. (2019) *Review of all fatal accidents in Queensland mines and quarries from 2000 to 2019*, 67.

³⁸⁶ Brady, S. (2019) *Review of all fatal accidents in Queensland mines and quarries from 2000 to 2019*, 71.

³⁸⁷ Brady, S. (2019) *Review of all fatal accidents in Queensland mines and quarries from 2000 to 2019*, 63.

receive prominent place in corporate reporting of OHS performance including influencing board decisions and being duly reported to shareholders and other interested parties.

Fourth, it is increasingly common for safety reviews to make reference to 'safety culture' and while the organisation's leadership team is arguably the critical body in shaping this, this aspect is often not developed adequately and in any case the concept of safety culture is somewhat ambiguous, being used in different ways and with different meanings, its linkage to corporate responsibility not adequately explained in terms of what it means for regulation (indeed safety culture has been used to argue that regulation is old-fashioned and no so relevant to improving safety).³⁸⁸

In high hazard industries in particular, where the consequences of failure are especially acute, there is a good argument that major responsibility for OHS should reside where power/authority lies and that is at corporate level, not with the management team at a particular mine who are employees, unless the mine is small and the owners are essentially the managers. Complex corporate structures (including joint-ventures) can create difficulties and these are common but the corporate veil shouldn't diminish the responsibility of those with the authority to make critical decisions on OHS-related actions, resources and the like effectively through decisions on structure, production and cost targets. One instructive example of the points just made was BP who experienced a series of four major disasters (Texas City, Prudhoe Bay, Deepwater Horizon) resulting from fundamental flaws in its personal safety-focused OHS management regime as well as devolving decision-making to particular 'profit-centres' and over-emphasising production targets. Despite a growing array of information in addition to the disasters themselves (including internal and external reports) there was limited and too belated learning prior to Deepwater Horizon, no senior officer of BP was charged notwithstanding the devastating human and economic costs (estimated \$40 billion for Deepwater Horizon alone) to the community.³⁸⁹

Rewards and decision-making

Investigations into disasters/catastrophic events rarely investigate how corporate rewards and decision-making processes may have contributed to their occurrence. A clear exception was the 2019 Banking Royal Commission which found widespread and systematic malfeasance had flourished due to a combination of an overriding pursuit of profits, poor corporate governance (whereby for example critical governance safeguards like internal audit review committees were ignored) and reward schemes that essentially incentivised unethical if not outright rapacious behaviour (like charging dead clients and selling products poorly adapted to some customer's needs) and regulatory failure (poor enforcement and over-reliance on 'light touch' regulation which do not

³⁸⁸ This report cannot undertake a detailed examination of the value of safety culture. Andrew Hopkins, amongst others, has examined it critically in the context of safety, including death/disasters at some length. For a summary of this and points made in this report with a specific focus on safety in mines and other high hazard workplaces see Hopkins, A (2006) *Studying organizational cultures and their effects on safety, Safety Science*, 44: 875-89; and Quinlan, M. (1014) *Ten Pathways to Death and Disaster: Learning from Fatal Incidents in Mines and Other High Hazard Workplaces*, Federation Press, Annandale, 10, 17, 23, 29-31, 76, 112, 119, 134, 150, 168-170, 213-216 & 222. For criticism of the use of safety culture in other high hazard industries, unless deduced through organisational decisions during incident investigations see Strauch B. (2015) Can we examine safety culture in accident investigations, or should we? *Safety Science*, 77:102–111.

³⁸⁹ Hopkins A, (2012) *Disastrous Decisions: The Human and Organisational Causes of the Gulf of Mexico Blowout*, CCH, Sydney.

modify financial institution behaviour).³⁹⁰ The Banking Royal Commission was not directed to health and safety outcomes although it documented some of the harrowing and stressful effects on clients. As with many workplace disasters, there were clear warning signals and numerous complaints over a number of years before the Royal Commission was finally established.

Relatively few official investigations into OHS incidents have examined if or how corporate decision played any roles in the lead up to the incident, and usually only when the outcomes has be particularly catastrophic like the Deepwater Horizon and Pike River mine disasters (some others and evidence in this regard is discussed below). However, the reports do occasionally contain relevant information and a number of researchers have used this and other information to identify connections with regard to particular incidents. Hopkins and Maslen sought to provide a comprehensive overview of the links between reward regimes and safety outcomes and linked to questions of governance, examining 11 corporations examining in hazardous industries (oil and gas, petrochemicals and mining).³⁹¹ They argue that while it may appear rational for corporate decision-makers and managers to take actions to avoid disasters that can prove, with clear examples, enormously costly – an indeed some actions are taken – the incentive to do this is not as compelling as it would seem while there are also powerful incentives working in the other direction. Senior corporate leaders are not owners of large corporations but paid employees whose performance payments (including share dividends and bonuses) can reward behaviour delivering short-term benefits even at the cost of longer term risks because those persons are unlikely to be around when incidents arising from the later occur. The concentration on short-term financial outcomes in terms of judging corporate performance can exacerbate these negative incentives as the GFC demonstrated.³⁹² The same can apply to managers on performance-based pay (even balanced scorecard schemes including safety indicators) or short-term (fixed contract) appointments. Regarding the Texas City incident Hopkins and Maslin (at page 3-4) noted that notwithstanding numerous dangerous gas releases the bonus paid to managers paid no attention to how major hazards were being managed (the Baker official review into the incident recommended their pay be contingent on satisfactory safety performance).³⁹³ As Reason's concept of latent failure demonstrates, failures like maintenance flaws/weaknesses arising cost-cutting, which have been and remain causal factors in workplace disasters can remain undetected or un-actioned for years before a number in combination with an otherwise minor (and less predictable) precipitative event create catastrophic consequences.³⁹⁴ This scenario has repeatedly played out in mine disasters and fatalities, and indeed due to the same types of failure including production and reward pressures.³⁹⁵

Hopkins and Maslen acknowledge that the relationship between bonuses and behaviour are complex, and that this can be dependent on the type of bonus regimes and the nature of the performance measures that are used in relation to them (including single measure, balance scorecards and the like). Balanced scorecards may include measures designed to guard against

³⁹⁰ Hayne K (2019) *Royal Commission into Misconduct in the Banking, Superannuation and Financial Services Industry: Final Report*. Canberra, ACT, Australia: Commonwealth of Australia.

³⁹¹ Hopkins A & Maslen S (2015) *Risky Rewards: How Company Bonuses Affect Safety*. London: Routledge

³⁹² Hopkins A & Maslen S (2015) *Risky Rewards: How Company Bonuses Affect Safety*, 25.

³⁹³ Baker, J (2007) Report of the BP US Refineries Independent Safety Review Panel, United States.

³⁹⁴ See for example Reason J, (2008) *The Human Contribution: Unsafe Acts, Accidents and Heroic Recoveries*, Ashgate, Farnham Surrey.

³⁹⁵ Quinlan, M. (2014), *Ten Pathways to Death and Disaster: Learning from Fatal Incidents in Mines and other High Hazard Workplaces*, Federation Press, Annandale.

undesirable practices/behaviour (nonetheless unintended consequences have occurred) in a wide range of settings (performance management in the UK National Health Service produced 20 unintended consequences including box-ticking responses in emergency wards).³⁹⁶ With regard to workplace safety the most common unintended consequences of both performance and safety bonus schemes is to affect reporting. Production bonus and contractor performance assessment that use safety indicators (to guard against corner cutting on safety and the like) have been found to reduce incident reporting and encourage ‘manipulation’ of data while a safety reward scheme at Beaconsfield mine was seen to encourage trivialised reporting.³⁹⁷ Reporting hazardous or bad news needs to be encouraged, and sometimes this may look trivial, but there are better ways of doing than a financial reward system.³⁹⁸ These issues have been dealt with in another section of the report and will not be examined further here. Hopkins and Maslen found that many individual performance agreements for managers included a statement of their job description along with business and safety objectives but little detail as to priorities with regard to this (there were often significant differences between stated and ‘real’ objectives), and managers often had an ambivalent attitude to KPIs.³⁹⁹

As disasters occur irregularly they are not amenable to routinized decision-making. Hopkins and Maslen identify a number of factors that repeated occur with regard to disasters including competency deficiencies in management teams making key decisions, cost-cutting that compromises monitoring and respond to major hazard risks, failure to learn from previous incidents.⁴⁰⁰ Another finding was that ‘process safety’ was largely invisible in the group component of bonuses and a more powerful driver was awareness of high profile disaster like Texas City.⁴⁰¹ The capacity of disaster/failure to enhance awareness of the need to address low frequency high impact event risk is relevant to the question of ensuring studying and understanding disasters/failure as an essential part of industry training discussed elsewhere in this report. The relevance/importance of the finding on bonuses and process safety will become apparent in the following section but Hopkins and Maslen found process safety scorecards (though warning against the overuse of loss of containment measures) and awareness of/attention to precursor events to disasters (in mining HPIs) had value in terms of management decision making. They also advocated that executive bonuses needed to be tied to long term performance, through mechanisms such as deferred bonus schemes.

Harbingers of Serious Incidents and Key Performance Indicators

Broadly speaking it is possible to categorise two types of hazardous events, routine injuries or relative high-frequency but low impact events (like slips, trips, minor lacerations and most falls) and low frequency high impact events (fatalities and multiple fatality events). The most typical example

³⁹⁶ Hopkins A & Maslen S (2015) *Risky Rewards: How Company Bonuses Affect Safety*. London: Routledge, 25.

³⁹⁷ Wright, C (1986) Routine deaths: fatal accidents in the oil industry, *Sociological Review*, 34(2): 265-289; Wright, C (1994) A fallible safety system: institutionalised irrationality in the offshore oil and gas industry, *Sociological Review*, 42(1): 79-103. Quinlan, M (2009) *Report on OHS Management at the Beaconsfield Joint Venture Gold Mine, Tasmania up to and Including the Time of the Rockfall Incident at the 925 Level of the Mine that Occurred at around 9.23 pm, Resulting in the Death of Larry Paul Knight and the Entrapment of Todd Andrew Russell and Brant George Webb*, Expert Report Prepared for Greg Melick SC, Independent Investigator appointed by the Tasmanian Government, 30 August 2007

³⁹⁸ Hopkins A & Maslen S (2015) *Risky Rewards: How Company Bonuses Affect Safety*. London: Routledge, 56.

³⁹⁹ Hopkins A & Maslen S (2015) *Risky Rewards: How Company Bonuses Affect Safety*, 106-107.

⁴⁰⁰ Hopkins A & Maslen S (2015) *Risky Rewards: How Company Bonuses Affect Safety*, 52-60.

⁴⁰¹ Hopkins A & Maslen S (2015) *Risky Rewards: How Company Bonuses Affect Safety*, 131.

of the latter in coalmining are methane/coal-dust explosions/fires which has caused more multiple-fatality events (and most fatalities) in Australia for well over century and the same applies to other countries like the USA. These different types of hazards are sometimes referred to as personal hazards versus process hazards or personal safety versus process safety. It is now widely accepted in OHS that these types of hazards require distinctive arrays of interventions and performance measures. In high hazard workplaces like mines, refineries and oil rigs and major hazard facilities (like those storing or processing large amounts of dangerous goods (this can include some of those just mentioned like refineries and mines where mineral processing using toxic chemicals is undertaken) significant attention has been given to minimising the risk of catastrophic events. Major reforms to coalmine safety legislation introduced in NSW and Queensland in the late 1990s specifically targeted multiple fatality risks following the Gretley mine inrush (1996) and three mine disasters in the town of Moura (1975, 1986 and 1994) respectively. The reformed laws subsequently proved (in conjunction with vigorous and targeted enforcement) effective in this regard notwithstanding a large expansion in coal production, were deemed world's best practice used as the model for the complete overhaul of New Zealand mine (and quarry) safety legislation in the aftermath of the Pike River mine disaster in 2010. Without judgement of its causation the 6 May 2020 incident at the Grosvenor mine in Moranbah was worrying in this regard, being the closest thing to a disaster in a Queensland coalmine since 1994 I am aware of and therefore warranting careful investigation.

While safety legislation, at least those dealing with high hazard workplaces like mines, recognise that preventing fatal/multiple fatality incidents requires particular measures Hopkins and Maslen (page 2) noted that many managers didn't understand the distinction between personal and process safety 'or if they did, assumed that attention to personal safety hazards would automatically ensure that attention was given to process safety.' They go on to note that as safety performance is typically measured on an annual basis organisations will focus on driving down these statistics but this will relate to personal safety/routine incidents as process safety hazards will not appear in most years. Reports on mine safety and significant hazardous events in other industries (like the Texas City fire/explosion in the USA) have repeatedly highlighted the critical need to focus on process safety to prevent such events and how by way of contrast an over-emphasis on personal safety actually contributed to the disaster. The disconnect including the intermeshing of reward and performance systems with routine hazards/personal safety has been explicitly identified in recent reviews like the Pike River Royal Commission which argued this 'fixation' could extend to insurers and regulators:

The indicators of personal safety and process safety are also different. The occurrence of personal safety accidents has usually been measured by the lost time injury rate of the company. This is a lag indicator, a measure of performance made after the event, actually a measure of failure. Many companies place considerable store on their lost time injury rate figures. They may be used to measure performance and thereby affect a senior manager's bonus payment. They may attract the attention of the regulator, or even of an insurer in fixing a premium.⁴⁰²

Even single fatality events will or should be so rare as to make it difficult to assess trends or failures within a particular organisation (industry level data will provide some guidance but only some and of

⁴⁰² Royal Commission on the Pike River Coal Mine Tragedy (2012) Volume 2, Wellington, 28.

limited apparent relevance to individual organisations or managers). There may be more pressure on managers in industries like aviation where large numbers the public may die in a crash and this historically helps explain tight regulation and attention to even minor rule violations though increased competition has raised increased safety concerns.

As indicated routine hazards and low frequency high impact events require different interventions and different performance indicators. Widely used performance indicators like lost-time-injury-frequency rates (LTIFR) and medically treated injuries (MTI) can be valuable in monitoring and responding to routine injuries but as the 1994 Moura mine disaster tragically demonstrated they are of little value when it comes to low frequency high impact events and may even give a false sense of security that hazards in relation to the latter are being managed.⁴⁰³ Similarly, when part of the independent investigation into the Beaconsfield goldmine fatality in 2006 I found, that while catastrophic were not ignored (though rock-falls only ranked third on the ranking although it is one of the most common cause of underground mine fatalities, especially multiple fatalities), there was an imbalance relative to the time and effort the mine management spent on routine injuries and behavioural based safety.⁴⁰⁴ While the mine recorded many [but not all and nor was the regulator notified of all falls] rock-falls (the number, frequency and causes of these were not subject to systematic evaluation – post fatality analysis indicated inadequate ground support was the likely cause identified for a significant number of the falls). Following potentially catastrophic falls of ground (in the same levels as the later fatal event) in October 2005 mine management took remedial measures but failed to undertake a comprehensive risk assessment (including the adequacy of existing ground support) or to reconsider its actions when rock-falls began to occur even under the new methods when mining recommenced after the October fall. The sequence of events just described is by no means unique, with failure to heed warning signals or undertake adequate risk assessment occurring in other mine disasters/fatalities (Pike River to name but one). As part of the investigation I also examined workers compensation records for the mining industry in Tasmania. It confirmed that injuries through rock-falls were a relatively infrequent source of injury but these injuries were almost always extremely severe if not fatal.

The Importance of Warning signals, High Potential Incident (HPI) monitoring and response

The need to deal with fatality – especially multiple fatality risks - has been long recognised in mine safety legislation. The ways miners are killed have been known (apart from those connected to electricity and machinery) for centuries and the precursors to a number of these also well-known, for example dangerous levels of methane in coalmines. What might be colloquially called ‘near-misses’, ‘near-hits’ or in other words events that could have had fatal consequences with a slight change of circumstances are one the best indicators we have of dangerous conditions prior to an event. Most disasters across a range of industries were preceded by such incidents that should have rung alarm bells and as a result legislation often requires the inspectorate to be notified of these

⁴⁰³ Hopkins, A. (1999) *Managing Major Hazards: The Lessons of the Moura Mine Disaster*, Allen & Unwin, St Leonards.

⁴⁰⁴ Over focusing on behavioural-based safety regimes, including a preoccupation with personal/routine injuries has been the subject of some criticism, especially with regard to disasters/fatal incidents, examples of which have already been given in this report. It has also been criticised in academic research. For a overview of these criticisms/limitations see Hopkins, A (2006) What are we to make of safe behaviour programs? *Safety Science*, 44: 583-597.

events if not also requiring information on the remedial measures taken to prevent the situation being repeated or deteriorating. In mining, especially coalmining, mandatory reporting on such events, now called High Potential Incidents (HPI) have long existed and have been progressively strengthened over time, for example to work in tandem with other regulatory changes on major hazards in mines (such as the need for ventilation management plans/systems, a ventilation officer and trigger action response protocols or TARPs setting out the response to concerning events like elevated methane levels introduced after the 1994 Moura incident and similar measures in New Zealand following Pike River). Failure to promptly report HPIs to the mines inspectorate can be deemed a serious offence, especially when it relates to a particularly serious hazardous event.

While HPIs are recorded in reports from individual mines my admittedly brief review of corporate annual reports only that of BHP referred to a component of HPIs, namely high potential injuries as well as briefly describing a fatality at BHP Mitsubishi Alliance's Saraji Mine on 31 December 2018 and a serious train rollaway event in Western Australia. The BHP report identified the total number of high potential injuries for the past three years before noting:

High potential injuries declined by 7 per cent from FY2018 due to reductions at WAIO, Olympic Dam and Potash. High potential injury trends remain a primary focus to assess progress against our most important safety objective: to eliminate fatalities.⁴⁰⁵

Though more informative than the small number of other company annual reports I was able to read this still didn't amount to a detailed discussion of HPIs, especially information on the type of HPIs, where they were occurring and any trends in this regard, as well as effective investigations/interventions. To its credit, BHP's reporting with regard to health across a range of areas, the use of indices and discussion of recent developments regarding pneumoconiosis and hazards exposures was also comparatively detailed and informative.⁴⁰⁶

A recurring problem identified following disasters/fatalities and serious incidents in mines and other high hazard workplaces has been the failure to respond to a series of events (near misses or HPIs) or to treat as isolated events and not to look for connections or trends. Some examples of this have already been given (for example the number, pattern and causation of rockfalls [unplanned falls of ground] in the 18-24 months prior to the Beaconsfield Gold Mine fatality in 2006 and the hazardous methane levels experienced at the Pike River Coal Mine prior to the disastrous explosion in November 2010). Reviewing gas monitoring at the Pike River coalmine the Royal Commission noted:

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. 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.

⁴⁰⁵ There was also follow-up on some aspects of safety performance in coalmining illustrated by the following statement: BMA's safety performance requires significant improvement. With three fatalities over the last four years, BMA is focusing its efforts to drive a change in safety through the consistent application of improved safety standards, increasing the standardisation of work, improving the quality of task-based risk assessments and decreasing fatal risk exposure through investment in hard controls, *BHP Annual Report 2019*, 56, 69.

⁴⁰⁶ *BHP Annual Report 2019*, 57-58.

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. 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.'⁴⁰⁷

At Pike River the problem was more profound than one of normalisation of risk with the Royal Commission later concluding:

Many catastrophic accidents are preceded by situations in which warning signs are normalised, dismissed as intermittent or simply ignored. At Pike, however, a lot of safety information was not assessed at all. It simply remained unnoticed in the safety management system.⁴⁰⁸

I have directly observed such failings during mine inspections. At one mine in 2012 there were a series of incidents involving contractors where the subsequent investigation repeatedly labelled the remedy as 'retrain the operator.' To his credit the safety manager at the mine recognised that such repeated incidents involved failures more fundamental than an operator-training deficiency. As my visit was part of an audit I am unaware of what remedial measures were subsequently undertaken. Summarising this and other observations the audit observed:

At one of the mines visited there was evidence of problems with regard to the use of subcontractors, including incident reporting and the quality of investigation (and therefore the remedial measures adopted) undertaken by a contractor into incidents (emphasising behavioural failures on the part of individual workers and overlooking more systemic issues underpinning the events including their recurrence). Another issue identified by the inspector during the visit (with another set of subcontractors) highlighted the inconsistency of rules at the mine until a particular problem could be rectified. Establishing and monitoring key performance indicators for contractors regarding safety requires caution because it runs the risk of discouraging the reporting of incidents. At another worksite visited the failure of a subcontractor supplying material to meet health standards in relation to their workers was

⁴⁰⁷ Footnotes removed. *Royal Commission on the Pike River Coal Mine Tragedy* (2012) Volume 2, Wellington, 176-177.

⁴⁰⁸ Footnotes removed. *Royal Commission on the Pike River Coal Mine Tragedy* (2012) Volume 2, Wellington, 175.

jeopardising supply and therefore adversely impacting on the principal. Again these represent ongoing challenges for inspectors.⁴⁰⁹

It is important to note that these problems are not confined to contractors in mines. The Beaconsfield failures primarily arose from management decisions not contractors although the presence of significant use of contractors may increase their likelihood. Leaving the question of contract labour to one side, the failure of at least some mines to use HPI information or incident investigation effectively (or the regulator to use audits to ensure this always happens) is a major concern because, as already indicated, these failures arguably increase the risk of a serious/fatal event.

While the normalisation of risk should not be ignored, especially with regard to management decision making other factors influencing responsiveness to warning signs/HPIs and related indicators of failures. This includes production pressures and reward/bonus scheme incentives including pressures on (both real and perceived) vulnerability of contract labour which been examined elsewhere in this report. Another influence on workers can be financial pressures and job insecurity affecting to report or respond to such indicators which has been identified in a number of mine fatality investigations. For example, a coronial inquest into a fatality at the Renison mine in Tasmania afforded evidence of financial pressures, or the job insecurity associated with this, inducing unsafe practices amongst workers, as well as the compounding effect of cutbacks in the inspectorate. In response to Coroners Jones' query that miners were behaving recklessly a mineworker referred to these pressures and the compounding effect of staff cuts in the mines inspectorate:

Yeh, reckless, right. Not through any kind of ... failings of the people, but the fact that when you are under the pump, mines are going bad, like I have been laid off at about seven mines in – since the early eighties you know. So I understand how ... these situations do arise where there is no cash ... [T]here is no cash to say, okay, stop that heading, leave it let it settle, sign it off ... You have got to get in there and actually mine it ...so hence you cut corners or – you don't mean to cut corners, but that is how it is actually evolves ... because well these days you know we don't have a fully staffed mines department ... Government since the early nineties ... slashed the workforce which overall I can recollect as having a workforce down at Rosny and Launceston of about two hundred and fifty, now there's roughly sixty odd doing virtually triple the workload of the other...⁴¹⁰

Finally, the Pike River mine disaster holds a further lesson here beyond those already referred to. Lamm and Lips-Wiersma's study of the disaster points to a conspicuous failure of the wider notion of governance as portrayed by political scientists - namely as a network of stakeholders extending well beyond the corporation to the wider community. They point to a network of silence amongst a range of parties including the board, the regulator, professional associations, government departments and community and to explain this draw on Thomas Mathiesen's work on systemic

⁴⁰⁹ Quinlan M, (2012) Second Audit of the Mine Safety Unit and Office of Chief Inspector of Mines, Tasmania 2012, 36-37.

⁴¹⁰ Jones, D (2008) *In the Matter of the Coroners Act 1995 and in the Matter of Inquests Touching the Deaths of Jarrod Keith Jones, Mathew David Lister and Sidney Thomas Pearce*, Coroners Court of Tasmania, Burnie.

silencing of stakeholders.⁴¹¹ Such networks can operate within workplaces but are less likely where independent oversight occurs notably through an engaged, proactive and strategically focused inspectorate and a well-developed and union-supported system of worker representation.

Why safety systems repeatedly fail, normalisation of risk and other explanations?

A number of reasons could be proffered as to why safety systems experience major failures while acknowledging that over a long time span the frequency of catastrophic failures has fallen in Australia and most other advanced countries:

- Normalisation of risk
- Corrosion of management safety regimes and oversight/feedback loops
- Production or job insecurity/work arrangement pressures on reporting action
- Gaps in or corrosion of regulatory oversight
- Chance, coincidence or aberrant events

The chance/coincidence explanation, while it might account for a small number of events, is not consistent with the capacity of jurisdictions to reduce workplace fatalities and the number of workplace disasters over time, or with the trends and evidence examined in this report or the wider research literature on OHS and mine safety. If incidents really do result from chance then meaningful risk management would be seriously weakened if not become a meaningless exercise. Again, the record/history of OHS and indeed more generally does not support this explanation.

The other four explanations are not mutually exclusive and evidence supporting all them to some degree has been presented in this report. Some further evidence can be presented, pointing to connections between production pressures and job insecurity and the willingness to report injuries. While this refers to routine types of injuries not the precursors to serious events it is indicative of reporting suppression. In 2013 Probst and Graso published a study in leading safety journal on production pressures and accident reporting based on a sample survey of 212 copper mining workers in south-western USA.⁴¹² The survey measured employee perceptions regarding production pressure, attitudes toward reporting accidents, perceived consequences of reporting accidents, and actual reporting behaviour (like types and numbers of accidents experienced compared to those reported). They found perceived production pressure did affect accident reporting:

As predicted, the average number of experienced accidents per employee was significantly higher ($M = 2.84$) than the number of reported accidents ($M = .49$). In addition, production pressure was related to more negative reporting attitudes. Individuals who had positive reporting attitudes were injured less frequently; however, when an incident occurred, they were more likely to report it. Finally, higher levels of production pressure were related to greater accident under-reporting. Additionally, employees who perceived high levels of

⁴¹¹ Lamm F, & Lips-Wiersma M, (2018) A disaster waiting to happen: Silently silencing stakeholders at the Pike River Coal Mine, *Journal of Industrial Relations*, 60(4):560-583, DOI: 10.1177/0022185618774595.

⁴¹² Probst T, & Graso M, (2013) Pressure to produce = pressure to reduce accident reporting? *Accident Analysis and Prevention*, 59: 580-587, DOI: 10.1016/j.aap.2013.07.020.

production pressure not only experienced more accidents overall, they also reported fewer of them to the organization.⁴¹³

Tahira Probst and colleagues have conducted a number of other studies pointing to a connection between job insecurity and accident reporting not specific to mining.⁴¹⁴ One study examined data on perceived job insecurity, accidents experienced and accidents actually reported from 786 employees in 24 US organizations and 563 employees in 20 Italian organizations in sectors where safety was 'highly relevant.' The study found that job insecurity was related to the likelihood of experiencing an accident and also inhibited reporting of accidents to appropriate company officials and that:

...when job insecurity was low, there was little difference between the total number of experienced accidents and the number that employees reported. However, as job insecurity increased, the under-reporting of accidents increased.⁴¹⁵

The third and final study of Probst et al to be discussed, examined how the combination of contingent work (like temporary employees, seasonal employees, leased workers and fixed-term employees) and job insecurity affected safety-related behaviour (ie not just reporting) using survey data from a sample of 1228 employees from a variety of different private and public organizations in Italy to test competing vulnerability and immunity hypotheses.

Our results generally supported the vulnerability hypothesis, suggesting that contingent work coupled with job insecurity significantly increase employee risk for poor safety-related outcomes. Specifically, under conditions of job insecurity, contingent workers displayed more adverse safety-related outcomes (e.g., worse safety compliance, safety knowledge, and safety participation) compared to permanent workers. However, the accuracy of their accident reporting was increased under conditions of job insecurity, compared to permanent employees.⁴¹⁶

These findings, as they incorporated a range of safety-behaviours, reinforce evidence that insecurity and precarious work arrangements like labour hire are likely to affect safety behaviour in ways that could compromise overall OHS.

Learning and remedies to low frequency high impact risks

One major effort to reduce risk of fatalities/disasters falls under the rubric of building high reliability organisation (HRO). There is an expansive literature on this beyond the scope of the present review which will focus rather on its applicability to coalmining. The importance and value approach as opposed focusing on human behaviour was highlighted by a review of the Queensland mines inspectorate undertaken in 2005. The author's cited research by Weick et al (1999) highlighting

⁴¹³ Probst T, & Graso M, (2013) Pressure to produce = pressure to reduce accident reporting? *Accident Analysis and Prevention*, 59: 580.

⁴¹⁴ Probst T, Barbaranelli C, & Petitta L, (2013) The relationship between job insecurity and accident under-reporting: A test in two countries, *Work & Stress*, 27(4):383-402, DOI: 10.1080/02678373.2013.850756

⁴¹⁵ Probst T, Barbaranelli C, & Petitta L, (2013) The relationship between job insecurity and accident under-reporting: A test in two countries, *Work & Stress*, 27(4):383.

⁴¹⁶ Probst T, Petitta L, Barbaranelli C, & Lavaysse L, (2018) Moderating effects of contingent work on the relationship between job insecurity and employee safety, *Safety Science*, 106:285–293.

dangers were not confined to incidents like the 1992 Westray mine explosion (26 killed) where ‘production routines kept “rolling” while monitoring of methane buildups, spilled fuel, and enforcement of limestone dusting to neutralise coal dust, were done only sporadically.’ Rather, otherwise efficient organisations conducting regular reviews also experienced errors because people were rushed, distracted, careless, or ignorant; or because reviews/reporting became routinised (normalised?) and were re-enacted including repeating safe work practices without due consideration to changing circumstances or cumulative assessment to identify trends. Drawing on the wider HRO literature they point to key learning’s identified by Weick et al (1999, 89) namely:

- A preoccupation with failure, recognising that failures, no matter how minor, provide the opportunity to learn about potential disasters. Mindful organisations see ‘the reality of danger in a near miss’ (Weick, et al 1999: 93).
- Reluctance to simplify interpretations, ie using complex systems to manage a complex environment and by encouraging diverse views and approaches to operations.
- Sensitivity to operations, ie ensuring that someone in the organisation has a clear understanding of the “big picture” of operations at all times.
- Commitment to resilience, ie a commitment to ensuring that the organisation can cope with unexpected dangers through sufficient resourcing and skills.
- Deference to expertise, ie they do not rely on hierarchical structures, particularly in problem solving, when experience and expertise become more important than rank in the management hierarchy.

Mindful organisations give their employees the skills, authority and resources to change their environment, not simply wear protective gear and follow procedures. Indeed, making people feel that breaches of systems or procedures are bad and that they will be sanctioned for such breaches is very counter-productive. HROs encourage people to report everything. In any case, routines and structures in HROs are not static—they change constantly in response to changes in the operating environment. Research on HROs also suggests that action on hazards, rather than on people, is a key.⁴¹⁷

Several observations can be made with regard to the foregoing. First, reinforcing the above points on ‘routinisation’ and a focus on behaviour the report goes onto deal with the limitations of OHS performance indicators (KPIs) like LTIFRs in some detail – problems particularly with regard to low frequency high impact events already canvassed in this report.⁴¹⁸ Despite this, the 2005 inspectorate review found the Queensland mining industry remained strongly wedded to outcome measures like LTIFR. The admittedly small number of recent annual reports of mining corporations that I read in the course of preparing this report indicated these practices/predilections have not changed. More to the point perhaps, the limitations of lost time injuries and LTIFRs were extensively canvassed in the Brady-Heywood Review of in Queensland which reported in December 2019. The Review was

⁴¹⁷ ACIL Tasman, New Horizon Consulting & Shaw Idea, (2005) *Final Report on the Queensland Mines Inspectorate Review*, 16-17.

⁴¹⁸ ACIL Tasman, New Horizon Consulting & Shaw Idea, (2005) *Final Report on the Queensland Mines Inspectorate Review*, 36-40.

explicitly commission in response to concerns over the number of mine fatalities and its findings were stark:

LTIAs as a safety indicator are problematic. LTIs are prone to manipulation, are a measure of how the industry manages injuries after they have occurred, as opposed to a measure of industry safety. It is possible, therefore, to reduce the LTIFR without making the industry safer. Further, an analysis of the fatalities shows that many of the causal factors would not have caused injuries prior to the fatality. Therefore, they would not be recorded as LTIs, with them remaining unidentified as issues. At best the LTI Frequency Rate is a distraction that focuses industry on the wrong safety measure, at worst it results in early warning signs being missed.⁴¹⁹

The Review's recommendations with regard to KPIs was unequivocal namely that the industry should shift from lost time injury and LTIFRs. Consistent with this and the need to both better measure and better focus on low frequency high impact events, the Review also recommended that the regulatory should adopt the Serious Accident Frequency Rate as a measure of safety in the industry. As is already evident, the Brady-Heywood Review was not making a revelatory statement but rather confirming – with some force as it drew on interviews with those in the Queensland coalmining industry – knowledge that has been widespread in OHS circles for over a decade and indeed would be treated as accepted wisdom in presentations to OHS professionals in Australia (as was my experience when I delivered a number of keynotes to conferences run by the Australian Institute of Health and Safety in 2019).⁴²⁰ Whether a learning here is that legislative 'steer' is needed to initiate a change is a moot point.

Second, reference to the importance of focusing on failure as a learning and adaptation tool in minimising risk has also been identified as a key learning elsewhere in this report. More than many other industries perhaps, the mining and especially coalmining industry are aware of the potentially catastrophic consequences of failure. The Beaconsfield goldmine fatality in 2006 affords an example. Following the incident the regulator imposed a number of conditions on the mine to resume (requiring a safety case regime for how mining would occur safely – which it did) and associated regulatory learning was also introduced relating to management systems, worker involvement and specific requirements relating to reporting and management of known mining hazards. The incident and subsequent audits led to a more thorough overhaul on mine safety legislation (still underway) drawing on best practice legislation in NSW, Queensland and New Zealand. Inspection practices were also altered for Tasmania's only coalmine, including visits by experienced mine inspectors from (or ex-inspectors) and ISHRs from NSW which the Tasmanian inspectorate found helpful as it had no specialist coalmine inspector. Other lesser known learning occurred. The Beaconsfield goldmine embraced the new regulatory context but also introduced a number of innovative measures of its own which enabled the mine to operate efficiently and safely until 2012 (high gold prices have led to plans to re-open and mine those levels deemed uneconomic in 2012). To their credit the mine management published a number of papers on the innovations

⁴¹⁹ Brady, S. (2019) *Review of all fatal accidents in Queensland mines and quarries from 2000 to 2019*, Report prepared for the Department of Natural Resources, Mines and Energy, Brisbane, iv.

⁴²⁰ See for example Quinlan, M. (2019) Avoiding Back to the Future: Learning from past failures to build healthier and more sustainable work organisation Australian Institute of Health and Safety, Perth Safety Symposium 4 October.

and learning so they would become more widely known to the industry.⁴²¹ Another unreported learning occurred with regard to unplanned falls of ground (the cause of the fatality) and ground support. The use of 2.3m friction bolts shown to ineffective in high strain areas was not confined to Beaconsfield and the mines inspectorate subsequently undertook inspections of roof-bolting in other mines as well as presenting the results to meetings with the industry (which are held on a regular basis). Some mines changed their practices but where persuasion failed the inspectorate suspended operations at several points in mines where it believed the use of 2.3m friction bolts was unsafe until a risk assessment had been undertaken – resulting in a change in roof support.⁴²² The inspectorate presented statistics on unplanned falls of ground following these interventions which indicated a significant and unambiguous decline in incidents. Overall, both the industry and the unions (CFMEU and AWU) were strongly supportive of the new regulatory framework, seeing it as vital to the sustainability of mining in Tasmania into the future. Both strong lobbied to ensure the mine inspectorate was adequately staffed and vigorously and successfully opposed a government proposal to reduce the salary of the senior mines inspector who played an instrumental role in implementing some of the improvements just mentioned and who had developed an excellent working relationship with both employers and unions.

The post-Beaconsfield experience of learning from failure reinforces a number of themes identified elsewhere in this report, including the value of regulatory steer and proactive enforcement while also encouraging industry engagement and innovation and recognising the value of worker involvement. Equally important was not viewing the incident in isolation but as potential evidence of systemic failings. This learning applies equally to coalmining and the issue of methane. Without entering into the terrain of the causes of the event the Board is investigating the Beaconsfield saga underlines the value of knowing that if the methane problem experienced at the Grosvenor mine was not a one-off but occurred over a period of time whether other Queensland mines have or are experiencing a series of methane incidents raising issues about its management.

There is also some indicative evidence of a growing awareness of the value of learning from past failures. Reason developed the concept of latent failures, critical flaws in safety regimes but ones that do not have immediate effect, they may there for years before a combination piercing all layers of defence aligns and the disaster unfolds.⁴²³ Reason's notion of latent failure has informed much thinking and practice in relation to preventing serious/catastrophic events. There has been some criticism of the lack of specificity as to what were the most common or critical latent failures or what

⁴²¹ See for example Hills P, (2012) Managing seismicity at the Tasmania Mine, *Mining Technology*, 121(4): 204-217; Penney A, & Hills P (2013) Development of seismic heading re-entry and exclusion zones at the Tasmania Mine, 447-459 and Hills P, Reboli D, & Lynch R, (2013) Micro-seismic Monitoring at the Tasmania Mine, Beaconsfield, Tasmania, 483-492 in A. Malovichko & D. Malovichko (eds.) *8th International Symposium on Rockbursts and Seismicity in Mines*; Cummins-Potvin D & Hills P (2014) Use of a pre-existing seismic monitoring system to detect trapped miners (with reflections on Beaconsfield 2006), AUSIMM 12th Underground Operators Conference Adelaide, 24-26 October.

⁴²² While undertaking an audit of the mines inspectorate I witnessed an exchange while underground at one mine. The inspector asked an engineer undergoing training/experience operating a jumbo as part of a team installing 2.3m roof bolts. Asked by the inspector what as a jumbo operator was the best thing about 2.3m bolts he replied they were easy to stall. Then asked what as an engineer was their disadvantage - he replied 'they don't work' or similar words to this effect. While the reply was perhaps an overstatement this entirely unscripted exchange was revealing.

⁴²³ Reason J, (2008) *The Human Contribution: Unsafe Acts, Accidents and Heroic Recoveries*, Ashgate, Farnham Surrey.

were those that most commonly associated with disasters again and again over time. In work I did for the Department of Labour in the Pike River Inquiry I sought to identify the types of latent failures that most regularly caused mine fatalities and disasters I first explored this and developed it further for the book, *Ten Pathways to Death and Disaster: Learning from fatal incidents in mines and other high hazard workplaces*. This book entailed a detailed examination of 24 fatal incidents in coal metalliferous mines in five countries (Australia, New Zealand, USA, UK and Canada) between 1990 and 2011. Of these 15 involved three or more deaths (more than two deaths in a mine incident are commonly labelled a disaster but this is social convention not a technical definition/trigger point) and involved nine single fatalities. The book identified 10 repeat or pattern causes, namely:

- Design, engineering and maintenance flaws
- Failure to heed clear warning signals
- Flaws in risk assessment
- Flaws in management systems and changes to work organisation
- Flaws in system auditing
- Economic/production and rewards pressures compromising safety
- Failures in regulatory oversight
- Supervisor and worker expressed concerns prior to the incident
- Poor management/worker communication/trust
- Flaws in emergency procedures and resources

The examination found at least three present in virtually all incidents while majority had five or more – some had all 10. This count was conservative, relying on official investigations the quality and detail of which varied (areas most commonly omitted from investigations were there supervisor, worker, consultant etc. concerns expressed prior to the incident; failures in regulatory oversight; economic/production pressures; and worker/management communication and trust). The more thorough the investigation the greater was the number of pattern causes evident (like Pike River where the Royal Commission was especially thorough). Subsequent examination of further events typically yielded a minimum of 7 to 8 pattern causes (eg Ravensworth).

Since publishing *Ten Pathways* I have regularly spoken on this subject at mining industry conferences (with another scheduled for the October 2020 Minerals Council conference in New Zealand) and the Australasian Institute of Mining and Metallurgy organised about a dozen talks to local bodies in every state earlier this year. Only three could be completed before the COVID-19 pandemic shut things down (Singleton, Orange and Townsville⁴²⁴) but at all these I found the mine managers, safety officers, engineers, geologists and others who attended keenly interested in the subject and what could be learned from failure, asking questions and making perceptive observations. My book and others dealing with what can be learned from disastrous failures (especially the numerous books by Andrew Hopkins) have been used and read by regulators, managers and unions keen to improve safety. However, as far as I am aware training modules devoted to learning from failure do not form a standard part of industry training. One exception to this was in NSW where the regulator/Department developed an industry training package specifically devoted to learning from

⁴²⁴ Quinlan, M. (2020) Learning from failure: 10 Pathways to Death and Disaster AusIMM Distinguished Lecture 17th March, Townsville.

disasters.⁴²⁵ I am unaware of how extensive use of this training module has been. Learning from failure is a logical corollary of Einstein's definition of intelligence as the ability to change and his definition of insanity as doing the same thing over and over again and expecting a different result. It is not a magic bullet. Care needs to be taken the examples given are accurate, not over-simplified, training doesn't become routinised and active engagement is encouraged. Nonetheless, important lessons have been learned from past failures (the reforms to Queensland and NSW mine safety legislation in the late 1990s and more adept use of warning signals and scenario planning being but some examples). A key learning is that this needs to be extended and systematically incorporated into industry training and practices, as well as regulatory oversight. Managers, inspectors and SSHRs/ISHRs should all have exposure to disasters and the mindful-knowledge necessary to identify why seemingly comprehensive regimes fail to prevent fatal incidents and the prior warning signals that should prompt intervention before the fatality/disaster occurs.

This is but one example of the potential to learn from failure or failure as a learning tool. Other research has addressed the issue of why causes and their remedies repeatedly identified in mining incident investigations are not implemented. In 2020 a Canadian research team published the results of a five country study covering 50 years on this point whose summary methods and findings were:

A systematic analysis was conducted using ten occupational health and safety commissioned reports from Canada, New Zealand, United States, United Kingdom, and Australia spanning from 1967 to 2015. The objective was to identify commonalities and differences in the key recommendations across the identified reports. The text-mining software Leximancer was utilized to analyze the content of the recommendations through the semantic extraction of dominant themes, and the relational extraction and mapping of thematic relationships against each other. The identified themes were then analyzed within the concept map to fully understand the relationships. Based on the concept map, the thematic analysis provided a longitudinal perspective of the recommendations, identifying six key themes and 49 sets of overlapping recommendations. Key themes included: health and safety hazards ($n = 10$), legislation, regulations and organizational structure ($n = 13$), emergency management and mine rescue ($n = 9$), training, education and competence ($n = 10$), technology ($n = 4$), and research ($n = 3$). The results of this analysis illustrate that the same hazards continue to be identified across reports and recommendations, regardless of time or country of origin. This indicates that the communication of recommendations and/or the strategies developed in response to the recommendations need to be further addressed.⁴²⁶

This study highlighted some of difficulties in ensuring the findings of investigations, some very detailed and expensive exercises, were not implemented. It should be added there are conspicuous exceptions which led to pivotal changes, the inquiry into the 1994 Moura mine disaster and Pike River Royal Commission being two examples. Both these investigations didn't look at the incident in isolation but were informed by knowledge of previous events. There is probably an important learning here.

⁴²⁵ *Learning from Disasters: Facilitators Guides* (2018 draft), NSW Department of Planning and Environment, NSW Resources Regulator.

⁴²⁶ Tetzlaff E, Eger T, Pegoraro A, Dorman S, & Pakalnis V, (2020) Analysis of Recommendations from Mining Incident Investigative Reports: A 50-Year Review, *Safety*, 6(3):1-14, doi:10.3390/safety6010003.

Findings/learning

Corporate governance and risk management

The last 20 years have witnessed a significant growth of the notion of governance and risk management and the mining industry is no exception in this regard with the Annual Report perusing making explicit reference to both including the board's oversight role. At the same time this section identified a number of critical issues in this regard, notably:

1. Corporate structures and strategies do not always seem to align with stated objectives of achieving zero harm. The example was given of Hopkin's study of BP's disastrous decentralisation strategy. Whether mining companies have embraced similar strategies is unclear but if so warrants attention. What is clear is that the reporting of ambitious product targets in Annual Reports do not, at least not the ones I read, explain how this will be done without compromising safety. The safety sections of the reports are generally short (relative to those on financial risks) and the performance indicators apart from the number of fatalities along with measures like LITFR and MTIFR more suited to routine injuries than as indicators of low frequency high impact events. These limitations are well-known/longstanding and reiterated in the Brady-Heywood Report but as far as I am aware have not resulted in changes to corporate reporting, especially detailed analysis of incidents and HPIs (both trends and breakdowns) which are recognised as more effective tools in addressing low frequency high impact events. Some large companies like Rio Tinto are targeting the sources of death with a strong preference for engineering out hazards⁴²⁷, a commendable approach that other companies may be doing but is not evident in their annual reports where it should form part of the Board's evidence it is fulfilling its role. Another indication of this problem is the increasing focus on behaviour and individualised safety programs and communication/participation which both this and an earlier section of this report suggested are not the most effective way of dealing with major hazards and weaken representative participation structure that evidence suggests are more effective.⁴²⁸
2. Related to the last point, this section of the report pointed to areas of board/corporate decision-making where it is unclear whether careful risk oversight of the OHS consequences have been considered and adequate remedial/accommodating steps taken including production, bonus/reward schemes, the use and management of contractors and moving managers between mines on a regular basis (at least without a prolonged changeover/transition process). Pike River demonstrated a complete failure of governance

⁴²⁷ This included changes to ladders and hatch covers on barges and the feeding of rail tanker wagons. These changes may have included those referred to in the following statement. 'We are committed to the safety, health and wellbeing of our employees and contractors. We face a diverse range of risks across multiple geographies in our global sales and marketing, procurement and activities. Our primary focus has been implementing Group standards and critical-risk management fatality prevention programmes across our areas of greatest exposure, primarily marine and logistics, and procurement. We have also worked closely with our suppliers and contractors to embed safety into the equipment we procure and our approach to contractor management. In 2019, we had zero fatalities and a 0.04 all-injury frequency rate. In 2020, we intend to build on this and share our focus on safety, health and wellbeing through our daily interactions with our customers and suppliers.' *Rio Tinto Annual Report 2019 Strategic*, 58.

⁴²⁸ There is a wider research literature pointing to the superiority of representative models of participation over other models like direct participation. See for example, Walters D, & Nichols T. (2007) *Worker Representation and Workplace Health and Safety*, Palgrave Macmillan, Basingstoke.

in any meaningful sense. While an extreme case the warning signal it sent shouldn't be ignored or it will be just a matter of time before another catastrophic event will occur in large part due to poor corporate oversight. One question here is whether boards should include someone with specific expertise in OHS to ensure the risk/audit activities are carried out effectively and alert other board members to the issues to be considered when making decisions?

3. A key learning for regulators is that more attention needs to be given to this level of decision-making when it comes to OHS compliance. If something goes wrong in practice if not in law responsibility seldom comes back to the board which at its worst would amount to authority without corresponding responsibility. This stands in stark contrast to others, especially families of workers who are seriously harmed or killed, their friends and the communities they live. Research (including a global survey of family members) sheds stark light on the immense and long term impacts of traumatic fatalities in terms of post-traumatic stress, depression, grief, broken social networks, financial costs and even intergenerational effects on children.⁴²⁹ Seriously disabling injuries can also have profound effects although this is less-researched. There is also evidence of what families want and expect from coronial inquests, investigations and prosecutions following such incidents. This includes effective prevention measures so the type of incident causing the death will not be repeated (some evidence of learning from failure) and no other family will have to experience the same tragedy.⁴³⁰

The Importance of Warning signals, High Potential Incident (HPI) monitoring and response

Very few fatal incidents and disasters occur without clear warning signals – not wondrous hindsight – but something a reasonably cautious and knowledgeable management should have recognised and responded to. The report identified a number of reasons why workers, supervisors and others might not report or respond to such information. Some of these reasons are not mutually exclusive including production pressures, job insecurity and normalisation. More importantly perhaps, taken as a whole, this report suggests some learning/key ways of addressing this problem notably:

- Management structures and OHS regimes that genuinely encourage incident reporting, even seemingly trivial ones that may have significant consequences and give considerable attention to recording and as importantly analysing and responding to HPIs
- Rigorous auditing of HPI reporting and ensuring these are being analysed by companies along with some analysis of industry and company trends by the inspectorate/regulator
- A strong safety representative system covering all mines and one where problems like those posed by contract labour have been addressed.

Learning from failure and remedies to low frequency high impact risks

⁴²⁹ See for example, Matthews LR, Quinlan MG and Bohle P (2019) Posttraumatic Stress Disorder, Depression, and Prolonged Grief Disorder in Families Bereaved by a Traumatic Workplace Death: The Need for Satisfactory Information and Support. *Frontiers of Psychiatry* 10:609. doi: 10.3389/fpsyg.2019.00609

⁴³⁰ Ngo, M. Matthews, L. Quinlan, M. & Bohle, P. (2019): Information needs of bereaved families following fatal work incidents, *Death Studies*, DOI: 10.1080/07481187.2019.1586792; Matthews, L. Quinlan, M. Rawling-Way, O. and Bohle, P. (2019) Work Fatalities, Bereaved Families and the Enforcement of OHS Legislation, *Journal of Industrial Relations*, 61(5): 637-56

The problem with serious incidents is in the main not a lack of knowledge of what causes them (indeed learning here is longstanding although some important strides have been made in the past two decades), or even some of the measures that can be taken to prevent them (again a number of major successes can be identified). In many respects, indeed the Australian mining industry, and perhaps especially coalmining in Queensland and NSW, represent global exemplars in how to manage inherently hazardous environments safely and other countries and industries could learn from this. Nonetheless, as an examination of recent fatalities and other evidence presented in this report suggest miners continue to die due to a combination of the same latent failures that killed miners at Pike River, Westray and earlier incidents. Namely design, engineering and maintenance flaws; failure to heed clear warning signals; flaws in risk assessment; flaws in management systems and changes to work organisation; flaws in system auditing; economic/production and rewards pressures compromising safety; failures in regulatory oversight; supervisor and worker expressed concerns prior to the incident; poor management/worker communication/trust; and flaws in emergency procedures and resources.

This report suggests the problem is that some accountabilities are yet to be effectively implemented to ensure this learning is applied more comprehensively, and more especially to ensure that the types of failure that have repeatedly been associated with fatalities and disasters are addressed. It is also critical that education in the lessons from failure become a central part of industry training at all levels as well as informing safety systems, regulator activities/inspections, union safety training and the like. This would help to build on the important lessons already learned from the past (like those following the three disasters in the town of Moura) and also help ensure some worrying evidence of corrosion is arrested.

Brief Statement of Background and Expertise

I have been involved in research and teaching occupational health and safety (OHS) for over 40 years, holding full-time positions at Griffith University (1981-1994) and the University of New South Wales (1994-2018). I taught undergraduate and masters' level subjects in OHS as well as a masters' level subject in global organisational risk and published a widely used OHS text (1991, 2000 and 2010 editions). Following my retirement I was appointed an emeritus professor at UNSW, remaining a member of the Industrial Relations Research Centre at UNSW as well as retaining contacts with the School of Management. The main focus of my research was on the impact of changing work arrangements (including contact labour/subcontracting and downsizing/restructuring) on OHS, OHS management and regulation, and the causes of fatal incidents/disasters in mining and other industries as well as the impact of traumatic death on families. I have prepared reports for both unions and companies on OHS, am a director of two bipartite bodies (Mates in Construction NSW and TEACHO) and have given many presentations/key-notes to industry and professional conferences and seminars/workshops, most over the last five years relating to mining and the ten-pathways model. I have authored/co-authored a number of reports/investigations for state and federal governments on OHS (both industry specific like long haul trucking and mining as well as those of a more general characters like the 2008 ComCare Review) as well as New Zealand, the European Commission, the European Agency of Occupational Safety and Health, the World Health Organisation and a working paper for the International Labour Organisation. With regard to mining I was one of three expert members of the NSW Mine Safety Review chaired by Neville Wran and Jan Mclelland in 2004-05 and an OHS expert appointed to the Independent Inquiry into the Anzac Day 2006 fatality at the Beaconsfield Gold Mine. Subsequent to the latter I was engaged to audit the Tasmanian Mines inspectorate in 2010, 2012 and 2014 (a recommendation of the Coronial Inquest into the death of Larry Knight). In 2010-2011 I was appointed by the New Zealand Department of Labour to prepare three reports on mine safety and regulation as part of its response to the Pike River mine disaster and the Pike River Royal Commission. I was subsequently engaged as a member of the Expert Reference Group established to oversee the development of new mine safety legislation following the handing down of Pike River Royal Commission findings/recommendations. Following the introduction of the legislation I was appointed (and remain) an expert member of the New Zealand Extractive Industries Advisory Group, a tripartite body advising Worksafe New Zealand and the New Zealand Government on health, safety and regulation in mines, tunnels and quarries.