

Queensland Mine Safety Framework

Decision Regulatory Impact Statement

March 2018

Executive summary

Consultation RIS (2013 - 2015)

A Consultation RIS titled *Queensland's Mining Safety Framework Consultation Regulatory Impact Statement* was released in September 2013. It proposed four options to improve the state's mining safety and health laws, and analysed a range of proposals to further improve mine safety and health standards, whilst developing greater consistency with other jurisdictions.

Feedback expressed in over 240 submissions was diverse and generally followed industrial lines on a number of issues such as certificates of competency for a range of safety critical positions, the powers of industry safety and health representatives and fitness for work regulations. Whilst the mining industry was extremely supportive of addressing potential industrial matters, concerns were raised about many other proposals aimed at improving safety and health. Unions and their members were concerned that some proposals could potentially diminish protection in the safety and health sphere. Mine workers were generally supportive of proposals where they believed there was no reduction in safeguards at a mine.

The Consultation RIS process did not achieve tripartite consensus on many proposals, although there was general support for Option 1 of the four options presented. This option was to

Retain Queensland's two mine safety and health Acts - Coal Mining Safety and Health Act 1999 (CMSHA) and Mining and Quarrying Safety and Health Act 1999 (MQSHA) - for the coal and metalliferous sectors, plus amendments based on provisions from the Model Act and core or non-core NMSF that improve safety and health and consistency.

Subsequently consultation with union and industry representatives occurred to encourage a degree of tripartite agreement to progress key initiatives through a Bill.

Further consultation (2015 – present)

Subsequent targeted consultation from late 2015 encouraged broader consensus or compromise to respond to significant safety and health concerns. Meetings were held from late 2015 to mid-2016 with industry representatives to explain and discuss the details of the proposals. This consultation was particularly focused on the competency of ventilation officers at underground coal mines and explosion barriers. Opposition from industry to these initiatives reduced over time from late 2015, with safety concerns about the need for sound competency of ventilation officers at underground coal mines starting to be acknowledged by industry representatives during ongoing consultation. For example, the Queensland Resources Council (the QRC), in its response to the Consultation RIS did not support the introduction of a certificate of competency for ventilation officers, stating that the cost will not be offset by the safety gains. Subsequently, in its submission to the Infrastructure, Planning and Natural Resources Committee in September 2017 in relation the *Mines Legislation (Resources Safety) Bill 2017*, the QRC supported a certificate of competency for ventilation officers at underground coal mines.

Concerns that mandating explosion barriers would stifle new product innovations were addressed with assurances that the regulation would be similar to the New South Wales approach to explosion barriers, and that the requirement would still enable new innovative products that have been proven to be equally as effective as stone dust barriers.

In early 2017, a tripartite working group of union and industry representatives was established to review the proposals in the Consultation RIS and to encourage broader support. The tripartite

representatives on this working group consulted more broadly with their industry or union colleagues about the proposals before providing in-principle support. The ongoing tripartite consultation where possible, addressed stakeholder concerns and assisted in refining the details of the reforms. The proposals that gained in-principle support through this process and required legislative amendment have been included in the *Mines Legislation (Resources Safety) Amendment Bill 2018*. Those proposals that are not included in the Bill will be the subject of a subsequent (part two) Decision RIS.

The *Mines Legislation (Resources Safety) Amendment Bill 2018* and this part one Decision RIS contain the following priority proposals from the Consultation RIS:

- introduction of a certificate of competency requirement for ventilation officers in underground coal mines;
- improved contractor management;
- requiring small opal and gem mines (with 5 to 10 workers) to have a safety and health management system;
- proactive safety and health obligations for officers of corporations;
- higher maximum financial penalties for breaches safety and health obligations;
- notification requirements for designers, manufacturers, importers and suppliers;
- greater proactive release of safety information following incidents; and
- a simplified process for inspectors to enter any workplace where activities at that workplace that may affect safety and health at a mine.

In addition the following initiative was supported and requires regulation amendment to be implemented, i.e. is not included in the Bill:

- installation of explosion barriers in underground coal mines.

Stakeholder feedback during the 2017 Parliamentary Committee process and consultation with the Coal Mining Safety and Health Advisory Committee in December 2017 contributed to the minor revisions included in the re-introduced *Mines Legislation (Resources Safety) Amendment Bill 2018*.

Further targeted stakeholder engagement was carried out in early 2018 on the proposal to remove the exemption for the requirement for opal and gem miners to have a safety and health management system.

Summary of cost impacts of these proposals

Attachment 1 to this Decision RIS presents the total estimated equivalent annual costs for the above proposals delivered under Option 1, based on a present value of costs over a 10 year period¹ of \$2.1 million per year. Of this, explosion barrier requirements represent approximately \$2.0 million per year (as an equivalent annual value) for the total underground coal mining industry in Queensland, and the cost associated with the new statutory positions (which will be performed by existing staff with new certifications) is \$38,377 (as an equivalent annual value). Transitional costs for training inspectors and those in responsible safety critical positions at mines are estimated to be \$118,000.

¹ Present value is the total value of the future benefit stream (ten years) in present day terms - this allows costs and benefits to be compared at the point where decisions are made. This can also be presented as an 'equivalent annual value'.

The annualised estimated savings/safety and health benefit from these initiatives is calculated in Attachment 1 to be approximately \$5.1 million per year, generating an equivalent annual value of approximately \$3.0 million per year.

Introduction

The safety and health of workers in Queensland's mining sector is regulated under the *Coal Mining Safety and Health Act 1999* (CMSHA) and the *Mining and Quarrying Safety and Health Act 1999* (MQSHA). These Acts establish mining sector specific safety and health obligations which are distinct from general workplace obligations under the *Work Health and Safety Act 2011* (WHS Act).

To ensure this legislation remains contemporary and addresses the safety and health of workers effectively, analysis of a range of amendments were tested through a Consultation Regulatory Impact Statement process. The results of this extensive consultation process has led to the development of this 'part one' Decision Regulatory Impact Statement (RIS). It presents the results of consultation and analysis of the impacts on the mining sector in Queensland of nine proposals in the Consultation RIS.

Release of Consultation RIS

A Consultation Regulatory Impact Statement (Consultation RIS) was released on 11 September 2013 and followed earlier consultation with stakeholders through the 2012 National Mine Safety Framework (NMSF) Discussion Paper. The Discussion Paper provided Queensland's proposal for a nationally consistent mining safety and health legislative framework.

The Consultation RIS provided four options, as set out below, with Option 1 being recommended:

- Option 1** Retain Queensland's two mine safety and health Acts - *Coal Mining Safety and Health Act 1999* (CMSHA) and *Mining and Quarrying Safety and Health Act 1999* (MQSHA) - for the coal and metalliferous sectors, plus amendments based on provisions from the Model Work Health and Safety Act (the Model Act) and core or non-core NMSF that improve safety and health and consistency.
- Option 2** Build a new single Act by combining Queensland's two mine safety and health Acts into one piece of legislation covering both coal and metalliferous sectors, plus amendments based on provisions from the Model Act, core or non-core NMSF that improve safety and health and consistency.
- Option 3** Develop mine safety legislation primarily based on the Model Act, and core or non-core NMSF provisions that improve safety and health and consistency.
- Option 4** Do nothing/maintain status quo. Retain Queensland's two mine safety and health Acts, excluding amendments based on provisions from the Model Act and core or non-core NMSF that improve safety and health and consistency.

Current legislative framework

The current Queensland mine safety legislation (CMSHA and MQSHA) resulted from protracted policy development work carried out by the mining industry, the mining unions and the mines inspectorate following four major mining disasters between 1972 and 1994 resulting in the loss of 53 lives.

Through the ongoing consultation processes between 2010 and 2013 there was strong stakeholder support for the retention of the current Queensland mine safety legislation because it was developed using Queensland mining experience and expertise for the Queensland mining industry, and it had contributed to a strong safety and health performance overall, since 2001.

Consultation

The Consultation RIS was open to public comment from 11 September 2013 until 11 November 2013.

There were presentations about the proposals for amendment to the mine safety legislation at meetings held at Emerald, Moranbah, Dysart, Mackay, Rockhampton, Blackwater, Moura, Mount Isa, Townsville, Brisbane, Mareeba and Toowoomba.

There were 246 submissions received. The submissions are categorised as follows:

- mine operators and their representatives: 22 submissions
- statutory officials and their representatives: 9 submissions
- inspectors and government employees: 30 submissions
- employee representative bodies and union officials: 17 submissions
- mine workers: 148 submissions
- peak bodies, special interest groups and professional services: 20 submissions.

The Decision Regulatory Impact Statement – how this document works

This Decision Regulatory Impact Statement (Decision RIS) contains an updated analysis of the potential impacts on stakeholders of those proposals presented in the Consultation RIS and contained in the *Mines Legislation (Resources Safety) Amendment Bill 2018* and in the proposed Coal Mining Safety and Health (Explosion Barriers) Amendment Regulation 2018.

A copy of the Consultation RIS is available on the [Queensland Government website](#). Cross references to the Consultation RIS are made in this Decision RIS where relevant.

An updated cost analysis (refer Attachment 1) has been included in this Decision RIS as a result of (a) the time elapsed from the release of the Consultation RIS in 2013; and (b) only 9 of the proposals in the Consultation RIS are progressing in the Mines Legislation (Resources Safety) Amendment Bill 2018 or through an amendment to the Coal Mining Safety and Health Regulation 2018.

The nine proposals included in this part one Decision RIS are:

- introduction of a certificate of competency requirement for ventilation officers in underground coal mines;
- improved contractor management;
- requiring small opal and gem mines (with 5 to 10 workers) to have a safety and health management system;
- proactive safety and health obligations for officers of corporations;
- higher maximum financial penalties for breaches safety and health obligations;
- notification requirements for designers, manufacturers, importers and suppliers;
- greater proactive release of safety information following incidents;
- a simplified process for inspectors to enter any workplace where activities at that workplace may affect safety and health at a mine; and
- improved stone dusting risk management at underground coal mines through the requirement for explosion barriers – to be delivered through regulation amendment.

A decision on the remaining proposals in the Consultation RIS will be concluded at a later date.

Responses and Recommendations

This section presents a summary of each proposal, the results of consultation and recommendations based on the outcomes of consultation. Note, of the original proposals in the Consultation RIS, nine are presented in this Decision RIS. The remaining 14 initiatives included in the Consultation RIS could be progressed with another suite of initiatives through a Bill at a later time. At that time, the continued relevance of these initiatives and the feedback received on them in the original Consultation RIS will be assessed in light of the time that has elapsed and other priority amendments. If they are progressed, a 'part two' Decision RIS will be developed.

The nine proposals analysed here are:

1. introduction of a certificate of competency requirement for ventilation officers in underground coal mines;
2. improved contractor management;
3. safety and health management systems required for small opal and gem mines (with 5 to 10 workers);
4. proactive safety and health obligations for officers of corporations;
5. higher maximum financial penalties for breaches safety and health obligations;
6. notification requirements for manufacturers and suppliers to inform the mines inspectorate in the event of a hazardous aspect or defect in equipment or material supplied;
7. greater proactive release of safety information following incidents and protection from reprisal provisions;
8. a simplified process for inspectors to enter any workplace where activities at that workplace may affect safety and health at a mine; and
9. improved stone dusting and use of explosion barriers.

Remaining initiatives in the Consultation RIS that would be included in a 'part two' Decision RIS, if required:

10. Other safety critical positions requiring a certificate of competency
11. Improved risk management planning for high risk activities
12. Rights to appeal through the court system (identified options are subject to further consultation)
13. Additional possible court orders following a prosecution
14. Longer limitation period for prosecutions
15. Obligations of designers, constructors, erectors and demolishers
16. Clarifying the directive to suspend operations given by industry safety representatives for an unacceptable level of risk
17. Streamlining the election process for site safety and health representatives
18. Fitness for work (coal mines)
19. Issues related to mine plans for abandoned mines
20. Removing the requirement for coal mines to submit mine plans at the end of each calendar year
21. Refocusing the Coal Mine Workers' Health Scheme
22. Increasing the number of industry safety and health representatives (coal mines)
23. Implementing Ombudsman recommendations about a confidential complaints system.

1. Introduction of a certificate of competency for ventilation officers in underground coal mines (pages 47 – 80; cost analysis pages 9 – 18 Consultation RIS) (Clauses 17, 47 and 96 of ML(RS)A Bill)

The Consultation RIS noted the proposal to introduce a range of additional certificates of competency for statutory position for mines. The QRC, Rio Tinto Coal Australia, BHP Billiton and Ensham in their responses to the Consultation RIS were all opposed to the proposal for an additional 11 certificates of competency (occupational licences) for statutory positions. Vale Australia and Coal Assets Australia Glencore (CAAG) were similarly opposed, except for the position of ventilation officer for underground coal mines where they gave qualified support.

From late 2015, greater support from industry subsequently developed for a certificate of competency for underground coal ventilation officers due to agreed concerns about competency shortcomings. During ongoing consultation with industry and during tripartite consultation, safety concerns about the competency standards for ventilation officers were acknowledged, and it was agreed that competency assessment processes be increased.

There is an existing requirement under the *Coal Mining Safety and Health Act 1999* that a person appointed as a ventilation officer for an underground coal mine must have the competencies recognised by the tripartite Coal Mining Safety and Health Advisory Committee, as appropriate for the duties and responsibilities of this safety critical position. This is because the ventilation officer is directly responsible for the implementation of the mine ventilation system, and for the establishment of effective standards of ventilation for the mine. Responsibilities of ventilation officers under the *Coal Mining Safety and Health Regulation 2017* include ensuring adequate ventilation of the mine, overseeing any changes to the mine's ventilation system and the proper construction and maintenance of the mine's ventilation control devices, gas alarm level settings, and the measurement and recording of the mine's air quality including monitoring methane, and in general, noxious and flammable gases and other contaminants.

The amendments require appointed coal ventilation officers to also have an independent check by the Board of Examiners of the competency requirements already established by the tripartite Coal Mining Safety and Health Advisory Committee. Statutory positions are required to be occupied by persons with qualifications mandated by the Minister's advisory committees. The committees have the function of recognising, establishing and publishing the competencies accepted by the committees as qualifying a person to perform stated tasks, and the safety and health competencies required to perform the duties of a person under the mining safety legislation. It should be noted that committee members are appointed by the Minister on the basis of their breadth of experience in the mining industry, their demonstrated commitment to promoting safety and health standards in the mining industry and their practical knowledge of the mining industry and of relevant legislation.

Currently, SSEs determine if the persons appointed to these positions have the required competencies set by those committees. The Consultation RIS referred to a body of evidence indicating that SSEs were not meeting this obligation and that there are shortcomings in the assessment of competence at mine sites, including for coal ventilation officers.

The steps required in obtaining a certificate of competency (occupational licence) from the Board of Examiners provide an independent assessment by a panel with current mining experience. Industry people outnumber government and union people on the Board of Examiners. This means that industry people will still be primarily making the decisions about the competence of coal ventilation officers for industry.

Costs of competency

In its response to the Consultation RIS, the QRC developed costs on the basis that all training costs should be included as additional costs.

In their responses to the inquiry by the Infrastructure, Planning and Natural Resources Committee into the *Mines Legislation (Resources Safety) Bill 2017*, the QRC noted that it had decided to support a certificate of competency for ventilation officers at underground coal mines but still maintained that the cost has been underestimated because all of the current training costs to ensure workers are competent, required under the legislation had not been included. The QRC estimated that \$2.6M is about the quantum for implementing just one of the many positions that were proposed in the Consultation RIS in 2013.

It is the view of the Department of Natural Resources, Mines and Energy (DNRME) that the training costs, claimed by the QRC to be additional costs, currently exist if mines are training people to meet the current legislated requirement that people in these roles are competent to the standard set by the mining safety and health advisory committees.

The QRC statement that the costs in the Consultation RIS are a significant under estimate is incorrect. The practical impact of the proposed statutory position amendments is limited to the additional step of having competency certified by the Board of Examiners and the preparatory work and prerequisites required of the applicant to obtain that certification. The training and development required for these people to be competent should have already been provided to meet current legislative requirements. It is an offence to have people in the specified roles who do not possess the required competencies.

The site senior executive of a mine is responsible for ensuring that only persons competent to perform the role are appointed to the positions. The proposal for the requirement for a certificate of competency (occupational licence) issued by the Board of Examiners adds an independent quality assurance step. The applicant should already have the necessary training and qualifications and they should know how to comply with legislation relevant to their role.

RIS responses from industry that challenged the costing of certificates of competency erroneously include costing details for a person with no knowledge or experience. Industry already has the cost burden for providing training and practical experience. It is not a new cost. The additional cost is that of preparing a candidate for the examination and undertaking the examination for a certificate of competency.

The QRC and BHP stated that there are no equivalent requirements in other high risk industries for practicing certificates of competency for statutory positions and similar requirements are not reflected in other industry specific legislation. This assertion is not supported by DNRME. Practicing certificates of competency are occupational licences as recognised by the *Mutual Recognition (Queensland) Act 1992*. For example, the Queensland Building and Construction Commission issue over 70 occupational licences and registrations for the construction industry and most have annual renewals, which cost much more than a once-only certificate of competency issued by the Board of Examiners. The *Queensland Building and Construction Commission Act 1991* and the associated Regulation contain approximately 100 pages of licensing provisions.

The numerous electrical licences for electrical mechanic, electrical linesperson, electrical fitter, electrical joiner, electrical work training permit and restricted electrical work licence are issued

for a 5 year period. The *Electrical Safety Act 2002* and associated Regulations contain over thirty pages of provisions on licences.

Other responses or submissions

The zero harm aspirations of the industry are admirable and there is no doubt that mining companies have contributed strongly to the significant improvements in safety performance in the past 20 years. However, there are impediments to achievement of the 'zero harm' ideal as described by Professor Neil Gunningham²:

"Finally, there are serious obstacles to further progress towards 'zero harm' as a result of a breakdown of trust between workers and management (which statutory worker participation provisions can only mitigate to a limited extent), serious weaknesses in current enforcement regimes, substantial challenges in engaging with what is sometimes a dysfunctional culture at individual worksites, a disconnect between Head Office aspirations and 'coal face' practices, and as yet unresolved difficulties in bringing some contractors up to acceptable levels of Occupational Health and Safety (OHS) performance."

'Coal face' practices can be improved by adding the quality assurance step provided under the examination processes of the Board of Examiners, to the training already undertaken by industry.

Professor Gunningham in 2014 commented in the New Zealand press, when asked about the Pike River mine disaster, on findings from a study he was undertaking on the effectiveness of risk-based regulation in the Australian coal mining industry. This body of work was commissioned by the Australian mining industry. Gunningham stated in the news article that³:

"Queensland's risk management is inconsistent and leaves the way open to another disaster like Pike River.

...closer investigation of the practices of companies and regulators in Queensland, and those of New South Wales, suggest that all is far from well with regulation in the Australian coal mining jurisdictions.

Safety legislation in both states focuses on general duties, structured risk management and OHS management systems. Importantly, it recognises that most injuries and incidents involve an organisational or management failure, and the best way of addressing such failure is to develop a systemic risk-based approach, rather than a prescriptive one.

But much can also go wrong with risk management, and with regulation that insists upon this approach. On the basis of more than 60 interviews with members of mine management, regulators and union officials in the two Australian coal mining jurisdictions, a disturbing picture emerges.

*According to some, risk assessment is like torturing a spy - if you do it for long enough, you get the answer you want. Others report that **people without the***

² Gunningham, Neil, 2006, *Working Paper 42: Evaluating Mine Safety Legislation in Queensland*, National Research Centre for Occupational Health and Safety Regulation, Regulatory Institutions Network and Research School of Social Sciences, Australian National University, Canberra.

³ Gunningham, Neil, 10 April 2014, *Neil Gunningham: Mining safety model far from rock solid*, New Zealand Herald.

technical competencies and knowledge are made responsible for managing safety systems, with the result that there is a large gap between the development of these systems and their implementation. (Emphasis added)

The bottom line is that risk management is only as good as the people doing it. If you don't have the right input from the right people, it's useless. (Emphasis added)

*....the Queensland inspectorate warned in its 2012 annual report of "a litany of near disasters" and expressed concern at an influx of inexperienced, poorly trained workers and the appointment of supervisors lacking understanding of hazard identification or legislative mandates. Such **inexperience and lack of understanding can be particularly deadly when people "don't know what they don't know"**.* (Emphasis added)

The result is a mismatch between mining safety legislation and high level safety practice within the coal mining companies on the one hand, and "ground level" implementation on the other. This "implementation failure" stifles continuous improvement, inhibits innovation and constrains any further step change in safety.

It should not be forgotten that at Pike River it was poor quality risk management that led to disaster. (Emphasis added)

So what is needed to complete the journey to effective risk-based regulation? Certainly industry leadership is part of the story. So, too, is developing a safety culture within the industry itself. As one mine manager put it: "It needs to become a way of life. You need to breathe a safety culture into everyone."

Also important is education, training and awareness at mine site level. And above else, building trust between stakeholders who have long been adversaries. (Emphasis added)

The practices at the operating level of mining activities require competent and effective supervision. According to James Reason, Professor Emeritus at the University of Manchester and internationally recognized expert on accident causation:

*"Effective teams, capable of operating autonomously when the circumstances demand it, need high-quality leaders. This, in turn, requires the organization to invest heavily in the quality, motivation and experience of its first-line supervisors."*⁴

With respect to the corporate values espoused by large organisations, Professor Reason states:

"But commitment alone is not enough. The organization must also possess the technical competence necessary to achieve its safety goals." (Emphasis added)

If an individual is currently working as a coal ventilation officer then they should be able to demonstrate their skill and experience to three of their peers through the Board of Examiners. The time to prepare for examinations should be minimal.

A transitional period of three years is provided in the Bill to allow time for candidates to prepare for examinations and obtain the certification of competency.

⁴ Reason, J. 1997 *Managing the Risks of Organizational Accidents*: Ashgate Publishing Limited; Surry UK

The Electrical Trades Union (ETU) submission supported the additional statutory positions including the certificate of competency for a ventilation officer. The submission stated:

“It is important that critical safety positions become statutory positions that include the attainment of a statutory certificate of competency, to ensure that individuals holding these positions possess the necessary knowledge, experience and expertise to suitably respond to the complex situations that occur specifically in the mining industry.”

The Construction, Forestry, Mining and Energy Union (CFMEU) agreed with DNRME's certificate of competency statutory positions proposals including for ventilation officers.

The success of the risk-based approach that underpins the safety framework relies on a concept described in work control process models such as the Nertney Wheel⁵. The Nertney Wheel has four fundamental components: a controlled work environment; fit for purpose equipment; safe work practices; and competent people. Without any one of these components you cannot have safe productivity. The risk-based approach assumes that a mine has all of these components in place all of the time. Inspections by the regulator, under a risk-based model, are designed to identify systemic deficiencies in the implementation of the model not to direct the mine on risk controls.

Furthermore, inspections only sample parts of the safety and health management system at a point in time, yet the requirement is for continuous operation of the four components. An inspector cannot know about or cover all of the activities on a mine, even in a small time slice let alone continuously. The large number of compliance actions that have been necessary indicates that, while individual instances of deficient competency are addressed on a case by case basis, the underlying system deficiencies may not be. Lifting the standards of competency tackles the underlying systemic failures and ensures continuity of competency is achieved proactively and for all activities, not just on an individual case by case basis and at the point in time when an inspector issues a directive.

Between 2004 and 2018, there have been only three instances of incompetence by incumbents of statutory positions with certificates of competency. In each instance the person was either prosecuted or required to surrender their certificate of competency.

The low number of instances of incompetence of certificate holders supports the position that requiring roles such as the coal ventilation officer to be subject to certification will improve competency in the industry. Increasing the competence of workers in safety critical roles such as these that directly supervise or control high risk activities on a mine site will have a twofold effect:

- It will increase the knowledge and capabilities of the people in these roles to properly manage and deal with the hazards under their control; and
- It will have the flow-on effect of these people having the capabilities to identify and address the competency of the roles under their supervision undertaking high risk activities (but not subject to this proposal).

People currently in the coal ventilation officer role will be required to have a certificate of competency issued by the Board of Examiners within the transition period.

⁵ BULLOCK, M.G. 1979. Work Process Control Guide, System Safety Development Centre. EGandG Idaho, Inc. Idaho Falls, Idaho.

Before deciding whether or not to progress with the other 10 proposed certificates of competency, further consultation with key stakeholders across the mining sector will be required along with further inter jurisdictional analysis of the benefits of these competencies, where they are in place.

Competencies to be examined

Competency will be assessed by the Board of Examiners based on the attainment of pre-requisite competencies, experience, knowledge of the mine safety legislation and problem solving scenarios.

Under section 185 of the CMSHA, the Board of Examiners decides “the competencies necessary for holders of certificates of competency” whereas under section 76 of the CMSA, it is the advisory committee that has the distinct function of recognising, establishing and publishing the competencies it will accepted to qualify a person to perform the tasks prescribed under a regulation; or the safety and health competencies required to perform the duties of a person under that Act.

The advisory committee includes, in its published competencies the competencies considered necessary by the Board of Examiners for the holders of certificates of competency.

Benefits

The key benefit is that people in a critical safety role such as a coal ventilation officer will have the competence to manage high risk activities reliably.

The other proposals for certificates of competency included in the Consultation RIS have not been included in the *Mines Legislation (Resources Safety) Bill 2018*, and may be subject to further tripartite consultation.

It is estimated that the requirement for coal ventilation officers to hold certificates of competency to work in underground coal mines will impose a cost on industry of approximately \$40,000 per annum (see page 2 of Attachment 1: Cost analysis for National Mine Safety Framework proposals in Queensland)

Recommendation

It is recommended that a certificate of competency issued by the Board of Examiners be required by coal ventilation officers, with a three year transition period.

2. Improved contractor management through a single safety and health management system (pages 83 – 90 Consultation RIS) (Clauses 8, 9, 12, 16, 18, 56, 57, 60, 64 and 66 of ML(RS)A Bill)

The Consultation RIS noted the proposal to improve contractor management at mines through further clarifying the requirement to establish a single safety and health management system at the mine. The majority of the responses were supportive of the RIS proposal to further confirm and clarify a single safety and health management system (SHMS), with contractors and service providers also part of the single system. The Queensland legislation always intended only one SHMS at a mine site and is already reasonably clear on the requirement for one single system.

The QRC stated that a SHMS system is
“too vast to be contained in a single document”.

DNRME did not propose that the SHMS be a single document. The requirement in the legislation is a single **system** which may be comprised of many different plans and components.

It was always the intent of the current legislation, that a single SHMS be developed for each mine. This has been reinforced by Coronial recommendations.

For example, if a contractor's SHMS conflicts with the mine's SHMS then the contractor must comply with the mine's SHMS. If for some reason the contractor's system is considered more effective, there is absolutely nothing to prevent the SSE amending the mine's SHMS to incorporate the better methodology.

Evidence suggests that contractors working at mine sites are more likely to be involved in a fatal incident. Between 2001 and 2014, eight of the ten deaths in coal and ten of the twenty deaths in metal mines and quarries had been contractors. Between 2007 and 2017, contractors comprised 73 per cent of fatalities in coal mines and 46 per cent of fatalities in metalliferous mines, although contractors only comprised 49 per cent and 30 per cent of the respective workforces.

The CFMEU supported improved contractor management, however, they stated:

“we believe, and our legal advice confirms this, that the Coal Mining Safety and Health Act 1999 (Qld) (“CMSHA”) already requires the development of (and compliance with) a single Safety and Health Management System (“SHMS”) at a coal mine: see, for example, ss40(2)(b)(1) and 41(1)(e)(ii).”

Submissions did not raise any significant concerns about any costs being associated with this proposal.

Recommendation

It is recommended that the existing provisions relating to the single safety and health management system and the management of contractors and service providers within this single safety and health management system and respective obligations, be further clarified in the legislation.

3. Safety and health management systems required for opal and gem mines (pages viii and 45 Consultation RIS) (Clauses 55, 56 and 91 of ML(RS)A Bill)

The Consultation RIS noted the proposal to make a safety and health management system for small opal or gem mines with fewer than 11 workers mandatory. The proposal that safety and health management systems be introduced for these small opal or gemstone mines to enable operators to meet their existing obligations under the legislation did not attract any comment.

The mines inspectorate had held workshops on safety and health management systems with opal and gem miners over the two years prior to the release of the Consultation RIS.

Safety and health management systems have been mandatory for mines with 10 or more employees since 2001 and mandatory for mines, other than opal and gemstone mines, with fewer than 10 employees since September 2010, following two years of site visits and training by mines inspectors under the Small Mines Program.

Consultation with stakeholders in early 2018, indicated that this proposal should be changed to remove the exemption for opal or gem mines with 5 to 10 workers, which would retain the current exemption only for opal or gem mines with 4 or fewer workers. It is not clear that a documented system would provide better protection for opal or gem mines with 4 or fewer workers, than regulation education and interaction from the Mines Inspectorate.

Safety and health management systems are particularly important in systematising and communicating the hazards and risks at larger mine sites where larger employee numbers and more complex operations create a more complex risk profile. The Mines Inspectorate will continue to provide educational guidance about risk management for small opal or gem mines with 4 or fewer workers,

It is proposed that a similar implementation process to that in 2008 to 2010 will be used to introduce safety and health management systems for small opal or gem mines with 5 to 10 workers. A template safety and health management system will be utilised, and the mines inspectorate will continue to run training workshops on risk management through a safety and health management system.

There are no significant costs associated with small opal and gemstone mines with 5 to 10 workers developing a safety and health management system. There are expected to be safety and health benefits for these miners, through greater knowledge and awareness of systematic risk assessment and management of the risks and hazards of their mining operations. This will assist them to operate safely with an acceptable level of risk.

Recommendation

It is recommended that the current requirement for opal and gem mines with 11 or more workers to have a safety and health management systems be extended to small opal and gem mines with 5 to 10 workers, with a transition period of 3 years to facilitate implementation through a partnership between the small opal and gem miners and the mines inspectorate.

4. Changes applying proactive safety and health obligations to officers of corporations (page 90 Consultation RIS) (Clauses 5, 13, 14, 42, 43, 49, 52, 61, 62, 85, 86 and 92 of ML(RS)A Bill)

The Consultation RIS noted the proposal to make obligations applying to executive officers more proactive under mine safety legislation to be consistent with the approach in the Model WHS Act. The QRC agreed with the removal of a reverse onus or blanket liability approach to executive officers. However, they claimed that the Department had failed to make the safety case for adopting the "officer" definition from the Model WHS Act and the approach from the Model WHS Act.

These provision have applied since 2012 to all general workplaces in Queensland through the *Work Health and Safety Act 2011* and has been the approach to officer liability implemented by New South Wales, for mining as well as general workplaces. Proactive officer obligations were considered an important safety and health innovation by the panel who recommended the content of the Model WHS Act and the policy was tested through the RIS process for the Model WHS Act.

Holding officers accountable is based on both corporate leadership considerations and the capacity to adequately resource mine sites to meet their safety and health obligations. It is essential that the importance of safety and health matters be considered alongside production and fiscal matters from the company board down. It is difficult for site leadership to develop a safety culture together with a production culture, without corporate office managerial and financial support.

The Royal Commission on the Pike River Coal Mine Tragedy found that⁶:

"The board did not verify that effective systems were in place and that risk management was effective. Nor did it properly hold management to account, but instead assumed that managers would draw the board's attention to any major operational problems. The board did not provide effective health and safety leadership and protect the workforce from harm."

Executive management, Messrs Ward, Whittal and White, were focused on hydro coal production, as was the board. Associated risks were not properly assessed. At the executive manager level there was a culture of production before safety at Pike River and as a result signs of the risk of an explosion were either not noticed or not responded to."

As quoted earlier in this document Professor Neil Gunningham had commented on the need for industry leadership⁷:

"So what is needed to complete the journey to effective risk-based regulation? Certainly industry leadership is part of the story. So, too, is developing a safety culture within the industry itself. As one mine manager put it: "It needs to become a way of life. You need to breathe a safety culture into everyone."

The proposed officer duties relate to the position and influence of the officer within the corporation. What is required of an officer is directly related to the influential nature of their

⁶ The Royal Commission on the Pike River Coal Mine Tragedy, 2012, *Report Volume 1 and Overview*, Wellington pp. 18, 19.

⁷ Gunningham, Neil, 10 April 2014, *Neil Gunningham: Mining safety model far from rock solid*, New Zealand Herald.

position. This is because the officer governs or significantly contributes to governing the corporation and makes decisions for management. A high standard requires persistent examination and care, to ensure that the resources and systems of the corporation are adequate, to comply with the duty of care required by the corporation. This also requires ensuring that all aspects of the operation are performing effectively. Where the officer relies on the expertise of a manager or other person, that expertise must be verified and the reliance must be reasonable.

SSEs are influenced or directed by officers who are more senior in the organisation. If that officer's influence or direction results in a non-compliance with legislation, it is only reasonable that the officer should be held accountable.

In principle, the ETU supported the proposed changes, on the basis of creating greater consistency across mine and general workplaces and for the increased rigor and accountability it would create for executive officers.

The CFMEU supported the proposed changes applying to executive officers.

In their responses to the inquiry of the Infrastructure, Planning and Natural Resources Committee into the *Mines Legislation (Resources Safety) Bill 2017*, the QRC noted that it now supported in principle the adoption of proactive obligations for executive officers, but still did not support adopting the definition of "officer" from the *Corporations Act 2001*. The QRC stated that it believes that it is less relevant in the mining industry to broaden the definition of "executive officer" to be the definition of "officer" from the *Corporations Act 2001* than may be the case for general workplaces under the Queensland WHS Act.

There needs to be equity or greater consistency about the safety and health obligations of "officers" across all workplaces and industries and the definition of "officer" from the *Corporations Act 2001* should be adopted in the CMSHA and the MQSHA.

Recommendation

It is recommended that the officer duties provisions in the *Queensland Work Health and Safety Act 2011* be adopted in mining safety legislation. This includes the removal of the reverse onus of proof on officers and the definition of "officer" from the *Corporations Act 2001*.

5. Higher maximum financial penalties for breaches of safety and health obligations (pages 92 – 97 Consultation RIS) (Clauses 6 and 53 of ML(RS)A Bill)

The Consultation RIS noted the proposal to increase maximum penalties under the Queensland mine safety framework. The QRC did not support this proposals, stating that there is no evidence that the courts have in any way been limited by the existing sentencing regimes or that increased penalties will otherwise achieve greater safety outcomes.

Although the QRC noted that higher penalties apply in all general workplaces in Queensland through the *Work Health and Safety Act 2011* they argued that there is no evidence this has had any significant effect.

If penalties are too low, the moral hazard of insufficient financial incentive to comply with the legislation may result. There needs to be equity or greater consistency in this respect across all workplaces and industries.

It was also proposed in the Consultation RIS that the penalty regime for mining safety and health be more consistent with general WHS laws, including adoption of the offence categories in WHS laws. It was argued that penalties must be reasonably aligned across all occupations to enable courts to give similar sentences for corresponding offences in other industries.

The QRC also did not support changing the offence categories, neither did the CFMEU, who stated that:

“the offences regime in the CMSHA is a better fit for the mining industry”

However, the CFMEU supported an increase in the level of maximum penalties.

Offences can be distinguished by the presence of different types of culpability or aggravating factors such as recklessness, gross negligence or exposure to a serious risk, or alternatively, by the consequences of a breach (for example, multiple deaths). The Model WHS Act structures offences based on seriousness of the culpability and risk, regardless of whether or not harm has occurred, and mostly without legal question of causation, either as an aggravating factor or element of the offence. One of the reasons for this approach stated in the First Report⁸ on the development of the Model WHS Act was to make it clear that employers need to be vigilant in ensuring risks that might lead to death are eliminated.

The First Report prepared for public consultation on the development of the Model WHS Act also noted that:

“Changing attitudes towards the regulation of occupational health and safety, reinforced by the various reviews of OHS laws and a growing body of regulatory scholarship, have led to increases in fines under the Acts, greater provision for custodial sentences and, as discussed later, other sentencing options. Nonetheless ...there remains considerable disparity in the maximum fines and periods of imprisonment that can be imposed under the various Australian OHS Acts.

In our view, the maximum penalties provided in some jurisdictions are too low to have a meaningful value as a deterrent or as a potential punishment for a breach. In this respect, we note the observation of the UK Sentencing Advisory Panel, that ‘... in principle it should not be cheaper to offend than to prevent the commission of an offence.’ We consider that fines are a key part of achieving the deterrence required to give credibility to a process of graduated enforcement. We consider that higher maximum fines are necessary for the model Act and that they should be complemented by a range of other sentencing options...”

Rather than adopting the Model WHS Act focus on culpability and exposure to risk, DNRME proposes that the graduated response to offences under the CMSHA and MQSHA will continue to relate to outcomes or degree of harm from the breach (i.e. multiple deaths compared to death or grievous bodily harm or bodily harm or otherwise). For all categories of offence other than the last one of “otherwise”, causation will remain a circumstance of aggravation that may be raised during the prosecution.

⁸ https://docs.jobs.gov.au/system/files/doc/pdf/national_review_into_model_ohs_laws_firstreport.pdf

Although offence categories will not correspond with the approach in the Model WHS Act, there will be an improved correlation of financial penalties by substantially increasing the penalties in the CMSHA and MQSHA. A different approach to the Model WHS Act's approach to imprisonment penalties (maximum 5 years for being reckless as to risk) will remain with a lower but broader range of imprisonment penalties under the CMSHA and MQSHA ranging from a maximum 3 years down to 6 months.

The table below provides a general comparison of existing maximum penalties, with the differing categories roughly aligned.

Table 1: Comparison of penalties across safety and health legislation, Qld

Legislation	Penalty			
	Penalty units (\$ amount)	Penalty units (\$ amount)		Prison
Current CMSHA and MQSHA	<i>Corporation</i>	<i>Officer</i>	<i>Individual</i>	<i>Officer and Individual</i>
Multiple deaths	10,000 (\$1,261,500)	N/A	2,000 (\$252,300)	3 Years
Death or grievous bodily harm	5,000 (\$630,750)	N/A	1,000 (\$126,150)	2 Years
Bodily harm	3,750 (\$473,062.50)	N/A	750 (\$94,612.50)	1 Year
Exposure to a substance likely to cause death or grievous bodily harm	3,750 (\$473,062.50)	N/A	750 (\$94,612.50)	1 Year
Otherwise	2,500 (\$315,375)	N/A	500 (\$63,075)	0.5 Year
Current WHS Act	<i>Corporation</i>	<i>Officer</i>	<i>Individual</i>	<i>Officer and Individual</i>
Category 1 (reckless conduct)	30,000 (\$3,000,000)	6,000 (\$600,000)	3,000 (\$300,000)	5 Years
Category 2 (failed S&H duty, individual exposed to risk of death, serious injury or illness)	15,000 (\$1,500,000)	3,000 (\$300,000)	1,500 (\$150,000)	Nil
Category 3 (failed S&H duty)	5,000 (\$500,000)	1,000 (\$100,000)	500 (\$50,000)	Nil
Proposed CMSHA and MQSHA	<i>Corporation</i>	<i>Officer</i>	<i>Individual</i>	<i>Officer and Individual</i>
Multiple deaths	30,000 (\$3,784,500)	6,000 (\$756,900)	3,000 (\$378,450)	3 Years
Death or grievous bodily harm	15,000 (\$1,892,250)	3,000 (\$378,450)	1,500 (\$189,225)	2 Years
Bodily harm	7,500 (\$946,125)	1,500 (\$189,225)	750 (\$94,612.50)	1 Year
Exposure to a substance likely to cause death or grievous bodily harm	5,000 (\$630,750)	1,000 (\$126,150)	500 (\$63,075)	1 Year
Otherwise	5,000 (\$630,750)	1,000 (\$126,150)	500 (\$63,075)	0.5 Year

Recommendation

It is recommended that financial penalties be increased to align more closely with the financial penalties in the *Work Health and Safety Act 2011*.

6. Notification requirements for manufacturers and suppliers to inform the regulator as well as their customers of a hazard or defect (page 114 Consultation RIS) (Clauses 10, 11, 58 and 59 of ML(RS)A Bill)

Note: This was a coronial recommendation

The Consultation RIS noted the proposal to require manufacturers and suppliers to inform the regulator and their customers of any hazards or defects associated with equipment or material supplied to a mine.

The following coronial recommendation is from the inquest into the death of Shane William Davis:

“Recommendation 3: That consideration be given to amending Section 44(6) of the CMSHA to require that manufacturers and suppliers inform the regulator as well as their customers in the event they become aware of a hazardous aspect of or defect in the equipment that the supplier has supplied to a coal mine.”

There was overwhelming supporting for this proposal.

Recommendation

It is recommended that the proposed amendments proceed to require designers, manufacturers, importers and suppliers to inform the Chief Inspectors of any hazard or defect.

7. Greater proactive release of information by regulators regarding incidents (page 101 Consultation RIS) (Clauses 45, 46, 88 and 89 of ML(RS)A Bill)

The Consultation RIS noted the proposal to clearly enable the regulator to proactively release information in relation to a safety incident without risk of litigation. This proposal was based on the concern that dissemination of important information gleaned immediately after an incident was at times delayed due to possible litigation should some minor detail be incorrect. Such a delay is not in the best interests of safety. Distributing information as soon as possible after an incident will enable other operations to assess whether they too are at risk and put appropriate measures in place if they are.

The QRC supported the proposal:

“provided there is no intention to introduce a formal system of disciplinary proceedings for certificate holders as apparently suggested in the RIS.”

The QRC also claimed that there has been a request in the QRC SSE/GM forums to the Chief Inspectors for the early release of safety alerts.

This proposal is about the regulator having the ability to release information as quickly as possible about an incident. The information available immediately after an incident is not always accurate and too often in the past, safety alerts have been held back from release in order to check and recheck data to ensure accuracy. This time delay may have exposed others to a similar hazard at another mine site.

Generally submissions received were in broad support of the release of information following an incident because of the potential safety and health benefits. There were some concerns and they are best expressed by Rio Tinto who wished guarantees that:

- *data was de-identified so that the relevant mine, operator and individuals are not identified,*
- *Information is factually accurate or based on a reasonable belief that it was factually accurate; and*
- *Information is provided in good faith.*

These concerns are noted and that is the intent of the proposal.

Recommendation

It is recommended that the proposals to proactively disseminate information be adopted.

8. A simplified process for inspectors to enter any workplace where activities may affect safety and health at a mine (page 100 Consultation RIS) (Clauses 23, 24, 70 and 71 of ML(RS)A Bill)

The Consultation RIS noted the proposal to clarify and simplify entry powers for mines inspectors. The majority of responses were in agreement with the proposal. Some mine operators and the QRC did not support the proposal on the basis that the current legislation implies a right of entry. Some mine operators were fully supportive, provided the powers only extended to matters directly related to mining activity.

It should be noted that the impetus for inspectors to have the right of entry to workshops engaged in overhaul and repair of mining equipment came from front line managers at mine sites who had issues with some workshops and maintenance companies.

In its response to the Consultation RIS, the QRC did not support this recommendation. The QRC assumed that this has about a single incident. It was not, as there have been any number of incidents involving equipment that has been either incorrectly overhauled or repaired. The inspectorate needs to respond to requests that come from mine site electrical engineering managers, mechanical engineering managers and SSEs to undertake more visits to overhaul and repair facilities.

The QRC argued that:

“It is worth noting that the responsibilities of the SSE do not extend to how any off site work is undertaken as these places are not mines nor is the work an onsite activity”.

While repairs and overhauls of equipment can take place off site, the mines inspectorate is about ensuring that all work undertaken on any equipment or processes that may affect the safety and health of mine workers is conducted in a way that risk is at an acceptable level. More effective regulatory oversight of overhaul and repairs or other activities that are conducted offsite that may affect the safety and health of mine workers is of benefit to the industry overall.

The QRC acknowledges that mines inspectors can gain access to a facility that is conducting or undertaking work that could affect safety at a mine site. The issue is that to gain entry is not straightforward unless entry is granted in a spirit of cooperation.

The clear right to enter any workplace is a power that is already granted to the Mines Inspectorate in NSW and to general WHS inspectors in Queensland and indications are that this operates without problems.

This proposed power does not add a burden to industry. It should be noted that mining companies have, on occasions, invited inspectors to enter suppliers' workplaces to inspect equipment, intended for their mines, at various stages of manufacture. This is seen as partnering with industry to facilitate safety and to anticipate and address potential hazards before equipment is brought into operation.

In their responses to the inquiry of the Infrastructure, Planning and Natural Resources Committee into the *Mines Legislation (Resources Safety) Bill 2017*, the QRC noted that it was now not opposed to the proposal but questioned whether there was potential for jurisdictional uncertainty. Mines inspectors principally inspect mines and the proposed power to enter any workplace is an adjunct to their existing powers to attend to any matter that directly affects safety at a mine. The mines inspectorate has the expertise to assess such matters.

The mines inspectors will only be entering an off-mine site workplace if that workplace may be affecting safety and health at a mine, or as part of an investigation of an incident that occurred at a mine, which may have been influenced by a workplace off-site. For this reason, there should be no issues about jurisdictional uncertainty being created. Mines inspectors already have the power to access a workplace off-site when performing their functions under the current legislation. The amendments confirm and simplify this power.

Recommendation

It is recommended that mines inspectors be granted a clearer power to enter any workplaces under the conditions allowed under the Model WHS Act as this will have tangible investigation benefits, for example in relation to off-site workplaces that are carrying out work on mining equipment.

9. Improved stone dusting and use of explosion barriers (page 80 - 83; cost analysis pages 146 – 151 Consultation RIS) To be delivered through regulation amendments

The Consultation RIS noted the proposal to require the use of stone dust explosion barriers in underground coal mines. There were two distinct proposals for stone dusting. The first was for the requirement to stone dust after each 30 metres, instead of the current 50 metres, of roadway advance to align with the New South Wales standard (in the United States the distance is 40 feet or approximately 12 to 13 metres). The second is the installation of explosion barriers in underground coal mines.

New South Wales is the only other Australian jurisdiction with a significant underground coal mining industry. New South Wales continues to require through regulation that explosion barriers are installed and maintained to restrict the propagation of any coal dust explosion.

The QRC did not support the RIS proposal that underground coal mines be required to install explosion barriers and to stone dust roadways after each 30 metres that the roadway advances during coal production. While the QRC did not advocate any backward step in protecting mine workers from this most serious of risks, it did not believe the RIS made an adequate case for changing to a more stringent standard. The QRC supported engagement with the Australian Coal Association Research Program to review standards for stone dusting and other coal dust explosion prevention measures. The QRC also stated that:

“The current distance of 50m allows for the maximum likely distance that a development panel can be driven in the space of a single shift. Stone dusting is generally performed at the end of each shift, as this is the most efficient and appropriate way to undertake the task. The proposal therefore represents a significant potential reduction in productivity on some shifts.”

The QRC contended that the fact that one Queensland underground coal mines had started installing explosion barriers in 2013:

“should not be held up as a reason why every other mine should take a similar approach regardless of its own risk assessment and principal hazard planning processes. To do so is yet another sign that DNRME are advocating moving from the risk-based framework where individual mines take responsibility for identifying hazards, then assessing and addressing risks, to a compliance model where what is written in the legislation (and supporting codes of practice) is the only way to address a hazard.”

...the RIS fails to make an adequate case for change for the proposal to reintroduce mandatory explosion barriers in all underground coal mines. The QRC reiterates its position that explosion protection measures should only be altered in line with relevant research undertaken within a Queensland coal mining context, and that such additional information should be adopted through the risk-based approach.”

The response from the QRC indicated they will seek further work to be undertaken by the Australian Coal Association Research Program to determine more accurate distances.

DNRME will allow industry through the QRC to conduct further research on distances for stone dusting. The accepted research on the distance of a roadway that could be exposed without the possibility of a coal dust explosion being propagated was that of Polish scientist Cybulski in the 1970s. That work was used to establish the distances adopted and currently implemented in NSW. Cybulski's research was based on Polish coals that are of a different chemical composition and with different roadway dimensions to those typically found in Australia. In the absence of any other scientific evidence, Cybulski's work has been the accepted benchmark.

Vale supported in principle the use of stone dust barriers on the proviso that a risk-based approach can be applied at each individual coal mine.

Rio Tinto Coal Australia stated

"...in relation to explosion barriers, the decisions should be risk-based. For example, the RTCA Kestrel mine has a very high compliance rate, which indicates that its incombustible dust maintenance strategy is sound under the current requirements. However dry, degassed, high capacity long wall faces may not be able to comply with the requirements for incombustible content in a return airway and as such should use a barrier.

If an operation cannot physically meet the requirements outlined in the legislation, it is the role of the regulator to issue a directive challenging the effectiveness of the SHMS in allowing the operation to operate at an unacceptable level of risk. Introducing a prescriptive requirement across the entire industry on account of the failing of some would be an unreasonable response."

Ensham stated:

"Should explosion barriers be introduced in QLD legislation as proposed, we believe they should only be required in mines where there is a real risk of a methane explosion initiating a coal dust explosion. There are a number of mines in QLD that have little or no methane present when mining, hence they lack the fuel to enable an explosion to initiate or propagate. Those mines that can demonstrate very low or nil levels of methane should be able to apply a risk-based methodology to avoid an unnecessary cost in their operation."

BHP Billiton stated

"...for example, the BMA Crinum underground coal mine experiences a very low gas regime, with methane levels in the Crinum North area being negligible to the point of being non-existent. Therefore, the potential for a methane gas explosion, a recognised precursor for a coal dust explosion, is extremely low. BHP Billiton does not consider explosion barriers to be necessary at the Crinum mine. Stone dusting is performed at the end of each shift at the Crinum mine as this is the most efficient way to undertake the task."

It is the mines inspectorate's contention that an underground fire causes coal to release explosive gases of which methane is the main gas.

Stone dust has been proven to be an effective control against the propagation of an explosion, should it happen in an underground coal mine. Incombustible stone dust of for example 85% in face areas, 80% in returns and 75% in outbye intakes can be effective with explosion barriers throughout the mine as an additional control, to ensure that if and when an explosion is required to be suppressed, the stone dust barrier or equivalent effective barrier achieves the result.

The CMSHR, under section 301(2)(a), requires that the underground mine manager must ensure that each 50m length of a roadway that is being driven at the mine is stone dusted, or treated with another coal dust explosion inhibitor immediately after the length is driven.

High production rates associated with modern mining methods can make 100% continuous compliance with this stone dusting requirements difficult to achieve and even a small variance

in compliance could result in the failure to prevent the propagation of a coal dust explosion, with disastrous consequences.

The QRC claims:

“the coal mining industry takes the management of the risk of coal dust explosion extremely seriously however, the QRC does not support the proposals on the basis that there is no evidence that such change is required to deal with the task”.

This statement was inconsistent with the industry's own pursuit at the time to understand and improve on explosion barrier technology through research grants from the industry-funded Australian Coal Association Research Program into active explosion barrier research and development.

While the legislation is currently silent on the specific need for explosion barriers, it was assumed that barriers would be required and installed as the outcome of risk assessment, given the legislative requirement that risk is to be as low as reasonably achievable. Stone dust spread along underground roadways to prevent coal dust explosions does not mitigate risk as low as reasonably achievable, unless supplemented with explosion barriers. An audit of 50% of all underground coal mines in Queensland in 2013, revealed that all failed to comply with current legislative requirements for stone dusting. A risk assessment would identify the extent of explosion barriers required at each underground mine.

The type of explosion barrier deployed must be demonstrably effective based on supporting science and engineering tests. This does not limit the technology to stone dust.

A coal dust explosion (undoubtedly the worst thing that can happen in an underground coal mine) is a critical hazard to be managed through the prescribed minimum standards for stone dusting. For critical hazards like coal dust explosions, where the consequences can be catastrophic, the probability must be reduced to as low as reasonably achievable. The minimum standard of 85 per cent total incombustibles in the face zone prescribed in the regulation, still allows a five per cent residual probability of a coal dust explosion propagating. A five per cent residual probability is not low enough to adequately control the risk. Add to this the further complication that, for every one per cent of methane present, the required level of incombustible content has to increase by five per cent.

In addition to methane, high tension electric cable flashes and shot firing can initiate coal dust explosions, as can the gases emitted from a spontaneous combustion or belt fire (heated coal produces methane and hydrogen in appreciable concentrations even when there is no methane in the seam gas).

Audits of stone dusting at Queensland coal mines conducted by the mines inspectorate and reported in a 2013 safety bulletin showed very poor compliance, even with the prescribed minimum standards.

The following are excerpts from Safety Bulletin 134:

“Queensland stone dusting audit program

- International incidents have prompted the Queensland Mines Inspectorate to audit the efficacy of coal dust explosion prevention and suppression systems in underground coal mines. The audit's primary objective was to review the status of SHMSs or practices, procedures and processes related to coal dust explosion prevention and suppression,*

identifying non-compliance with legislation and scope for SHMS improvement to ensure that risk from this hazard is at an acceptable level.

Audit findings

- *The auditing revealed a gross lack of understanding among various levels of management and supervision as to legislative requirements for sampling, analysis and application of stone dust. General erosion in the quality of sampling and analysis over a period of time was observed. Considering the requirements for roadway dust sampling in extensive out-bye areas, long and multiple gate-roads, sampling organisations in most cases were found lacking resources."*

With respect to stone dust processes numerous shortcomings were found in safety and health management systems and in standard operating procedures.

Subsequent targeted consultation from late 2015 encouraged compromise. This resulted in opposition from industry to explosion barriers lessening. Concerns that requiring explosion barriers would stifle new product innovations were addressed with assurances that the regulations would be similar to the New South Wales approach to requiring explosion barriers, and that the requirement would still enable new innovative products that have been proven to be equally as effective. Transitional periods for installation were discussed.

In early 2017, union and industry representatives participating as part of a tripartite working group to review proposals, provided in-principle support, subject to further consultation about the details of the amendments. It is estimated that the requirement to install and maintain explosion barriers in underground coal mines will impose a cost of approximately \$2.1 million per year as an equivalent annual value across the 10 operating mines, or approximately \$200,000 to \$250,000 per mine (see pages 1 and 2 of Attachment 1: Cost analysis for National Mine Safety Framework proposals in Queensland).

Recommendations

In the matter of roadway development distances, it is recommended the current regulation at 50 metres or 24 hours, whichever is the minimum, be retained pending the outcome of further research by industry.

It is recommended that the installation of explosion barriers in underground coal mines be made mandatory and that Coal Mining Safety and Health Regulation 2017 Part 10 Division 1 be amended accordingly. The type and spacing of the barrier should be left to an assessment of the suitable type at each individual mining operation. There will be a transitional period of one year for the installation of the explosion barriers.

Summary of impacts of the recommendations

Changes due to consultation

Following consultation with stakeholders, the Department has revised some recommendations. As a result, there have been amendments to the quantified costs and benefits provided in the Consultation RIS, as described below:

Stone dusting and explosion barriers

The proposal in the Consultation RIS, to reduce the distance to stone dust from 50m to 30m, was estimated to cost \$526,000 per year. However, as the distance of 50m will be retained (pending the outcome of further research), this cost has been removed from the analysis. Furthermore, based on new information provided during consultation and updated 2017 data, the estimated cost of mandatory explosion barriers is expected to be \$2.0 million per year as per **Attachment 1**.

Revised Cost Estimates as per Attachment 1 for proposals included in the Bill and regulation

The total equivalent annual value of costs for the proposed amendments (based on a present value of costs over a 10 year period) is \$2.1 million per year. Of this, stone dusting requirements (explosion barriers) represent \$2.0 million per year (as an equivalent annual value) for the total underground coal mining industry (only) in Queensland.

The cost associated with the new certificate of competency for the statutory position of ventilation officer (which will be performed by existing staff with new certifications) is \$38,377 (as an equivalent annual value) across all underground coal mines in Queensland. The cost for certifying a statutory position is primarily the 'time costs' for the applicant to study for and undertake the examination and a small increase in the administrative costs of the Department.

Transitional costs to implement the initiatives in the Decision RIS are estimated to be \$118,000 (as an equivalent annual value).

A summary of the costs is provided in the table below.

Amendment	Estimated cost (as equivalent annual value)
Installation and maintenance of explosion barriers at 10 underground coal mines	\$2.0 million
Certificate of competency for underground coal mine ventilation officers	\$38,377
Transitional costs	\$118,000
TOTAL as equivalent annual value	\$2.1 million

Safety Benefits

The Department contends, based on the evidence and responses to consultation provided, that the certification of coal ventilation officers and use of explosion barriers will improve safety and health in underground coal mines and further minimise the risk of potentially serious incidents occurring (as a result of coal dust explosions and ignitions) causing serious injury or death.

Tooma⁹ in considering 'safety capital' states '*... one can consider safety capital as the bundle of systems, processes, controls, training, behaviours and attitudes which derive from the safety culture in an organization. It follows that an organization with a large safety capital will have fewer incidents. Given the cost of incidents (in lost production time to the injured worker and colleagues, damage to equipment, productivity impact of decreased morale, compensation costs and legal costs including penalties, and the insurance premium impact) this represents a financial value – a return – to be derived from safety capital. In addition, an organization with a large safety capital can also be expected to have a higher productivity. Investments in training, systems and processes can be expected to have a positive impact on staff morale and wellbeing. This can be expected to manifest itself in higher productivity*'.

As discussed in the Consultation RIS, it is extremely difficult, if not impossible, to determine (and therefore quantify) how much harm may be prevented or how many lives might be saved as a result of the proposals as a whole however if only one life per year is saved (at the rate of \$3.5 million per life) as a result of these amendments, the investment would be justified.

Further benefits would also be expected if the proposals also resulted in a decrease in injuries. Analysis provided in the Consultation RIS suggested that if injuries were reduced, as a result of all of the proposals included in the Consultation RIS as a whole, by 2 per cent per year this would equate to a benefit of \$1.6 million per year on average. **Attachment 1** suggests that if there is a reduction of 1.5 per cent per year after the amendments have commenced following the transitional periods, the benefits would be \$1.4 million (equivalent annual value).

There is also an illustrative example provided in the Consultation RIS, which detailed that if the reforms reduced the risk of a coal mining disaster by 20 per cent, there would be a benefit of \$8.3 million (equivalent annual value) from avoided deaths, reduced risk of loss of production and reduced risk of coal sterilisation.

The Consultation RIS set out options and reasons for partial harmonisation with other jurisdictions. A decision on the remaining proposals in the Consultation RIS will be concluded at a later date following further tripartite consultation.

Illustrative example worked through in Attachment 1 shows an estimated equivalent annual value for the benefits of these initiatives of \$5.1 million – providing an overall positive estimated annual value of \$3.0 million.

⁹ Tooma, Michael, 2011, Safety Security Health and Environment Law, The Federation Press; Sydney

Attachment 1 – Cost analysis of National Mine Safety Framework proposals in Queensland

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Summary

This analysis examines the two options for implementing improvements to the Queensland mine safety framework. This work was initiated through the COAG National Mine Safety Framework Project (NMSF). These options are:

Option 1 – retain Queensland's two mining Acts for the coal and metalliferous sectors, plus amendments based on provisions from the Model Act, core and non-core NMSF that increase safety and health and consistency with other states.

Option 3¹⁰ – develop new mine safety legislation primarily based on the Model Act, and core and non-core NMSF provisions that increase safety and health and consistency.

While the potential benefits of each option were not modelled explicitly due to a lack of data, an illustrative example of quantified benefits are presented to frame the case for action compared to the status quo.

Key findings include:

- The benefits of the amendments are to improve safety and health in Queensland mines. In particular it is expected that:
 - There would be a reduction in injuries due to amendments such as existing positions requiring statutory certificates and clarification of contractor management requirements. If this reduction was one and a half per cent each year after the amendments have commenced after the transitional periods, the benefits would be \$1.4 million (equivalent annual value)¹¹
 - There would be a reduction in the risk of an underground coal mining disaster due to the package of options, particularly installation of stone dust explosion barriers. This reduction in disaster risk would not only help avoid fatalities that carry high social costs, but also reduce the risk of mine closure and sterilisation (permanent loss) of coal resources as a result of an explosion. There is not sufficient information available on the baseline risk of an underground coal disaster in Queensland to model these risks adequately. However, an exploratory quantification was carried out to illustrate the potential benefits. If there is a baseline disaster risk of only five per cent per year, and this risk falls by 15 per cent as a result of the proposed changes, the benefits of Option 1 easily outweigh the costs. This is assuming a minimal amount of coal sterilisation.
- The **total equivalent annual value of costs** for Option 1 (based on a present value of costs over a 10 year period¹²) is **\$2.1 million per year**. Of this, explosion barrier requirements represent approximately \$2.0 million per year (as an equivalent annual value) for the total underground coal mining industry in Queensland, and

¹⁰ Option 2 was considered in an earlier consultation document, but was not considered here as the initial analysis suggested that was similar to the other options, and did not offer any likely benefit

¹¹ Present value is the total value of the future benefit stream (ten years) in present day terms - this allows costs and benefits to be compared at the point where decisions are made. This can also be presented as an 'equivalent annual value'.

¹² Present value is the total value of the future benefit stream (ten years) in present day terms - this allows costs and benefits to be compared at the point where decisions are made. This can also be presented as an 'equivalent annual value'.

the cost associated with the new statutory positions (which will be performed by existing staff with new certifications) is \$38,377 (as an equivalent annual value) across all mining industry in Queensland. Transitional costs for training inspectors and those in responsible safety critical positions at mines are estimated to be \$118,000.

- Option 3 is significantly more expensive with an equivalent annual value of costs of \$19.6 million per year (based on present value of costs over a 10 year period). This is driven by the high transition costs, as it is assumed miners will need to spend time learning the new legislation. There are also concerns about potential reductions in safety and health standards under the Model Act.
- Underground coal mines bear the costs of the proposals costed in this appendix due to the improved stone dusting requirements and certificate of competency requirements for underground coal ventilation officers. However, the benefits of disaster risk reduction also accrue to underground coal mine operators, their employees and coal mining communities.
- The **total equivalent annual value/benefit** of injury reduction and disaster risk reduction due to these initiatives is estimated to be **\$5.1 million**.
- **Providing an overall positive benefit of approximately \$3.0 million.**

1.0 Introduction

1.1 Overview of the options

The COAG endorsed a NMSF in the interests of encouraging consistency in regulation across jurisdictions. Queensland participated in the NMSF with the proviso that Queensland must not be disadvantaged through adopting any national provisions, including any diminution of safety standards.

Queensland currently has two mine safety and health Acts – CMSHA and MQSHA.

- Option 1** – retain Queensland's two mining Acts for the coal and metalliferous sectors, plus provisions from the NMSF that increase safety and health and consistency with other states.
- Option 2** – build new legislation by combining Queensland's two mine safety Acts into one piece of legislation covering coal and metalliferous sectors, plus provisions from the NMSF that increase safety and health and consistency with other states.
- Option 3** – develop new mine safety legislation primarily based on the Model Act, plus NMSF provisions that increase safety and health and consistency.

All of these options are compared with the status quo of no changes to policy. Any costs that are quantified are presented in relation to the status quo.

These options were explored in a consultation document. Consultation has occurred with a wide range of stakeholders, including the Queensland Resources Council, the Construction, Forestry, Mining and Energy Union, mining companies, Queensland mine safety regulators and inspectors and the Board of Examiners.

Option 2 is not investigated further in this report. The initial analysis did not identify additional benefits from having combined legislation. As such only Option 1 and Option 3 are investigated in the cost analysis.

1.2 Assumptions

This analysis is a desktop study based on published data and information from industry sources.

The jurisdiction covered by the analysis is Queensland – i.e. the costs to Queensland are primarily considered. The perspective is for all of Queensland society. The costs are not disaggregated into societal sectors, as the mining industry will bear most of the costs so disaggregation would not add a significant amount of information.

The time frame of the analysis is 10 years, in line with the default time frame suggested by Queensland Regulatory Assessment Statement Guidelines (version 2.1).

In this analysis, the average cost of labour is taken to indicate the value of time. For mining this is \$84.7/hr. These figures are based on Australian Bureau of Statistics (ABS) sources (2017) and include 24% for on-costs and superannuation. However, as the safety roles relate to senior roles within mines, it is likely this average under-estimates the cost of time. A 20 per cent premium was added onto the ABS average to account for this.

Inspector's time was estimated at \$75/hour. Secretariat support is indicated by an AO4 salary of \$45/hour (including on-costs).

Where historical information is used, the average for the last three years of available data is used to account for annual variability in figures.

A discount rate of seven per cent is applied to the figures to calculate the present value of costs (following Australian Government 2010).

The options are compared to a base case of the status quo. This is the world without the policy interventions described in Option 1 to Option 3. This means that costs are presented as relative to the status quo. The options described require new actions compared to the status quo, and as such are quantified in their entirety.

The overall Net Present Value is not calculated for either option. This is because the main benefit from Option 1 – a reduction in injuries and disaster risk at underground coal mines – has not been explicitly quantified due to lack of data. Some other minor benefits are quantified in Option 1.

However, a brief illustrative quantitative example is presented to help clarify the benefits of the options. The assumptions for this example are outlined in Section 2.2.

2.0 Option 1 costs and benefits

2.1 Overview

Option 1 involves:

- Maintaining current legislation (CMSHA and MQSHA)
- NMSF amendments to increase consistency with other states and/or improve safety and health. These can be seen in the Consultation RIS document in Appendix E.
- Only two amendments are analysed here as they are additional to the base case of maintaining the CMSHA and MQSHA, and are expected to cause an increase in costs:
 - Greater consistency in relation to statutory position requirements and competency requirements for underground coal ventilation officers
 - Changed stone dusting requirements (underground coal only).

2.2 Safety benefits

The main benefit of the proposed amendments is to increase safety and health in the mining industry, and reduce accidents. Although Queensland has had an enviable safety record in mining, each year there are significant high potential incidents that occur. The lost time injury frequency rate (LTIFR) also increased across some mining sectors during some periods (NRM 2012b). This indicates that safety improvements can still be made.

Details on the safety benefits can be found in the Consultation Regulatory Impact Statement and its appendices. The general safety benefits expected from stage one through the *Mines Legislation (Resources Safety) Amendment Bill 2018* and the Coal Mining Safety and Health (Explosion Barriers) Amendment Regulation 2018 include:

- certification of underground coal ventilation officers by the Board of Examiners to provide greater assurance of the competency of workers holding this safety critical position at underground coal mines
- reduced risk of explosions and ignitions
- stone dusting barriers will help contain any explosion that does occur.

For this study it has not been possible to robustly quantify these safety benefits offered by the proposals within Option 1. This is due to uncertainty over quantifying:

- the risk of an underground coal disaster if intervention occurs (i.e. the baseline risk of an underground coal mining disaster). Historical data was not felt to be a good guide to risk as Queensland's safety laws have changed significantly since the last coal mining disaster (Moura 1994), and thus pre-1994 data is not a sound indicator of future risk of disaster. Although there has not been a disaster in Queensland since 1994, DNRME does not believe this means there is zero risk of an underground coal mining disaster, and do not believe it is appropriate to model the risk as zero
- the likely reduction in baseline risk of disaster as a result of additional requirements under Option 1 and Option 3
- the likely reduction in risk of injury from the proposed Queensland policies. Aggregated data on the causes of current injuries is not available, and so it is difficult to quantify the likely impact of proposed changes to future injury rates in

Queensland. This challenge to quantify robustly echoes the findings of Access Economics (2011) and the Productivity Commission (2010).

However, there are potentially significant social and economic benefits from the proposals put forward in Option 1. In particular:

- the reduction in risk of an underground mining disaster would have benefits for mine owners, mine workers and mining communities. In particular:
 - there would be less potential fatalities from a disaster. There were an average of 14 deaths from the mining disasters in Queensland between the 1970s and 1990s. As more miners are on-shift in larger mines in the present, fatalities could conceivably be even higher
 - the national Office of Best Practice Regulation has suggested that the value of an avoided death is \$4.3 million (in 2017 dollars). In addition to this, as a consequence of a fatality there are unquantifiable negative social and psychological impacts on the families, friends and communities impacted by the disaster
 - a mine would stand to lose significant income from the temporary closure of a mine as an investigation occurred – this can be a lengthy process
 - in addition to the temporary closure, it is likely there would be some sterilisation (permanent loss) of coal resources due to conditions being too dangerous around the impacted seam, and due to sensitivity over disturbing a grave site. Thirty million tonnes of coal were sterilised after the 1994 Moura disaster (internal NRM figures). It is not clear how much sterilisation has occurred after other mining disasters, or how much could be expected from a future Queensland underground coal mining disaster
- safer work practices are likely to result in a fall in injuries. Safe Work Australia (2012) weighted the standard Office of Best Practice Regulation's value of an injury-free year by the most common injuries in mining. This revealed a value of \$107 000 per injury free year (in 2017 dollars).

Illustrative quantification of safety benefits

As noted above, there is little evidence to support explicit modelling of the safety benefits for Option 1. However, some illustrative figures are presented here to help complement the costing analysis.

Using the Safe Work Australia figure for the value of injuries, and following their assumption of a two per cent growth in injuries per year in the status quo world due to increased employment:

- If Option 1 leads to a 1.5 per cent fall in injuries each year over the eight years that all new regulations are in, this is a benefit of \$1.2 million per year on average over the 10 year analysis period.

The present value of these injury reductions is \$8.3 million.

There is no evidence for the baseline risk of coal mining disasters in Queensland, or the potential impact of a disaster (especially about the permanent loss of coal resources that might occur). However, if:

- there is a five per cent baseline risk of disaster in underground coal mines (i.e. each year there is a five per cent risk that there will be an underground coal mining disaster)
- the reforms reduce the risk of an underground coal mining disaster by 15 per cent in each year.

Then the associated benefits could be:

- \$0.9 million per year for the avoided deaths, assuming the disaster leads to 28 deaths (double the average of deaths in pre-1994 Queensland disasters to reflect great number of workers per mine) and the national OBPR value for a statistical life
- \$0.96 million per year in reduced risk of loss in production for one year as the mine is shut for investigation. Here an average coal price of \$96/tonne is used (Office of the Chief Economist 2017) weighted by the average proportion of thermal and metallurgical coal produced by Queensland between 2007–08 and 2011–12. The net economic loss resulting from this loss of production is estimated at 70 per cent of the value of coal mining lost. This is based on data from national input-output tables (ABS 2009)
- \$1.4 million per year in reducing the risk of a permanent loss in coal (sterilisation) of 2 million tonnes (based on an average coal mine that has two-thirds of its resources remaining and loses one per cent to sterilisation). This is likely to be a conservative estimate as there is potential for far greater loss of coal resources after a disaster. Approximately, 33 million tonnes of coal was excluded from production at Moura after the 1994 disaster (DNRME internal sources).

The present value of these disaster risk reduction benefits is \$24.8 million.

In total, the safety benefits modelled in this illustrative example would be \$33.1 million, or **\$5.1 million in equivalent annual value**. If used in a net present value calculation with the Option 1 costs documented in the rest of chapter two, this would be a positive result of \$19.5 million (EAV \$3.0 million).

2.3 Statutory position holders and competency requirements - costs

There is a proposal to turn the existing critical safety role of ventilation officer into a statutory position at underground coal mines requiring a competency certificate. This will increase the status and credibility of the role of ventilation officer which could increase the safety culture in mines (Reason, 1997).

The Bill upgrades the competency required for a coal ventilation officer by requiring a certificate of competency through examination by the Board of Examiners. Ventilation officers at underground coal mines are in a safety critical position with responsibilities including ensuring adequate ventilation of the mine, overseeing any changes to the mine's ventilation system and the proper construction and maintenance of the mine's ventilation control devices, gas alarm level settings, and the measurement and recording of the mine's air quality including monitoring methane, and in general, noxious and flammable gases and other contaminants. The re-identification of CWP has shown the need for constant monitoring and vigilance of respirable dust and other risks to health and safety particularly in underground coal mines. The introduction of a certificate of competency for ventilation officers in underground coal mines will help ensure that ventilation officers have sufficient competencies to perform their safety-critical roles.

Note: it is envisaged that positions will not require new employees, but rather will be met by existing employees with new certification requirements.

Table 1 - number of statutory positions

Role	Number of mines	Number per mine	Total statutory positions	Assessment (assumed for purposes of this study)
Coal underground				
Certificates of competency already issued for underground mine manager, deputy; site senior executive already required to pass legislation exam so there will be no additional requirements for these positions.				
Ventilation officer	10	2	20	Board of Examiners written and oral exams

Costs

The proposal to increase the number of statutory position holders has implications for the cost of Option 1, as this means that certificates of competency will be required. Costs of achieving this harmonisation with New South Wales will fall on the underground coal mining industry. As noted above, it is not assumed that the new role will be filled by dedicated new full time staff, but rather that existing staff will have responsibilities that require certification. The cost of this certification is discussed here.

Certification cost increase

The number of positions requiring certificates through the Mines Legislation (Resources Safety) Amendment Bill 2017 is outlined in Table 1. When calculating the overall cost for the 10 year period, there is a three year transition period with no costs, then in year 4 the certification costs are imposed. Then there is allowance made for 10 per cent turnover p.a. after this initial period (i.e. for the last six years).

There is a cost associated with the position holders gaining their certification, made up of the time required for study and then actually sitting the exam.

For coal mines, there is a requirement to do Board of Examiners managed written and oral exams for the ventilation officer position. Sitting the written test is assumed to take three hours, and the oral test two and a half hours. Travel time to each test is assumed to take two hours as well. Workers spend approximately one week in exam preparation for each exam. The total time taken for the exams is 45 hours for written Board of Examiners exams, and 44.5 for oral Board of Examiners exams. In total, the time taken for the position that requires both a written and oral exam is 89.5 hours.

Examinations for ventilation officers go through the Board of Examiners process, and an allowance is made for those who have to re-sit the exam due to failing it the first time through. Based on the last three years of examination results for a non-SSE position (which is likely to be similar for the ventilation office position), for the oral exams there is an average 47 per cent failure rate. There is a 51 per cent failure rate on the written exams. It is assumed these applicants re-sit the exam once.

In total certification costs applicants approximately \$156,000 as a one-off cost.

Table 2 Summary of assumptions for statutory positions – Board of Examiners exam

Variable	Assumption/calculation
Number of statutory position holders	As per Table 1
Preparation time for written and oral test	1 week per applicant for each type of exam (2 weeks if doing both written and oral)
Travel time to tests	2 hours
Test time	3 hours written, 2.5 hours oral
Total time	45 hours for written Board of Examiners exams, and 44.5 for oral Board of Examiners exams
Percentage re-sitting exams	47% for oral exams, 51% for the written exams (this then adds on the costs for travel and re-sitting the exams).

Workload increase for DNRME and the Board of Examiners

Associated with the existing critical safety role of ventilation officer becoming a statutory position for coal mines requiring a certificate of competency is an increase in the workload for the Board of Examiners. This Board is made up of eight members consisting of three inspectors and five industry and union representatives. The inspectors write the exam. All members of the Board are responsible for marking written exams.

The oral panels are made up of one inspector (chair of the panel) and two industry representatives although sometimes there will be two inspectors and one industry representative on the panel, if only one industry representative is available.

Inspectors are responsible for developing and testing exam papers. At present, this takes one month of work for an inspector for the written exams. Assuming a 38 hour work week, and the average number of certificates issued in the last three years (65 certificates), this is approximately 2.4 hours of work per certificate issued.

Marking written exams takes 1.5 hours per exam for any member of the Board.

For the full Board of Examiners oral exam, inspectors spend approximately one month to prepare, assess and mark exams for 10 applicants. This is 15.2 hours per applicant.

The cost for the industry representatives consists of the time they spend marking written exams (1.5 hours per exam) and assessing oral exams (2.5 hours per exam plus one hour discussing candidate).

The number of applicants needing to re-sit their exams is based on the outcomes of Board of Examiners exams for the last three years. Based on the last three years of examination results, for the oral exams there is an average 47 per cent failure rate. There is a 51 per cent failure rate on the written exams. It is assumed these applicants re-sit the exam once.

These are conservative estimates as they do not incorporate any travel time for panel members.

The mine safety secretariat itself will face some increased costs of processing the new statutory certificates. Here it is assumed that it takes two hours per certificate.

The total cost to the industry and DNRME of preparing and marking all of these types of exams is approximately \$38,000.

Table 3 Summary of assumptions for Board of Examiners workload coal mine ventilation officer exams

Variable	Assumption/calculation
Number of certificates issued	As per Table 1
Number of Board members – written exam	3 inspectors + 5 industry/union
Number of Panel members – oral exam	1 inspector + 2 industry/union
Cost to Inspectorate – preparing written exam	2.5 hours per exam (1 month per written exam prepared, assuming only one per year here)
Cost to Inspectorate marking written exam	1.5 hours per exam (1 examiner per exam)
Cost to Inspectorate – oral exam	15.2 hours per exam
Cost to industry – written exam	1.5 hours per exam
Cost to industry – oral exam	3.5 hours per exam

Fees that help support the Secretariat are not considered in this analysis, as they represent a transfer of funds from one party to another, and thus do not change the overall outcome of the analysis.

2.4 Changed stone dusting requirements (underground coal mines only) - costs

A major hazard in underground coal mines is an explosion. A key method for reducing the risk of explosions in coal mines is installing explosion barriers, for example stone dust explosion barriers. Installing explosion barriers helps contain any explosion that occurs in an underground coal mine. There were four different options proposed for explosion barriers (see the Consultation RIS and its appendices for more details). For the purposes of this assessment, the cost of a distributed barrier is used as an indicator of the types of costs that might be incurred.

Average longwall panel length is around 3000 metres. A longwall of this size is generally extracted over a year. There are two roadways on the maingate side of the longwall where it would be practical to install distributed barriers for the full length. (This would also result in the bags having been preinstalled for the tailgate of the next longwall block). On average this is 6000 metres of bags hung for each longwall block.

Bags installed in mains development do not need to be hung for every metre developed. The barrier can be moved forward after each panel extension.

Assuming that there are 5 mains headings being developed and the barriers are 200 metres long, then this is an extra 1000 metres of bags installed.

This is a total of 7000 metres of distributed barrier per year for each mine. At a cost of \$29.20/metre this is a cost of \$204,000 per annum. Allowing for some labour costs to move the barriers forward in the mains area then a reasonable estimate would be between \$200,000 to \$250,000 total per mine.

There are currently 10 operating underground coal mines. The expected cost to industry as a whole would be in the order of approximately \$2.0 million dollars per year. This is approximately \$200,000 per mine.

2.5 Transitional costs for Option 1

The final quantified cost for Option 1 is the cost of re-training Inspectorate staff and safety officials in the mines for the new legislation. This is assumed to take two hours for Inspectorate staff. The current statutory position holders (one per metalliferous mine and four per coal mine) are assumed to need two hours to learn about the new legislation under this option. In total this costs approximately \$118 000. This is assumed to be the maximum learning time that this transition would require.

Table 4 - transitional costs for Option 1

Variable	Assumption/calculation
Training of Inspectorate (including time to train industry)	2 hours for all staff (approx. 50)
Training time for mining safety officials	2 hours for all current (not new) statutory position holders (approx. 477 people – four per coal mine and one per other mine)
Total annual transitional cost	\$118 000

3.0 Option 3 costs and benefits

3.1 Overview

Option 3 is to develop new mine safety legislation primarily based on the Model Act, and NMSF provisions that increase safety and health and consistency. This would involve moving from Queensland's current two mine safety Acts to one based on the Model Act, which would involve significant changes.

The costs and benefits that were quantified in Option 1 (statutory positions and stone dusting) apply to Option 3 as well. Additional costs and benefits are detailed below. Consistent with the illustrative example of quantified safety benefits included for Option 1, the benefits for Option 3 (less reduction in injuries that do not apply to Option 3) are \$24.8 million (present value) or \$3.8 million in equivalent annual value. If used with the costs presented, the net present value would be -\$102 million, or -\$15.8 million in equivalent annual value. This clearly indicates that Option 3 is unlikely to be beneficial.

3.2 Benefits

The level of improvement in safety benefits predicted in the Safe Work Australia national RIS (2012) for Model core mining Regulations is unlikely in Queensland as Queensland already mostly has comparable provisions to those in the core mining Regulations. Any improvements from the core process can also be adapted to the framework of Option 1 and not only the Option 3 framework.

If the Mining Acts are combined and changed to be primarily based on the Model Act, it is likely that safety will be impeded by factors including:

- less clear and precise legislation and regulation and an increase in the number of provisions to be interpreted
- replacement of a clear mining specific risk management approach with a general workplace Model Act
- replacement of inspectors' proactive directives with infringement and prohibition notices, unless there are modifications to infringement and prohibition notices to make them more proactive;
- inspectors will not be able to exercise powers remotely
- potential damage to Queensland's current 'safety capital'. Safety capital is the 'bundle of systems, processes, controls, training, behaviours and attitudes which derive from the safety culture in an organisation' (Tooma 2011). As the current safety system was developed following coal mining disasters in Queensland by inspectors, industry and unions, a piece of legislation developed at a national level generically for all general workplaces is less likely to have support.
- inspectors will not be mining specialists
- contractor management will be less easily clarified and improved under this option.

For this reason the safety benefits (reduction in injuries) quantified in Section 2.2 do not apply for Option 3.

3.3 Costs

As discussed in Section 3.2, there may be a fall in safety standards if Option 3 is introduced. This will have a cost for the mining businesses, miners and their communities. This cost has not been quantified as there is no available modelling to indicate what the safety impact could be.

An additional cost to Option 3 that has been quantified is the cost of re-training Inspectorate staff and safety officials in the mines for the new legislation. This is assumed to take three weeks for Inspectorate staff, which includes time to communicate the changes to industry. This is based on the 12 days required to re-train Justice and Attorney General Workplace Health and Safety Queensland staff in 2011 when the new Work Health and Safety laws were introduced. The current statutory position holders (one per metalliferous mine and four per coal mine) are assumed to need one week to learn about the new legislation under this option. All mine workers are assumed to need three days to learn the new legislation. This is based on current employee numbers of 57 313 workers, with the assumption new workers in the future do not face additional learning costs to what they would already have had to learn. This leads to a significant cost of \$113.9 million in transition costs.

Table 5 - transitional costs for Option 3

Variable	Assumption/calculation
Training of Inspectorate (including time to train industry)	3 weeks each
Training time for mining safety officials	1 week each
Learning time current employees	3 days
Total transitional cost	\$113.9 million

To date, Queensland's stakeholders have consistently indicated a strong preference to keep separate mining safety Acts for the coal and metalliferous sectors.

The costs associated with explosion barriers and additional statutory positions also apply under Option 3 as well as Option 1.

4.0 Summary of costs and benefits

4.1 Overall cost

The Present Value (PV) of costs is presented in Table 10. These represent the future value of costs over the 10 year policy period in today's value. The total cost of Option 1 is \$13.7 million, and the total cost of Option 3 is a significantly higher \$127 million.

Table 6 – Present value of costs

	Option 1	Option 3
Present value of costs	\$13,668,859	\$127,447,762
Equivalent annual value	\$2,097,985	\$19,561,507

Discount rate seven per cent over 10 years

Another way of looking at this information is to present it as an annual figure. The Equivalent Annual Value¹³ is approximately \$2.1 million per year for Option 1 and \$19.6 million per year for Option 3. Although this is a societal cost, it is likely to be borne in the most part by the mining industry.

Explosion barriers represent \$2.0 million per year (equivalent annual value), and the cost associated with the new statutory position is \$38,000 (equivalent annual value). Transitional costs for training inspectors and those in responsible safety critical positions at mines are estimated to be \$118,000.

In the Consultation RIS, it was decided not to present a net present value calculation in the absence of credible data, therefore, the benefits were not taken off the overall costs, but were included as an indicative benefit.

4.2 Distributional impacts

A detailed distributional analysis was not undertaken for this report as there was not expected to be a wide distribution of costs and benefits between different sectors. For this reason transfer values (which are payments that essentially shift the same resources from one sector to another) such as royalties have not been included.

In general, the costs will be borne by the mining sector. This is not only due to the direct costs of the policy options (such as explosion barriers) but because there is an industry levy that funds the mines safety inspectorate. In particular, the costs will be borne by underground coal mines, as the explosion barriers are the main new cost of the proposed regulations. As a result, there are limited costs to government or the wider community from either policy option.

The benefits of the policy options are likely to be felt by mining companies (for example through reduced risk to production) and mining employees and contractors. A recent report estimated that workers and their families bear almost three-quarters of the cost of injuries (PC 2012). Mining communities will also benefit from the reduction in injuries and risk of mining disaster.

¹³ This is calculated by dividing the NPV by an annuity factor, $\frac{(1+r)^n - 1}{(1+r)^n * r}$, which is 6.515

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