Department of Primary Industries

Regulatory Impact Statement

Amendments to the Mineral Resources Development Regulations 2002

May 2010

PRICEWATERHOUSECOOPERS

Disclaimer

This Regulatory Impact Statement was prepared for the Department of Primary Industries.

In preparing this Regulatory Impact Statement we have only considered the circumstances of the Department of Primary Industries. Our Regulatory Impact Statement is not appropriate for use by persons other than the Department of Primary Industries, and we do not accept or assume responsibility to anyone other than the Department of Primary Industries in respect of our Report.

Regulatory Impact Statement

This Regulatory Impact Statement (RIS) has been prepared to fulfil the requirements of the *Subordinate Legislation Act 1994* and to facilitate public consultation on the proposed *Mineral Resources Development (Mining) (Amendment) Regulations 2010*. A copy of the proposed Regulations is provided as an attachment to this RIS.

This RIS will consider the nature and extent of the problem that the Regulations are designed to overcome, state the objectives of the Regulations and explain the potential impacts of the Regulations. It will assess the costs and benefits of the proposed Regulations compared to the potential net benefits of other viable options for regulation. Consideration of any possible impacts of the proposed Regulations upon small businesses and competition within Victoria will also be explored.

Public comments and submissions are invited on the proposed Regulations, in response to information provided in this RIS. All submissions will be treated as public documents. Written comments and submissions should be forwarded no later than 5pm on Monday 14 June 2010 to minerals.ris@dpi.vic.gov.au or to:

Earth Resources Policy Unit

Department of Primary Industries

1 Spring Street

MELBOURNE VIC 3001

PRICEWATERHOUSECOOPERS

Acronyms

Acronym	Full text
DPI	Department of Primary Industries
DTF	Department of Treasury and Finance
EES	Environment Effects Statement
ESC	Essential Services Commission
GWh	Gigawatt Hour
MCA	Minerals Council of Australia
MRSDA	Mineral Resources (Sustainable Development) Act 1990
MWh	Megawatt Hour
NPV	Net Present Value
OHS	Occupational Health and Safety
PEA	Planning and Environment Act 1987
RIS	Regulatory Impact Statement
SECV	State Electricity Commission of Victoria
TRB	Technical Review Board
VPPs	Victorian Planning Provisions

Glossary[1]

Term	
Aquifer	A layer of relatively porous rock or soil that contains and transmits groundwater.
Batter	General reference to the open cut mine wall, including individual benches.
Bench	One of the smaller steps in the overall batter face, inclined at a steeper angle than the overall batter and separated by berms.
Berms	The flat section of the open cut mine wall between benches.
Block sliding	The sliding of a mass of soil or rock by essentially horizontal translation along a weak zone or defect.
Crack	A separation in the coal caused by excavation, ground movement or water presence.
Creep	Ongoing time dependent movements of either the batter or the mine floor that occur as a result of excess stress and/or marginal stability.
Dewatering	Removal or drainage of water from behind the mine walls or floor, typically using horizontal bores or pumped wells. This term is also often used to refer to the depressurisation of aquifers.
Geotechnical	The engineering behaviour of rocks and soil.
Groundwater	Water occupying openings, cavities and spacings in soil or rock.
Hydrogeology	The study of the distribution and movement of groundwater in soil and rock.
Interseam	The layers of soil or rock between coal seams.

[1] Derived from the Mining Warden's Report, p 105 – 107.

Contents

1 Executive summary

The Victorian mining industry is primarily regulated under the *Mineral Resources (Sustainable Development) Act 1990* (the MRSDA) and the associated *Mineral Resources Development Regulations 2002* (the Principal Regulations). The Principal Regulations have provided the basis for the regulation of the mining industry for the past eight years. The Principal Regulations will expire in 2012.

Background

On the 14 November 2007, the Yallourn brown coal mine's northern batter of the East Field pit suffered a major collapse resulting in around six million cubic metres of material shifting 250 metres into the mine pit. Although no one was injured, this collapse caused environmental damage (diversion of the Latrobe River into the mine), collapsed an internal road at the mine and caused disruption to the normal operation of the mine.

In response to the Yallourn mine collapse, two inquiries were established, one by the Mining Warden and the other an Inspectorate Investigation undertaken by the Department of Primary Industries (DPI). The Mining Warden's report, *Mining Warden Yallourn Mine Batter Failure Inquiry,* found that although available data showed signs that a collapse was imminent, the lack of specialised knowledge of the unique geological characteristics of the Latrobe Valley mines meant that the data had been interpreted incorrectly.[2]

This Regulatory Impact Statement (RIS) finds that there are potential catastrophic consequences of a mine collapsing, in particular consequences for public and infrastructure safety, environmental damage and loss of electricity supply. The types of impacts that could occur include:

- loss of life or injuries to members of the public (e.g. if travelling on public infrastructure (roads, bridges, rail) or situated on land at time of collapse)
- environmental damage (e.g. disruption to rivers, contamination of water, collapse of land requiring rehabilitation)
- interruptions to services (e.g. primarily electricity but also pipelines, etc).

When conservatively estimated, it is expected that the external cost of a collapse could be almost $162 million. Such costs can be borne by industry, government and the public.

---

[2] Available on the 'What's New' section of the DPI website, www.dpi.vic.gov.au. The *Government Response to the Mining Warden Inquiry into Yallourn Mine Batter Failure* is also available at the DPI website. Victorian Government Printer (30 June 2008), Victorian Government (2008), *Mining Warden Yallourn Mine Batter Failure Inquiry,* p. v.

This RIS finds that the Principal Regulations do not adequately address the possibility of a catastrophic event occurring. It finds that the Principal Regulations do not allow sufficient incentives for current industry participants to share existing information or invest in new expertise and knowledge.

It also finds that there is significant uncertainty and risk associated with brown coal mines due to the unique geological characteristics of brown coal. This risk may not be properly addressed as the mine operators are unaware of the issues, do not have appropriate systems to monitor and manage such risk, or there are insufficient incentives to invest in new expertise or knowledge.

The primary objective of government intervention in relation to this problem is to minimise the risk of a collapse or other significant event in mines. The secondary supporting objectives are:

- improvement in management of safety and infrastructure risks
- improvement in management of the environmental risks
- improvement in management of the electricity supply risk
- sharing of knowledge to improve mine stability
- reduced uncertainty and risk of a mine collapse
- appropriate cost recovery from industry in relation to certain activities is implemented.

Legislative changes have already been put in place as part of the Government Response to the Mining Warden Inquiry into the Yallourn mine batter failure via the Energy and Resources Legislation Amendment Act 2009. Regulations are required to support these legislative changes.

However, it should be noted that, due to the nature of the risks and impacts associated with the regulatory problem outlined in this RIS, some activities have been undertaken in anticipation of their commencement. The following has occurred or is currently taking place:

- the Technical Review Board has been established, and four members of the Board have been appointed. Three meetings have taken place. The Board has undertaken work, including site visits and reviews of reports.
- the funding agreement for five years with Monash University has been executed and the program plan has been developed. An Advisory Committee comprising of industry and other stakeholders has also been set up.
- DPI has undertaken lessons learnt workshops and is drafting guidelines in relation to mine stability. DPI capacity has also been enhanced with the employment of a senior hydrogeologist and two inspectors. DPI is in the process of engaging a geotechnical engineer. DPI has also undertaken initial mine audits.

Industry will not be required to retrospectively contribute to the initial cost of the above activities. The costs are being met by Government in order to ensure risk management activities start as soon as possible and deliver benefits to industry and the community as soon as possible. However, once the amending Regulations are in place, industry will be required to contribute to the ongoing cost.

It should be noted that any feedback that stakeholders would like to provide during the consultation phase of this RIS will not be limited by the initiation of these elements of the proposed Regulations.

Options considered

A number of alternatives to address the problem and the objectives have been analysed. These include:

- **Option 2 (a)–(d)**: Amend existing Regulations to:
  - include prescribed information to address mine stability in work plan requirements
  - require declared mines to provide biannual reports
  - require reports where a prescribed event occurs
  - establish a fee for service

  for a ten year period.
- **Option 2 (e)–(g)**: Amend existing Regulations to:
  - include prescribed information to address mine stability in work plan requirements
  - require declared mines to provide biannual reports
  - require reports where a prescribed event occurs
  - establish a fee for service

  for a two year period.
- **Option 3:** Change licence conditions to:
  - include prescribed information to address mine stability in work plan requirements
  - require declared mines to provide biannual reports
  - require reports where a prescribed event occurs
  - require coal mines to establish their own Technical Review Board
  - establish a fee for service.
- **Option 4:** Adopt a co-regulatory approach which includes:
  - the development of codes of practice by industry.

Analysis of costs and benefits

It is intended that any option to address the regulatory problem will run for ten years. This is consistent with representations made to industry about the initiative when it was developed. Furthermore, it is intended that there will be a review of various aspects in the fourth and fifth year of operation. However, the reality is that the Principal Regulations will expire in 2012 and therefore, it is likely that long term potential impacts will not fully present themselves within a two year timeframe.

As such, each of the options set out consequences over a ten year period, even where regulations may only be in place for two years under the particular option. Therefore, consideration has been given to two year and ten year options. The Regulations will again be considered in 2012 when more data is available on whether the changes should be retained for a longer period.

Within this RIS a cost-benefit analysis of each of the options was conducted, compared with maintaining the current Regulations (Option 1: the base case). All costs and benefits have been made as incremental to the base case (current Regulations) and therefore the cost of the current Regulations has not been considered in the analysis. The analysis found that each of the options presents a net benefit compared to the base case.

One of the more critical assumptions in the analysis is the approach used to value the benefits. The analysis uses an illustrative approach to value the benefits of each option using a likelihood value of a collapse occurring in each of the options over a ten year period. For example, under Option 2 (e) it is expected that the likelihood of a collapse occurring in each year of the analysis is 0.75 per cent. This likelihood is multiplied by the consequence to obtain the cost of an event occurring. The cost of an event under each option is compared with the base case to estimate the “avoided costs” or benefits. While this approach has been used, it should only be treated as illustrative of one approach that can be used to assess each of the options against the base case. The real value is in the ability of each option to avoid the consequence of a catastrophic event.

DPI expertise has been used to estimate the following likelihoods in relation to an event occurring.

Table 1.1 Estimated likelihood of an event occurring

	Estimated likelihood (%)
Option 2 (a)	3.00%
Option 2 (b)	0.45%
Option 2 (c)	0.45%
Option 2 (d)	0.45%
Option 2 (e)	0.75%
Option 2 (f)	0.75%
Option 2 (g)	0.75%
Option 3	0.90%
Option 4	2.10%

Using these likelihoods the following costs of, and benefits (avoided costs) associated with each of the options are set out in Table 1.2. The costs associated with the preferred option are estimated to be $5,437,028. The benefits due to avoided costs associated with the implementation of the Regulations for two years are expected to be $31,338,423.

Table 1.2 Summary of costs and benefits

	Costs 10 yr NPV ($)	Benefits 10 yr NPV ($)	Net outcome 10 yr NPV ($)
Option 2 (a)	$22,282,538	$35,516,879	$13,234,341
Option 2 (b)	$22,282,538	$35,516,879	$13,234,341
Option 2 (c)	$22,282,538	$35,516,879	$13,234,341
Option 2 (d)	$22,282,538	$35,516,879	$13,234,341
Option 2 (e)	**$5,437,028**	**$31,338,423**	**$25,901,394**
Option 2 (f)	$5,437,028	$31,338,423	$25,901,394
Option 2 (g)	$5,437,028	$31,338,423	$25,901,394
Option 3	$9,432,985	$29,249,195	$19,816,209
Option 4	$215,091	$12,535,369	$12,320,278

There has been some discussion relating to the expected likelihoods and therefore DPI seeks feedback from industry and community members through submissions to this RIS as to the expected likelihoods. To take into account consideration for a variation in likelihood we have set out a range of the ten year net outcome under different likelihoods.

Table 1.3 Summary of all options (ten year NPV)

	10 year net outcome Low likelihood – 2.3% ($)	10 year net outcome Expected likelihood – 3% ($)	10 year net outcome High likelihood – 10% ($)
Option 2 (a)	$4,947,070	$13,234,341	$96,107,059
Option 2 (b)	$4,947,070	$13,234,341	$96,107,059
Option 2 (c)	$4,947,070	$13,234,341	$96,107,059
Option 2 (d)	$4,947,070	$13,234,341	$96,107,059
Option 2 (e)	**$18,589,096**	**$25,901,394**	**$99,024,381**
Option 2 (f)	$18,589,096	$25,901,394	$99,024,381
Option 2 (g)	$18,589,096	$25,901,394	$99,024,381
Option 3	$12,991,397	$19,816,209	$88,064,330
Option 4	$9,395,359	$12,320,278	$41,569,473

Using a conservative estimate of a likelihood of 3 per cent of an event occurring under the current Regulations Options 2 (e), (f) and (g) present the highest net outcome at almost $26 million over the ten year period. The difference between each of these options is who bears the cost of the Regulations. It is assessed that as both Government and industry will benefit from the implementation of the Regulations the costs should be equally shared. This is achieved under Option 2 (e), and therefore, this option is the preferred option.

The preferred option requires a number of changes to the Principal Regulations, including:

- requiring declared mines to include prescribed information in work plan requirements
- requiring declared mines to provide biannual reports
- requiring verbal and written reports where a prescribed event occurs
- establishing a fee for service ($1.25 million) for Latrobe Valley region coal mines. This fee represents half of the cost of the intervention, with the other half of the cost to be met by the Government (totalling $2.5 million).

The preferred option (see Appendix F) will also include changes to streamline some exploration approvals to work effectively with cultural heritage requirements under the *Aboriginal Heritage Act 2006* (AHA). The Regulations also remove some redundant Occupational Health and Safety (OHS) references, as OHS is now regulated by WorkCover under OHS specific Regulations. These changes do not impose “an appreciable burden” on any sector of the public due to the fact that it does not impose any additional requirements or obligations, it is a purely machinery change. Therefore, this aspect of the amendments to the Principal Regulations will not be covered in any detail as part of this RIS (please refer to Sections 11.4 and 11.5 of this RIS for further explanation).

Impact of the preferred option on competition and small business

It has been determined that the preferred option will not adversely impact upon small business nor competition within the market.

The impact of the preferred option upon small business is expected to be negligible. Small mines are highly unlikely to ever be of a scale that will require declaring the mine as posing a risk to the public, the environment or public infrastructure. The only amendment that will impact upon small business is the notification requirements in relation to reportable events, which is expected to impose a minimal cost on individual operators who lodge a report.

Change in administrative burden

It has been determined that the regulatory framework for the preferred option is not sufficiently detailed to enable a Victorian Regulatory Change Measurement (RCM) of the changes to the administrative burden to be conducted as part of the RIS.

An ex-post measurement of the changes to the administrative burden will be conducted and an RCM Report will be provided to Victorian Competition and Efficiency Commission (VCEC)

within three months of the commencement of the proposed Regulations.

Implementation and Enforcement Issues

It is expected that there will not be any transitionary issues associated with the commencement of the Proposed Regulations, as the requirements are clear and do not present any difficulties to pre-existing licence holders in terms of transitional arrangements.

Due to the nature of the risks associated with the regulatory problem outlined in this RIS, the Government has undertaken some aspects of the Regulations in anticipation of their commencement. DPI will continue to provide information to industry to ensure that operators are aware of the Proposed Regulations.

It is expected that there will be uniform compliance with the Regulations. However, DPI, as regulator, will undertake enforcement activities available under the MRSDA as required. This may include education, inspections, audits, and prosecutions. Inspectors will also have the power to issue directions or penalties as part of enforcement activities. For example, DPI will issue section 110 notices (order to cease work) and directions in the event of non-compliance.

Penalties may also be issued, ranging from infringement penalties of ten units ($1169.00) to penalties available under the MRSDA.

Evaluation strategy

The preferred option will be subject to an ongoing evaluation strategy. This strategy will consider baseline data, such as industry and DPI data, and key performance indicators (i.e. implementation of mine stability plans). Ongoing consultation with stakeholders will also take place through mechanisms such as DPI's regular industry forums.

The preferred option will be subject to further robust scrutiny when the *Mineral Resources Development Regulations 2002* (which the Proposed Regulations amend) expire in 2012. As part of good regulatory practice all aspects of these regulations will be thoroughly reviewed prior to making new regulations.

The Technical Review Board will be reviewed after 18 months of operation and during its fourth year of operation, as publicly stated by DPI. The TRB will also provide annual reports to the Minister. The research and development program will be reviewed in its fifth year and the program will also submit six monthly progress reports to DPI.

Consultation

Following the tabling of the Mining Warden's report and the Government Response in Parliament on 4 December 2008, relevant stakeholders were consulted about the implementation of the Government's Response.

Ongoing consultation has taken place with industry, with meetings held between December 2008 and February 2010. This consultation has involved DPI, the three major coal mines and the Minerals Council of Australia (MCA).

It has been evident from consultation that industry has opposed some aspects of the Proposed Regulations (e.g. the levy, government involvement in research and development). However, industry has nominated that the levy be split equally between the prescribed mines and has agreed to Government involvement in the research and development program. Industry has participated in an advisory committee in relation to research and development and was involved in the development of the agreement with Monash University. The declared mines and the MCA also participated in a working committee for the Terms of Reference and guidelines for the Technical Review Board.[3] The MCA also acted as an industry participant on the selection panel for the Technical Review Board.

It should also be noted that as part of this RIS industry was consulted about the estimated costs associated with the preferred option. The estimates obtained were varied and anecdotal. To the extent to which they could be used in the analysis, they have. In particular, the cost for the variation of a work plan to include a mine stability plan has been based upon the actual costs ($150,000) provided by one of the mines to be declared in relation to a variation. The cost, which includes the cost of the mine stability plan and other variation to the work plan, has been used as an estimate within this RIS. The other two mines have commenced a variation which has not yet been approved and are yet to commence the variation respectively. Consequently, the cost estimates from these mines were not based on actual costs and were not used within this RIS.

This RIS will be made available for a public consultation period of 28 days, commencing on 17 May 2010. DPI welcomes industry and community input especially in relation to the expected likelihood of a collapse occurring under the base case and each of the options and the cost of each component to be funded under the mine stability levy.

All submissions will be treated as public documents and will be made available to other parties upon request.

[3] See Appendix G

Conclusion

This Regulatory Impact Statement concludes:

- the benefits to society of the Proposed Regulations exceed the costs
- the net benefits of the Proposed Regulations are greater than those associated with any practicable alternatives
- the Proposed Regulations do not impose restrictions on competition.

2 Introduction

2.1 Changes to the regulation of mining in Victoria

The Victorian mining industry is primarily regulated under the *Mineral Resources (Sustainable Development) Act 1990* (the MRSDA) and the associated *Mineral Resources Development Regulations 2002* (the Principal Regulations). The Principal Regulations have provided the basis for regulating the mining industry for the past eight years.

On the 14 November 2007, the northern batter of the East Field pit of the Yallourn mine collapsed, shifting 250 metres into the mine pit. As noted by the Mining Warden, "the failure was very large, it encompassed about six million cubic metres of material, was 500 metres long and occurred on a slope that was approximately 80 metres high."[4]

In response to the Yallourn mine collapse, two inquiries were established, one by the Mining Warden and the other an Inspectorate Investigation undertaken by the Department of Primary Industries (DPI). The Mining Warden's report found that although available data showed signs that a collapse was imminent, the lack of specialised knowledge of the unique geological characteristics of the Latrobe Valley mines meant that the data had been interpreted incorrectly. [5] Further details of the collapse are contained in section 4.1 and Appendix A of this RIS.

A number of legislative changes have been introduced in response to the collapse. These legislative changes (set out in Chapter 4) deal principally with brown coal mines in the Latrobe Valley and subsequent changes are to be made to the Principal Regulations.

In support of the proposed changes to the Principal Regulations, section 10 of the *Subordinate Legislation Act 1994* requires that a regulatory impact statement (RIS) be prepared in respect of a proposed statutory rule or amendment unless an exemption is granted. This RIS formally analyses the appreciable burden on a sector of the public of the proposed new regulations against the requirements in the *Victorian Guide to Regulation*.[6]

The *Victorian Guide to Regulation* requires that regulation should not be introduced, remade or adjusted without clear justification. Therefore, it is necessary to demonstrate the existence of a problem or that there are problems to which the

---

[4] Victorian Government (2008), *Mining Warden Yallourn Mine Batter Failure Inquiry*, p i.

[5] Victorian Government (2008), *Mining Warden Yallourn Mine Batter Failure Inquiry*,, p v, p96.

[6] Victorian Government (2007), *Victorian Guide to Regulation*, pp. 3–4

market will not, on its own, provide a satisfactory response. Where there is a circumstance in which the market will not provide a satisfactory response, there may be a need for government intervention of some kind. Alternatively, government intervention may be justified to implement important social welfare objectives which the market would not otherwise deliver. In determining whether there is a role for government intervention, there must be some form of overarching policy rationale. In the case of brown coal mining in the Latrobe Valley, this includes the potential impacts on the safety of the community and infrastructure surrounding each mine, the environment and the security of electricity supply to the state of Victoria.

This RIS sets out the objectives of the proposed amendments, explains their effect, assesses the dimensions of the problem that the proposed amendments seek to address and provides an estimate of the likely impacts—that is, costs and benefits—of a range of alternatives to address the problem, including the proposed amendments.

2.2 Structure of this Regulatory Impact Statement

This RIS is largely concerned with amendments to regulations which will relate to mining activities, as opposed to exploration.

The analysis in the RIS:

- identifies the background to the Victorian brown coal mining industry (Chapter 3)
- outlines the background to legislative changes (Chapter 4)
- identifies the nature and extent of the problems to be addressed by the proposed scheme (Chapter 5)
- outlines the objectives of the proposed scheme (Chapter 6)
- outlines alternative policy options to be considered in the RIS (Chapter 7)
- assesses the costs and benefits of the alternatives (Chapter 8)
- evaluates the alternatives against the objectives set out in Chapter 5 (Chapter 9)
- discusses other considerations relevant to the policy options such as the potential impacts on small business and competition (Chapter 10)
- provides a description of the preferred model (Chapter 11)
- provides a summary of stakeholder consultation undertaken (Chapter 12).

3 Background to the industry

This chapter presents an overview of the industry to provide context for the discussion on the problems in the brown coal mining industry and the regulatory options.

3.1 The mining industry

Under legislation, mining means "extracting minerals from land for the purposes of producing them commercially, and includes processing and treating ore."[7] Minerals are defined as "any substance which occurs naturally as part of the earth's crust– including:

- oil shale and coal
- hydrocarbons and mineral oils contained in oil shale or coal or extracted from oil shale or coal by chemical or industrial processes
- any substance specified in schedule 4 (i.e. bentonite, fine clay, kaolin, lignite, minerals in alluvial form including those of titanium, zirconium, rare earth elements and platinoid group elements, quartz crystals and zeolite)
- excluding water, stone, peat or petroleum."[8]

A variety of mining activities take place in Victoria, with approximately 236 mining licences currently in place.[9] According to the DPI Statistical Review (2007-08), Victorian mineral production continues to be dominated by brown coal and gold.[10]

3.2 Brown coal mining

Australia has almost one-quarter of the world's brown coal reserves.[11]

While brown coal is present in all states of Australia, the vast majority of brown coal is located in Victoria, particularly in the Latrobe Valley. It contains some of the thickest coal seams in the world (up to 330m thick), and holds and produces (96 per cent and 98 per cent respectively).[12]

---

[7] Section 4 of the *Mineral Resources (Sustainable Development Act) 1990.*

[8] Ibid.

[9] Department of Primary Industries (2008), *Statistical Review 2007-08*, p. 7.

[10] Ibid., p. 4.

[11] IBISWorld (2009), *Industry Report B1102, Brown Coal Mining in Australia*, October

[12] Brown Coal (2009), Content maintained by Ron Sait, *Australian Mines Atlas*, www.australianminesatlas.gov.au (accessed 12 November 2009).

In 2007-08, Victoria's brown coal production was 66,033,000 tonnes.[13] Brown coal production is largely undertaken by electricity generation companies in the Latrobe Valley—International Power Hazelwood, Loy Yang Power Management Pty Ltd and TRUenergy Yallourn Pty Ltd.[14] The largest producer is Loy Yang followed by Hazelwood and Yallourn.[15] The other brown coal miner is Alcoa Australia Ltd, which produces brown coal at Anglesea to generate electricity for its Point Henry aluminium smelter.[16] The Maddingley Brown Coal Company also produces a very small amount of coal at Bacchus Marsh, mainly for fuel and soil conditioning purposes.[17]

Although the great bulk of the brown coal mined at Hazelwood, Loy Yang and Yallourn is used to generate electricity, briquettes are also manufactured.[18]

3.2.1 Hazelwood mine

The Hazelwood Power Station Mine covers over 800 hectares. It is about the size and depth of Uluru (the perimeter is over 14.5 kilometres in length) and supplies the 1,600 megawatt power station. The coal is covered by overburden which is made up of clay, gravel and top soil. This must be removed before the coal can be mined, although the top soil is reclaimed for rehabilitation work. The average depth of overburden is 18 metres and the average depth of the coal is around 100 metres although in many places the coal depth can vary.

The mine produces about 18 million tonnes of brown coal per year.[19] The mine includes four dredgers, four conveyors to carry coal out (over 50 kilometres of belt) and a processor.

3.2.2 Loy Yang Mine

This mine is the largest mine in the Latrobe Valley supplying coal to two power stations, Loy Yang A and Loy Yang B. These two power stations have a combined maximum electricity generation of 3,236 megawatt equating to approximately 50 per cent of Victoria's electricity.[20] Loy Yang Power supplies

---

[13] Department of Primary Industries (2008), *Statistical Review 2007-08*, p. 10.

[14] Ibid., p. 13.

[15] Ibid.

[16] Ibid.

[17] Ibid.

[18] Ibid.

[19] International Power Australia (2009), *International Power*, http://www.ipplc.com.au (accessed 16 December 2009); IBISWorld (2009), *Industry Report B1102: Brown Coal Mining in Australia*, October 2009, p. 29.

[20] IBISWorld (2009), *Industry Report B1102: Brown Coal Mining in Australia*, October, p. 18.

one third of Victoria's electrical energy needs[21] and Loy Yang B supplies 17 per cent of Victoria's power needs.[22]

The open cut 650 hectare mine produces more than 30 million tonnes of brown coal per annum.[23] The mine includes four coal dredgers and two transport conveyors.

3.2.3 Yallourn Mine

TRUenergy owns the 1,450 megawatt Yallourn power station in Victoria and the associated brown coal mine, which produces about 18 million tonnes of brown coal per year. The mine's bucket wheel coal dredgers have been replaced with large satellite-guided bulldozers. These bulldozers are capable of pushing at least 2,400 tonnes of coal per hour to a feeder breaker, which loads it onto a moving conveyor for delivery to the power station's furnaces. More than 38 kilometres of conveyors are located in the mine for carrying coal to the power station.[24]

3.3 History of brown coal mining and power stations

There are three separate companies which mine brown coal in the Latrobe Valley for electricity generation, but there is a long history to the current structure of the industry.

A state owned brown coal fuelled power station was established in the Latrobe Valley following on from recommendations from the Advisory Committee on Brown Coal in 1917.[25] In 1921, the Government established the State Electricity Commission of Victoria (SECV).[26] In 1924, the SECV took over the operations of the Great Morwell Brown Coal Mine (which delivered coal to a temporary power station in Yallourn).[27] Over the next 50 years, the SECV responsibilities were further expanded to include developing and planning new mines and power stations. Increasing electricity demand in the early 1950s saw Hazelwood power station built followed by Yallourn in the 1970s and then Loy Yang in the 1980s.

---

[21] Loy Yang Power (2010), *Fast facts,* http://www.loyyangpower.com.au (accessed 18 January 2010).

[22] International Power (2010), *Loy Yang B Power Station*, http://www.ipplc.com.au/Page.php?iPageID=141 (accessed 18 January 2010)

23 Loy Yang Power (2010), *Fast facts,* http://www.loyyangpower.com.au (accessed 18 January 2010).

[24] Ibid., p. 22.

[25] Heritage Council of Victoria, *Coal Mining Heritage Study in Victoria* (March 2008), p. 8.

[26] Ibid., p. 9.

[27] Ibid., p. 49.

In 1991, a Commonwealth Government Industry Commission Inquiry into Energy Generation and Distributions recommended that extensive privatisation of electricity generation and distribution assets of Electricity Supply Authorities throughout Australia be undertaken.[28]

Between 1993 and 1996, the SECV was disaggregated and privatised following a series of review and inquiries. In 1994, the State owned coal mines of Yallourn, Hazelwood and Loy Yang were disaggregated into separate power generation businesses. The current power generation and brown coal mining companies were established in 1996, following amendments to the *Electricity Industry Act 1993* and the deeming of mining licences under the *Mineral Resources Development Act 1995* (MRSDA).

3.4 History of technical expertise in the brown coal industry

The SECV was responsible for the management of all three Latrobe Valley Coal Mines prior to the privatisation of the power generators and brown coal mining companies in the 1990s. This included managing mine stability. It employed geotechnical and hydrogeological expertise to analyse and interpret data to mitigate against any risks associated with a mine collapse. DPI estimates (based on information from previous SECV employees) that in the early 1990s the SECV employed approximately seven to ten people in each of the three Latrobe Valley Coal Mines to oversee the management of the mine at the mine site with approximately 20 people also employed to act as a centralised technical support service. In addition, external contractors who had specialist expertise in mine geology, artesian dewatering, mine stability and modelling were also contracted to assist the SECV manage the three Latrobe Valley Coal Mines.

Statements from previous employees of the SECV indicate that employees were very well trained and were encouraged to undertake courses, masters and PhDs relating to geotechnical studies which were funded by the SECV.

After privatisation management of geotechnical and hydrogeological assessment became the responsibility of the mining operator.

[28] Commonwealth Government Printer (1991), Industry Commission Inquiry Report – Energy Generation and Distribution. http://www.pc.gov.au/ic/inquiry/11energy, (accessed February 2010)

3.5 Summary

Brown coal mining is unique to Victoria, with Victoria holding 96 per cent of all reserves within Australia, and with Australia holding 25 per cent of world brown coal reserves.

The brown coal industry in Victoria is dominated by three major players – International Power Hazelwood, Loy Yang Power Management Pty Ltd and TRUenergy Yallourn Pty Ltd. They are three separate companies who compete for the supply of electricity to domestic and business consumers here in Victoria and the wider national electricity market.

Prior to 1996, the brown coal mining and electricity generation was managed by the SECV. The industry has only recently been privatised, with arrangements relating to technical expertise now being the responsibility of each mine operator. The full extent of the risks associated with decentralising the responsibility for technical expertise may take some time to materialise. Any regulatory change needs to consider the potential for considerable time for the risks to become apparent, the likelihood and consequences if the risks do result in problems, and alternative approaches for addressing these risks.

4 Background to the recent changes

The *Mineral Resources (Sustainable Development) Act 1990* (MRSDA) regulates the Victorian mining industry. The stated purpose of the MRSDA, as it relates to mining, is to encourage commercially viable mining industries which make the best use of resources in a way that is compatible with the economic, social and environmental objectives of the State.[29] The MRSDA regulates the grant of licences and other approvals for both exploration and mining and also provides a process for the coordination of applications for related approvals. Other issues such as compensation, rehabilitation and royalties for mineral exploration and development activities and enforcement also fall under the MRSDA.

The Principal Regulations (which support the MRSDA) have the following objectives:

- to prescribe various procedures, details, royalties, fees, forms, information required in documents and other matters authorised by the MRSDA
- to set out requirements relating to marking out licence areas
- to prescribe certain offences as mining infringements
- to set out the requirements for people who are required, under the MRSDA, to disclose any interests.

These objectives relate to means and processes rather than the ends to be achieved, or the broad policy outcomes desired, which is the aim of the identification of policy objectives in the *Victorian Guide to Regulation*.[30]

The MRSDA gives power to the regulator (DPI), to regulate the following activities in relation to public safety[31], infrastructure and the environment:

- approvals of mining licences and work authorities
- ensuring that rehabilitation bonds are lodged before work under a licence commences
- inspections, audits and enforcement activities in relation to work done under the mining licence to ensure that the licence is complied with.

The Principal Regulations set out the broad means and processes to achieve the goal to encourage commercially viable

---

[29] *Mineral Resources (Sustainable Development) Act 1990*, section 1

[30] Victorian Government (2007), *Victorian Guide to Regulation*, p. 3-4

[31] Occupational health and safety (OHS) has been regulated by WorkCover since 1 January 2008. Consequently, all references to OHS are being removed from the MRSDA under a separate legislative exercise. See section 4.3 of this RIS for further information about OHS.

mining in a way that is compatible with the economic, social and environment objectives of Victoria. However, there is concern that the Principal Regulations do not adequately address problems associated with the brown coal mines in Victoria. As such, this RIS mainly focuses on the three brown coal mines in Victoria (all situated in the Latrobe Valley). These are Loy Yang Mine, Yallourn Mine and Hazelwood Mine.

Unlike conventional "hard mineral" mines, brown coal is quite unique in its characteristics. Brown coal is about two thirds water when it is extracted, it is soft, easily deformed and highly combustible.[32] These characteristics mean that brown coal mining in the Latrobe Valley is different to other types of mining in that:

- the mines are very large scale excavations
- the mines operate on a "just-in-time" basis due to difficulties in stock piling brown coal
- brown coal mines seams are thick and low density, meaning that stability is susceptible to water pressures from groundwater or run-off
- the scale of dewatering required for stability is significant
- the mines are located in semi-rural to semi-urban environment and surrounded by both natural and man-made infrastructure
- the mines interact with each other and the surrounding environment.[33]

Government regulation has been considered a core element of managing risks relating to these issues. The consequence of the problems and policy concerns are discussed below.

4.1 Yallourn Mine Batter Collapse[34]

On the 14 November 2007, the northern batter of the East Field pit of the Yallourn mine collapsed resulting in around six million cubic metres of material shifting 250 metres into the mine pit. As noted by the Mining Warden, "the failure was very large, it encompassed about six million cubic metres of material, was 500 metres long and occurred on a slope that was approximately 80 metres high".[35]

---

[32] Department of Primary Industries (2009), *Pers, Comm.,* 24 December.

[33] Victorian Government (2008), *Mining Warden Yallourn Mine Batter Failure Inquiry*, p. 100.

[34] See Appendix A for a chronology of key dates that lead to the collapse.

[35] Victorian Government (2008), *Mining Warden Yallourn Mine Batter Failure Inquiry*, p. i.

Figure 4.1 Site of mine collapse, indicating scale

This disrupted the Yallourn power station (which supplies approximately 22 per cent of Victoria's and 8 per cent of Australia's electricity) and damaged an internal road at the mine.[36]

Damage occurred to three conveyors at the mine which disrupted the generation of electricity at the power station.[37] Two conveyors were restored to full operation by the end of January 2008 and all three coal conveyors were fully operation by 19 February 2008.[38]

It also diverted the Latrobe River which began flowing into the mine pit. This flooded the mine with approximately two gigalitres of water from the river.[39] The diversion of the Latrobe River was required to stem the flow of water into the mine and restore downstream river flows[40], and involved the construction of a

---

[36] TRUenergy (2009), *Yallourn,* http://www.truenergy.com.au/Production/Yallourn/index.xhtml (accessed:19 August 2009).

[37] TRUenergy (2008), *Yallourn mine operations fully restored*, http://www.truenergy.com.au/About/News/News.xhtml?newsitem=195 (accessed:19 August 2009).

[38] Ibid.

[39] Ibid.

[40] TRUenergy (2007), *Subsidence reduces production at Yallourn mine* http://www.truenergy.com.au/About/News/News.xhtml?newsitem=191 (accessed: 19 August 2009)

new 400 metre channel and the re-establishment of 450 metres of original river bed.[41]

According to the Mining Warden's report, "[t]he NE [North East] Batter failure occurred by block sliding of the coal seam along the interseam clays underlying the coal seam."[42] From a technical perspective there were two main causes for the failure, being water pressure in a joint along the rear of the failure and water pressures in the interseam clays.

The inability to interpret the data from the mine was not the sole leading factor that caused the mine to collapse, but was one of three significant interacting factors which contributed to the collapse. The three factors are:

- *Loss of understanding and knowledge*: This loss resulted in an incorrect design failure model becoming accepted and this model showed the NE batter had a high factor of safety and was stable.[43] The loss of understanding and knowledge also led to an inability to interpret data and may have contributed to the decision to remove critical controls. For example, there was "a belief that problems with pressure below the mine floor would always manifest themselves by measurable signs of floor heave" whereas "high pore water pressures can remain in the interseam clays, but not manifest themselves as visible signs in the mine floor."[44]
- *Removal of critical mine stability controls*: The removal of critical controls impacted on mine stability. For example, ceasing routine drilling of horizontal bores on 2002 or 2003[45], and switching off deep aquifer dewatering bores in the mine floor allowing free flow to artesian conditions[46] — resulting in increased groundwater level, increased groundwater pressure, increased interseam clays pore pressure and instability of the mine floor. This in turn led to the block sliding as water pressure in a joint along the rear of the failure exerted horizontal pressure on the block and interseam pressure caused a buoyancy effect on the block of coal reducing the resistance to sliding along its base.[47]
- *Inability to interpret data*: The monitoring data and signs evident prior to the collapse showing imminent failure were

---

[41] TRUenergy (2008), *Yallourn mine operations fully restored,* www.truenergy.com.au/About.News/News.xhtml?newsiten=195 (accessed 23 February 2010).

[42] Victorian Government (2008), *Mining Warden Yallourn Mine Batter Failure Inquiry*, p. 37

[43] Ibid., p. iv and 96

[44] Ibid., pp. 67-68

[45] Ibid., p. iii. – The approval for ceasing drilling horizontal bores was for the southern batters and the Mining Warden could find no other documentation regarding the NE batter – see ibid, p. 58

[46] Ibid., p. iii

[47] Ibid., p. i

not interpreted correctly. These signs manifested themselves to various extents in the years, months, weeks and days prior to the collapse.[48]

The above factors are inter-related. For example, had knowledge been retained over the years, critical controls would be less likely to have been removed and any remaining signs of a collapse could be interpreted more accurately.

In a sense, natural causes such as water pressure contributed to the collapse, however, the natural causes are generally able to be mitigated in instances where adequate data analysis occurs, knowledge is retained over the years and where critical controls are in place thereby reducing the likelihood and/or scale of a collapse or avoiding a collapse.

Two inquiries were subsequently established by the Victorian Government—an Inspectorate Investigation by DPI and an inquiry by the Mining Warden, Professor Tim Sullivan.

4.2 Recent legislative changes and Government decisions

The Mining Warden's report into the Yallourn Mine collapse found that although available data showed signs that a collapse was imminent, the lack of specialised knowledge of the unique geological characteristics of the Latrobe Valley mines meant that the data was interpreted incorrectly.[49]

DPI was not made aware of movements in the north-east batter at the Yallourn mine until immediately before the collapse.[50] DPI no longer regulates OHS issues, so there is no requirement for DPI to be notified of such collapses.

Following the Yallourn mine collapse, mine stability audits conducted by DPI found that certain mine sites required additional work to ensure stability.

In response to the Mining Warden's recommendations, the Government announced a range of initiatives to address the issues which led to the Yallourn Mine collapse. These included establishing:

- a Latrobe Valley cross-agency water coordination group to understand and coordinate regional groundwater and surface water issues associated with mining
- a regional mine and rehabilitation planning for the Latrobe Valley coal mining region

---

[48] *Mining Warden Yallourn Mine Batter Failure Inquiry,* p.v.

[49] Ibid..

[50] 'Batter' is used to describe the open cut mine wall, including individual benches. Cracking is a separation in the coal caused by excavation, ground movement or water presence. For further definitions see: Victorian Government (2008), *Yallourn Mine Batter Failure Inquiry*, 30 June 2008, p. 105

- a Technical Review Board (TRB), using the existing Part 4A provisions of the MRSDA.

The following legislative amendments, appropriate to support the above initiatives, have passed through Victorian Parliament (via the *Energy and Resources Legislation Amendment Act 2009)*:

- prescribing mines for the purpose of imposing work plan requirements and additional reporting requirements which are considered to pose risks to the environment, public safety and infrastructure
- imposing a requirement on all mines to report to DPI "reportable events" which have the potential to cause moderate to catastrophic environmental, public safety or infrastructure consequences
- establishing a levy to be applied to prescribed mines to recover remaining costs associated with the delivery of the new initiatives.

4.2.1 Declared Mines

Once the relevant sections of the *Energy and Resources Legislation Amendment Act 2009* commence, the MRSDA will provide the Minister for Energy and Resources with the ability to declare that a specified mine is a declared mine where there are geotechnical or hydrogeological factors within the mine that pose a significant risk to public safety, the environment or infrastructure.

Once commenced, sections 40(3)(ab) and 41AE of the MRSDA require a licensee in respect of the declared mine to make an application to vary an approved work plan to include prescribed mine stability requirements and processes.

A new section 41AB of the MRSDA will require the holder of a licence in respect of a declared mine to provide a report to DPI containing the prescribed particulars relating to the mine stability requirements and processes that are contained in the varied work plan, and the results of any monitoring. These reports will be provided to a Technical Review Board established under existing provisions of the MRSDA (that is, Part 4A).

It is proposed that the Loy Yang, Hazelwood and Yallourn coal mines be declared initially. This is due to significant risks to public safety, environment and infrastructure associated with factors in the mine. Other mines may be declared in the future, however, there is currently no other mines that are expected to be declared in the future.

4.2.2 Increased funding for research and development

A geotechnical and hydrogeological engineering research group is being established at the Gippsland campus of Monash University to provide geotechnical and hydrogeological expertise to the mining industry in the Latrobe Valley. This will help maintain and improve expert knowledge and will minimise the risk of mine failure incidents such as the mine batter failure at the Yallourn Mine. The group has been established by agreement between industry, government and Monash University. The group, which will require additional funding, will provide research and development support industry as well as developing training courses for mine personnel.

4.2.3 Levy

A new Division 9 in Part 2 of the MRSDA provides for a mine stability levy for the Latrobe Valley. This Division imposes a fee for service for the purpose of providing measures designed to decrease geotechnical and hydrogeological risks to mine stability in the Latrobe Valley region coal mines.

4.2.4 Reportable events

All mines will be required to notify DPI of reportable events. Section 41AC of the MRSDA is designed to pick up events that would not necessarily be required to be reported under existing OHS requirements but have the potential to have a significant impact on the environment, public safety or infrastructure. The MRSDA will require all licensees to provide notice to the Chief Inspector of any prescribed reportable event or reportable non-compliance with work authority conditions as prescribed.

4.2.5 Current implementation of Regulations

Due to the nature of the risks associated with the regulatory problem outlined in this RIS, the Government has undertaken aspects of the Regulations in anticipation of their commencement.

The following has occurred or is currently taking place:

- the Technical Review Board has been established, and four members of the Board have been appointed. Three meetings have taken place. The Board has undertaken work to familiarise itself with the mine's current stability programs (including site visits) and have undertaken reviews of reports from mines that will be declared. The Board has also undertaken some informal consultation with stakeholders and discussions with Monash University.

- the funding agreement for five years with Monash University has been executed and the program plan has been developed. The first progress report has been provided. A Geotechnical and Hydrogeological Engineering Research Group Advisory Committee made up of industry and other stakeholders, including DPI, has also been set up to provide advice and relevant topics and issues.
- a Senior hydrogeologist and two inspectors have been engaged. DPI is in the process of engaging a geotechnical engineer. DPI has undertaken initial mine audits. DPI has also provided “lessons learnt” workshops for stakeholders. Guidelines are also being drafted in relation to mine stability for work plan variations.

Industry will not be required to retrospectively contribute to the initial cost of the above activities. The costs are being met by the Government in order to ensure risk management activities start as soon as possible and deliver benefits to industry and the community as soon as possible. However, once the Regulations are in place, industry will be required to contribute to half of the ongoing cost for the Technical Review Board, research and development and DPI capacity.

The cost is fixed in the Act and Regulations, via a set number of fee units which constitute the “mine stability levy”. The monetary value of the fee units will increase from time to time (usually on an annual basis) as the value is assigned for a financial year by the Treasurer under section 5(3) of the Monetary Units Act 2004. While the value of the fee unit may increase from time to time, the number of fee units payable under the levy will not change on a yearly basis or fluctuate. Any change to the number of units will only occur after a review of the levy and after a RIS is undertaken regarding any proposed alteration to the number of fee units in the Regulations.

4.3 Other legislative instruments

There is regulation currently in place to manage the safety of both the employees of each mine as well as the broader public.

4.3.1 Occupational Health and Safety

The *Occupational Health and Safety Act 2004* (OHS Act) applies in the mining industry as it does for all businesses in Victoria. The mining industry is obliged to follow the general obligations under the OHS Act that apply to employers and employees in regard to safety in the workplace. In order to address the specific issues within the mining sector, there are also industry specific obligations within the OHS legislative framework. The relevant OHS regulation requires the implementation of a safe work place including:

- identification, assessment and elimination or control of risks in the work place

- identification and management of major mining hazards
- reporting of injuries within the workplace (this is currently required under the Principal Regulations but will be removed under a separate legislative exercise by DPI because responsibility for OHS regulation has been transferred from DPI to WorkSafe).

The primary aim of OHS legislation is to address work practices that pose risks to employees, but it does not specifically capture all risks, factors and events in mines which pose risks to public safety, infrastructure or the environment (although WorkSafe may investigate and address such events or factors which arise from workplace activities).

Until recently, DPI had the delegated responsibility for regulating OHS in mines under the OHS Act. On 1 January 2008, the responsibility for regulating OHS was transferred from DPI to WorkSafe. DPI no longer has a role in regulating OHS but does retain responsibility for regulating public safety aspects of the earth resources industries, including mining.

The MRSDA does not currently compel mines to report all factors within a mine which pose a significant risk to public safety, infrastructure or the environment.

4.3.2 Environment

Mines are subject to environmental regulation at a state and federal level. The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* applies to mining. This Act "provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places—defined in the MRSDA as matters of national environmental significance".[51]

Relevant State regulation protecting the environment and implementing environmental quality objectives for protecting air, noise, water and land, includes the *Environment Protection Act 1970*, the *Environment Effects Act 1978*, the *Water Act 1989* and the *Conservation Forests and Lands Act 1987*. State policies, such as the *Native Vegetation Management–A Framework for Action* and the *Protocol for Environmental Management (Air Quality Management): Mining and Extractive Industries,* also apply to mines.

The *Environment Protection Act 1970* is the primary environmental legislation within Victoria. The *Environment Protection Act* prevents pollution and environmental damage by setting environmental quality objectives and establishing

[51] Department of the Environment, Water, Heritage and the Arts (2010), *Environment Protection and Biodiversity Conservation Act*, http://www.environment.gov.au/epbc/ (accessed 13 January 2010).

programs to meet them.[52] In relation to mining, this Act largely applies to regulating off-site impacts caused by discharges.

The MRSDA also addresses the regulation of certain on-site environmental impacts via work plan requirements and licence conditions.

While the above regulation implements important environmental control, it does not currently require major environmental risk factors or actual events within the mine (or on-site) to be reported to the primary regulator of the mines (that is, DPI). In addition, the existing regulation does not enable DPI to implement ongoing monitoring and reporting regimes specific to those operational factors which pose a risk to the environment but are not captured by existing legislation.

4.3.3 Planning

The primary planning controls which apply to mining within Victoria are the *Planning and Environment Act 1987* (PEA) and the Victoria Planning Provisions (VPPs).

A planning permit from the local planning authority under the PEA and the local planning scheme is required to develop and use land for mining, unless an exemption applies. A planning permit will not be required if either:

- an Environment Effects Statement (EES) has been prepared under the *Environment Effects Act 1978* and mining is exempt from the requirement to obtain a permit under Section 42 or Section 42A of the MRSDA.
- the mining is in accordance with and within an area covered by a mining licence granted or Order made by the Governor in Council under Section 47A of the *Electricity Industry Act 1993*.

The VPPs also regulate the approval of adjacent developments. VPP 17.08-3 specifically addresses brown coal resources, requiring that planning and responsible authorities should ensure that "coal-related development is adequately separated from residential or other sensitive uses and main transport corridors by buffer areas to minimise adverse effects such as noise, dust, earth subsidence, and visual intrusion".[53] This VPP also states that the planning and responsible authorities should ensure that uses and development within the buffer areas are

[52] EPA Victoria (2010), *Environment Protection Act 1970*, http://www.epa.vic.gov.au/about_us/legislation/epa.asp (accessed 13 January 2010).

[53] Department of Sustainability and Environment (2010), *Victorian Planning Provisions – 17 Economic Development,* http://www.dse.vic.gov.au/planningschemes/aavpp/17_sppf.pdf (accessed 13 January 2010).

compatible with uses and development adjacent to these areas.[54]

Individual planning schemes specify such buffers. For example, within the Latrobe Valley planning scheme, coal buffers are in place to protect the public and infrastructure. As stated in the scheme, the buffers include areas between urban development and existing or future coal resource development. Such buffer areas currently extend for a distance of 750 metres from any urban settlement boundary to the perimeter of a 250 metre wide coal operational area. The total separation area between an urban settlement boundary and the crest of any future open cut development should not be less than one kilometre in width. Other coal buffers include areas to protect transport corridors.[55]

Section 45 of the MRSDA also imposes a control in relation to planning. Under the MRSDA work is prohibited under a licence if it is within 100 metres laterally of a dwelling house that existed before an approved work plan was registered in respect of the licence, or 100 metres below such an area. In addition, appropriate conditions are included on the work plan and licence to ensure that the mine is operated appropriately.

The above processes determine whether mining will be permitted as a land use in a particular area and may impose conditions on the development and use of land for mining. The above controls ensure that mines, housing and public infrastructure have been developed within appropriate proximity to one another, and consequently minimises public risk. However, these planning restrictions were not in place at the time that the mines commenced, so some building did take place initially. Images that show the proximity of the three brown coal mines to public infrastructure and towns are set out in Section 5.1.1.

4.4 Summary

There are a number of legislative instruments that regulate the management of brown coal mining in Victoria. Nevertheless, there was a failure of the Yallourn mine under the current regulatory requirements. An Inquiry into the failure found that that although available data showed signs that a collapse was imminent, the lack of specialised knowledge of the unique geological characteristics of the Latrobe Valley mines meant that the data had been interpreted incorrectly.

In addition to the incorrect interpretation, there is no requirement for any mine to report symptoms of imminent failure, such as movements in the batter and cracking, and therefore DPI was

[54] Ibid.

[55] *Latrobe Planning Scheme –Clause 22.02*, p. 1. These buffers will be re-enacted as clause 21.05 under the proposed planning scheme amendment (C62).

not made aware of movements in the north-east batter at the Yallourn mine until immediately before the collapse.[56]

In response to the Mining Warden's recommendations the Government announced a range of initiatives including establishing:

- a Latrobe Valley cross-agency water coordination group
- a regional mine and rehabilitation planning for the Latrobe Valley coal mining region
- a Technical Review Board, using the existing Part 4A provisions of the MRSDA.

The Government also made a number of legislative amendments:

- prescribing mines for the purpose of imposing additional reporting requirements which are considered to pose risks to the environment, public safety and infrastructure
- imposing a requirement on all mines to report to DPI "significant events" which have the potential to cause moderate to catastrophic environmental, public safety or infrastructure consequences
- improving DPI capacity
- establishing an appropriate levy to be applied to prescribed mines to recover remaining costs associated with the delivery of the new initiatives.

An assessment of the requirement for associated regulatory amendments is set out in this RIS.

[56] Victorian Government (2008), *Yallourn Mine Batter Failure Inquiry*, 30 June, p. 105.

5 Nature and extent of the problem

The business of mining inherently involves a significant amount of risk. There are risks to the safety of the employees as well as the surrounding public, there are risks to the surrounding community and to the environment both on and off a mine site. As such, there will always be a role for governments to ensure that these risks are appropriately considered. The Government already has in place a number of legislative instruments to manage these risks including requirements for OHS, planning, environmental protection and community consultation.

However, the uniqueness of brown coal compared to other types of minerals means that these risks are even more significant (refer to Appendix D for a risk assessment). This chapter explores the requirement for government intervention to further address risks to public safety and infrastructure; the environment and the risk to electricity supply.

5.1 Potential impacts of a mine collapse

There are a number of unique aspects of the mining industry and, in particular, brown coal mining, where current regulation is limited in its application. The subsequent sections outline the extent to which a brown coal mine failure in Victoria will impact on the public.

5.1.1 Safety and infrastructure risk

It is difficult to explicitly mandate safety outcomes to be achieved by regulation. In many other regulatory areas, the outcomes are relatively easy to specify—you must not dump waste or you must pay taxes. Under safety regulation, the objective is to "prevent harm—harm to workers, to passengers, to local residents and so on".[57] However, harm is rarely intentional, it is almost always accidental. In the case of mining, there is inherent risk in undertaking this activity. The benefit society receives from the practice of mining is inseparable from the risk that it creates. As such, it is impossible to enact regulations which forbid the harm, or which impose an absolute duty on mining businesses that they do not harm their employees, the environment or society. In recognition of this, we have safety regulations which are designed to prevent harm. Procedures are designed to indirectly protect against harm. It is only when regulations require a party to clean up or pay for the

[57] Hopkins, A. and Hale, A. (2002), *Issues in the Regulation of Safety: Setting the Scene, as cited in* Kirwan, B., Hale, A., and Hopkins, A. (2002), *Changing Regulation: Controlling Risks in Society*, Elsevier Science Ltd, p. 2.

result of an accident that these regulations directly address the problem.

Brown coal mining, in particular, involves high risk. In Victoria, the brown coal mines in the Latrobe Valley are open cut and very large excavations. The Warden's report notes that the structures of these mines are "highly deformable and the deformations spread a long way outside the mine perimeters."[58] In addition, the coal mines in Victoria are developed in a region that is surrounded by natural and man-made infrastructure that is often quite rigid or inflexible.[59] The deformable nature of the mines combined with the fact that the mines are surrounded by rigid infrastructure can impact on the risks associated with the operation of the mine.

The risks associated with the operation of the mine can include:

- Stability failure (subsidence, collapse) where an area of land collapses, shifts or slides. If a member of the public were on, near or below an area at the time of the collapse, the person may fall into the collapsed area or be buried by material. This may result in death or injury. The collapse may also damage private property.
- Collapse of land on which public infrastructure (i.e. road, bridges, railway) exists, resulting in deaths or injuries.

While perhaps an extreme example of the potential impact on public safety and infrastructure, the following recent collapse of a rehabilitated brown coal mine in Germany illustrates the potential for loss of life and property associated with a slope collapse.

[58] Victorian Government (2008), *Yallourn Mine Batter Failure Inquiry*, 30 June 2008, p. vi.

[59] Ibid.

Case Study: Lake Concordia landslide, 18 July 2009, Nachterstedt, Germany[60]

On 18 July 2009, a 350 metre stretch of shoreline of approximately 1 million cubic tonnes of soil collapsed 100 metres into the lake. The man-made lake is the site of a former open cut brown coal mine in Nachterstedt, approximately 170 kilometres south-west of Berlin.

Three people were killed when several houses were swept into the lake. The mine had advanced to within 120 metres of the closest home when it closed in 1991.

Due to slope stability issues, it is expected that further slope failures will occur and remaining residents at risk have been forced to evacuate. It is anticipated that at least €10 million[61] (approximately

[60] Pentley, D. (2009), *Intriguing Landslide at Nachterstedt in Germany,* http://daveslandslideblog.blogspot.com/2009/07/intriguing-landslide-at-nachterstedt-in.html (accessed November 2009); Daily Mail Reporter (2009), *Three people missing after two homes plunge over cliff during landslide,* http://www.dailymail.co.uk/news/article-1200567/Three-people-missing-homes-plunge-cliff-landslide.html (accessed November 2009); The Local – Germany's News in English (2009), *Clues emerge on cause of Nachterstedt landslide,* http://www.thelocal.de/national/20090808-21123.html (accessed November 2009).

[61] *Clues emerge on cause of the Nachterstedt landslide*, The Local: www.the local.de/national/20090808-21123.html (accessed 23 February 2010).

Case Study: Lake Concordia landslide, 18 July 2009, Nachterstedt, Germany[60]

$16 million)[62] will be paid in compensation to the people of Nachterstedt who are not able to return to their homes.

While the cause of the collapse has not been confirmed, initial views attribute the collapse to a rise in groundwater levels.

The Lake Concordia failure, with potential similar cause relating to groundwater, demonstrates that the Yallourn Batter failure is not unique. It is important to note in relation to the impact of the Lake Concordia failure that although the scale of the collapse was significantly smaller than Yallourn (one million cubic tonnes compared to six million cubic tonnes), it had a much more severe impact in terms of public safety – three lives were lost and several houses destroyed.

The possibility of a collapse has potential implications for public safety in terms of injuries and deaths, and in terms of public and private infrastructure.

In the event of a collapse, lives are at risk. A practice note prepared by the VCEC estimates the statistical value of a human life at $3.74 million.[63] In the case of the Lake Concordia collapse, had the same consequences occurred in Victoria then the social cost of the fatalities would have been approximately $11.22 million.

Although the working areas of the Latrobe Valley mines are not as close to houses as the above examples, the following photos show the proximity of the three coal mines in the Latrobe Valley to public infrastructure, particularly roads. All three mines are close to roads, including the Princes Highway. The Hazelwood mine in particular is close to the residential area of Morwell.

---

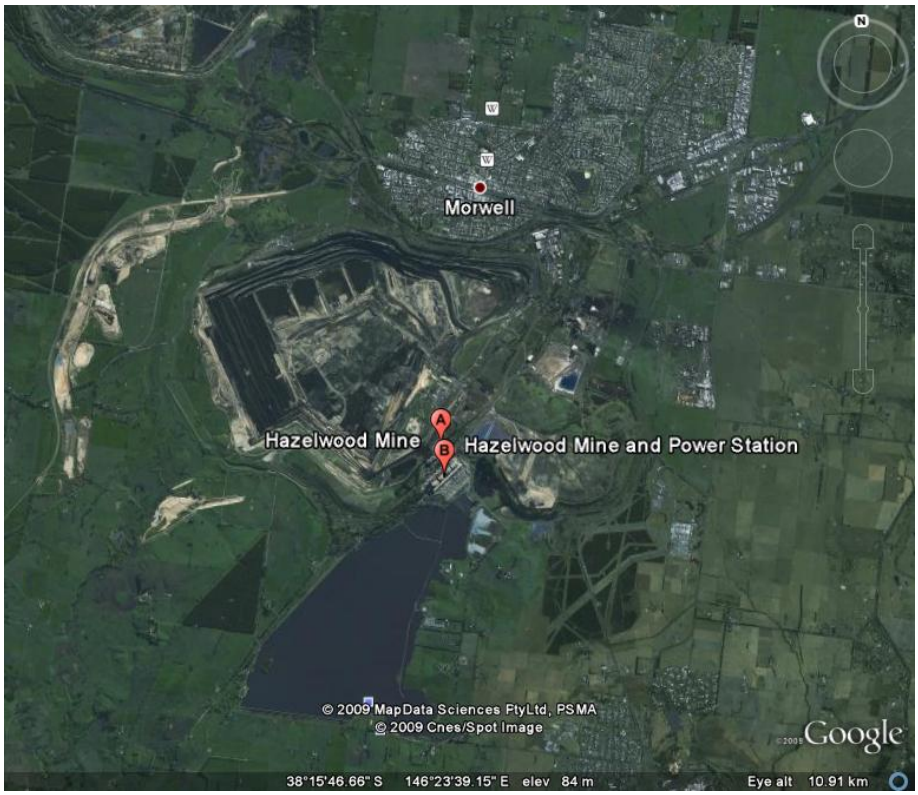
[62] At an exchange rate of 1 Euro = $1.61 AUD.

[63] Victorian Competition and Efficiency Commission (2007), *Suggested value of a statistical life in RISs and BIAs – practice note.*

Figure 5.1 Yallourn Mine

Figure 5.2 Loy Yang Mine

Figure 5.3 Hazelwood Mine



The Princes Highway plays a key role in facilitating freight and passenger movement to and from the Gippsland Region. The highway is important for the movement of goods for processing within the region (in particular quarry, forestry and dairy products) and for the distribution of consumer goods and production inputs (like fertiliser, fuel and stockfeed).[64] The Highway is also an important thoroughfare for the public.

The effect of a mine collapse is not limited to the area of the mine. The Mining Warden noted:

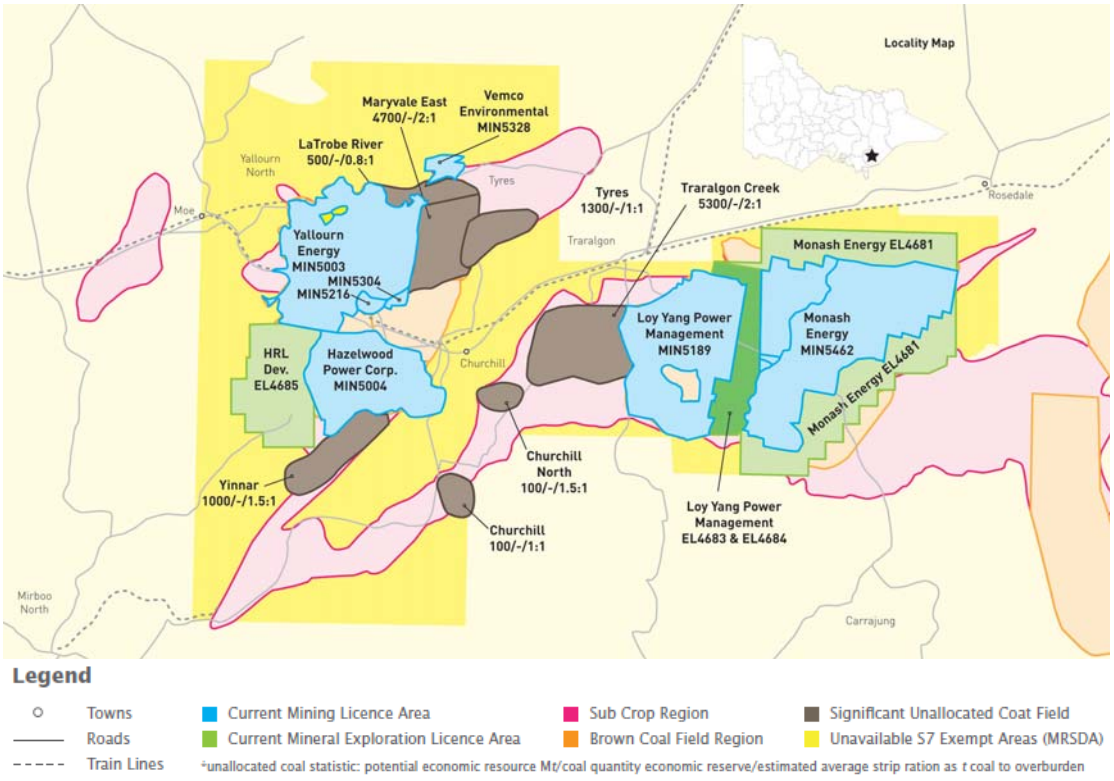
> *The mines are interacting with each other and their environment and this is also occurring over a very large area.*
>
> *There are also other regional effects in the Latrobe such as the Sale groundwater supply and the offshore oil and gas development.*
>
> *Hence is it [sic] considered that as well as local infrastructure issues around each mine there are also more widespread risk and infrastructure questions*.[65]

[64] Department of Transport and Regional Services (2007), *2007 Melbourne-Sale Corridor Strategy – Building our National Transport Future*, June.

[65] Victorian Government (2008), *Mining Warden Yallourn Mine Batter Failure Inquiry*, 30 June, p. 101.

A map setting out the close proximity of the mines within the Latrobe Valley is set out below. The map also sets out the proximity of the mines to roads and the train line.

Figure 5.4 The Latrobe Valley's mining and exploration licences, and unallocated coal resources.



In the event of a collapse in the Latrobe Valley region, such infrastructure could be affected, possibly resulting in:

- Collapse of land on which public infrastructure exists (i.e. road, bridges, railway) resulting in disruption to freight services for business and industry and disruption to passenger movement
- Collapse of land on which public infrastructure (i.e. pipelines) is located, resulting in disruption to essential services.

There are current Regulations in place to minimise the risk to safety and the environment both at the mine and its surrounds. However, the Regulations are limited in the extent to which mines can be required to include specific mine stability elements within the work plan to address specific risk factors and provide information to satisfy the regulator that such risks are being monitored and addressed.

The Regulations are also limited in the extent to which it can be used to require mines to notify the regulator of risks to public safety, infrastructure and environment outside of the mine.

As part of the Yallourn Mine Batter Inquiry, the Mining Warden also noted that there were three other issues which while not

relevant to the Yallourn failure show potential for significant failure.

One of the faults, a very large movement of the Morwell River Diversion, went unnoticed until the annual monitoring survey was carried out.[66]

Another example, showed that cracks in the TRUenergy dam were observed in 2004. The dam was checked by consultants. The Mining Warden noted, “the Latrobe Valley mines are “deformable structures” and movements occur a long way outside the mine boundaries”[67]. While the Warden notes that appropriate engineering studies and evaluations may have been carried out, the location of the dam—just above a state highway —has potential safety implications.[68]

Figure 5.5 Witts Gulley Dam[69]

The Warden found that “It is expected that issues that potentially extend beyond the strict limits of the mine and potentially affecting other infrastructure would be the subject of early notification to DPI.”[70] However, as DPI is no longer responsible for the regulation of OHS and there are no other

[66] Ibid., pg 101. Emphasis added by DPI in RIS.

[67] Ibid,. p 102.

[68] Ibid,, p. 102.

[69] Ibid., Figure 26.

[70] Ibid., p. 102

notification mechanisms for DPI in the MRSDA, there is no legislative requirement for the reporting of these events at any mine to DPI. Further, there appears to be a loss of historical understanding and a lack of knowledge to be able to assess how certain data or sightings (such as ground movement) may be interpreted to affect the wider environment and community.[71] This knowledge deficiency will be discussed further later in this chapter.

5.1.2 Environmental risk

As noted in the Mining Warden's report, the coal mines are developed in semi-rural to semi-urban environment. The damage that can occur to the environment as a result of a mine collapse is significant.

A diversion of the Latrobe River such as that which occurred as a result of the Yallourn Mine Batter failure was reported to have damaged the habitat of aquatic and riparian flora and fauna. An article in the *Herald Sun* reported that four to five kilometres of river were no longer receiving flows, and that some fish had died as a result.[72] Downstream users of water from a diverted river may have also been affected through loss of access to water for the period of the diversion. It was suggested that more than 90 irrigators and households downstream from the collapse faced cuts to water supplies.[73] A study that valued the improved environmental health of rivers found that participants were willing to pay for a 1 per cent increase in:

- fish species and populations—between $2.19 and $5.56
- healthy vegetation on both sides of the river—between $2.91 and $5.56
- native waterbird and animal species—$3.04 and $22.07
- river suitable for primary contact recreation without threat to public health: $0.00 and $2.12.[74]

In 2006, there were 19,564 families in the Latrobe Valley. If each household was willing to annually pay between $8.14 and $35.31 for improved health of rivers and the fish, animals and vegetation surrounding the rivers, then this would mean that the value to this area would be between $159,251 and $690,805 per annum (i.e. on average, $425,028).

Potentially, the collapse of a mine or tailing storage facility, ash ponds or water dams/cooling ponds could contaminate nearby

---

[71] Ibid,, p. 95

[72] Mickelburough, P., Masanauskas, J., and Wotherspoon, S. (2007), *Mine operator aware of leak,* Herald Sun, 16 November.

[73] Murphy, M., Kleinman, R., and Holroyd, J. (2007), *Heatwave no threat to power, experts say*, The Age, 16 November.

[74] Bennett, J., Dumsday, R., Howell, G., Sturgess, N. (2008), *The Value of Improved Environmental Health in Rivers.*

water sources. Water is a resource which is necessary for humans, animals and plants. It is also a resource which is used for recreational purposes (e.g. swimming, fishing). Depending on the use of the water, the contamination of water could affect local communities, wildlife and vegetation. If a collapse resulted in the contamination of water, the water would need to be treated before it could be directed back into the river course. Both the Yallourn and Hazelwood mines are located near rivers.

In the case of the Nachterstedt slope collapse, it has been reported that due to large amounts of heating oil contained in the houses that collapsed into the nearby lake there will be associated clean up costs with using chemicals to treat the oil now contained in the lake. The environmental costs for Nachterstedt have not yet been quantified.

Rehabilitation work may also be required to restore land stability or remove material that may be affecting or obstructing other environmental features.

5.1.3 Electricity supply risk

The existence and reliability of cost efficient electricity supply is fundamental to the proper functioning of our economy. Residents, businesses and industry rely on electricity supply as an essential service to go about their every day lives.

Brown coal mined from the Latrobe Valley is used for the purposes of electricity generation. In 2006-07, 94 per cent of the 53,488GWh of electricity generated in Victoria was electricity produced from brown coal supplied from the three Latrobe Valley Brown Coal Mines (that is, Hazelwood, Loy Yang and Yallourn).[75] It therefore represents a significant proportion of electricity supply within Victoria.

The conveyors that supply coal to the electricity generation plant are situated on the benches of the mine (which make up the overall batter), these conveyors are likely to be damaged during a collapse, affecting the supply of brown coal. Damage to other infrastructure (e.g. dredgers), caused by a collapse can also affect the supply of brown coal. This is likely to interrupt electricity supply. Alternatively, transmission lines may be affected by a collapse, resulting in disruption to supply. Interruptions to electricity supply are likely to impose significant costs on both residential and business consumers. In 2007-08 business consumption represented over 71 per cent of total electricity consumption.[76]

It is difficult to quantify the economic cost of an electricity supply interruption because the impact depends on the load at the time of the interruption. When the Yallourn collapse occurred in the

---

[75] Department of Primary Industries (2009), *Victorian Minerals and Petroleum (Mining) and Energy Industries - At a glance 2009*, June, p.17.

[76] Energy Supply Association of Australia (2009), *Electricity/Gas Australia*, p.26.

early hours of 14 November 2007, the effect on electricity supply was minimal due to excess capacity available in the national system at that time. However, a modest rise in the wholesale price of electricity was observed. In an extreme case, if a collapse occurred at Loy Yang mine on a batter where the conveyer belt supplies both the Loy Yang A and B power stations, during a period of very hot summer weather, widespread brownouts and possibly blackouts may occur during peak times for the duration of the supply interruption. A failure of this magnitude has the potential to have interstate impacts in terms of decreased supply and/or increased wholesale prices.

The Essential Services Commission (ESC) publishes comparative performance reports for the electricity distribution businesses which provide a range of data on the extent of interruptions to electricity supply.[77] The most recent performance assessment, for 2008, shows that Victoria-wide there were more than 120 minutes of unplanned electricity outages per customer, plus around 30 minutes of planned electricity outages.

In its 2008 publication *The Value of Customer Reliability Used by VenCorp for Electricity Transmission Planning*, VENCorp estimated the average cost to consumers of electricity not supplied. VENCorp estimated the value of the losses sustained by customers as a result of a non supply of electricity averaged $47,850 per MWh in 2007.[78] Taking into account inflation, the value of customer reliability is expected to be $52,054 per MWh in 2009.[79]

Data from ABARE show that total electricity consumption in Victoria during 2007-08 was equal to 59,090 GWh. This is equal to approximately 162 GWh per day. The most recent average of 120 minutes of unplanned electricity supply interruptions per customer is equal to approximately 8.3 per cent of one day. Thus, it can be estimated that the average amount of electricity not delivered per annum is equal to 13.4 GWh (that is 13,437 MWh).[80] Thus, the total value of the electricity not supplied due to unplanned electricity outages is equal to almost $700 million per year.[81]

In a situation where there is a collapse at one of the mines, this could have a significant effect on the supply of electricity. Loy Yang mine supplies about one quarter of Victoria's electricity

---

[77] Essential Services Commission (2008), *Electricity Distribution Businesses: Comparative Performance Report 2007*, October 2008 http://www.esc.vic.gov.au/NR/rdonlyres/A58C8DE2-1617-45A2-AF48-AEE85DC63F8F/0/ElectricityComparativeReport200708.pdf (accessed November 2009).

[78] VenCorp (2008), *The Value of Customer Reliability used by Vencorp for Electricity Transmission Planning – Consultation Paper,* 5 September, p.2.

[79] RBA Consumer Price Index Figures are 4.4 per cent for 2007-08 and 4.2 per cent for 2008-09.

[80] 161.8 GWh x 8.3% = 13.4 GWh.

[81] 13,437 x $52,054 = $699,449,598.

supply, or 16,000 to 17,000 GWh hours of electricity each year. If there were an incident at Loy Yang mine that meant that electricity supply was cut at Loy Yang A and Loy Yang B power stations, this would result in a decrease in electricity supply of 45 GWh (or 45,205 MWh) per day.[82] Using the VENCorp value of customer reliability and value of social disruption of $52,054 per MWh, a cut of this amount would represent a loss of $2.3 billion per day.[83] About 64 per cent of this value is attributed to the loss in supply to electricity to the commercial sector.[84]

As Victoria participates in a national electricity grid, it is expected that only in an extreme case would there be a significant cut to electricity supply. However, it is likely that a collapse that impacts on the supply of electricity will increase wholesale electricity prices. During the Yallourn collapse there was a notable change in electricity prices. Compared to the rest of the month, the wholesale prices for the five days after the collapse were, on average, 224 per cent above the average wholesale price (see Figure 5.6). In November 2007, the cost of the difference between the average wholesale price (excluding the five days of increase) and the average price for the rest of the month was almost $13 million.[85]

---

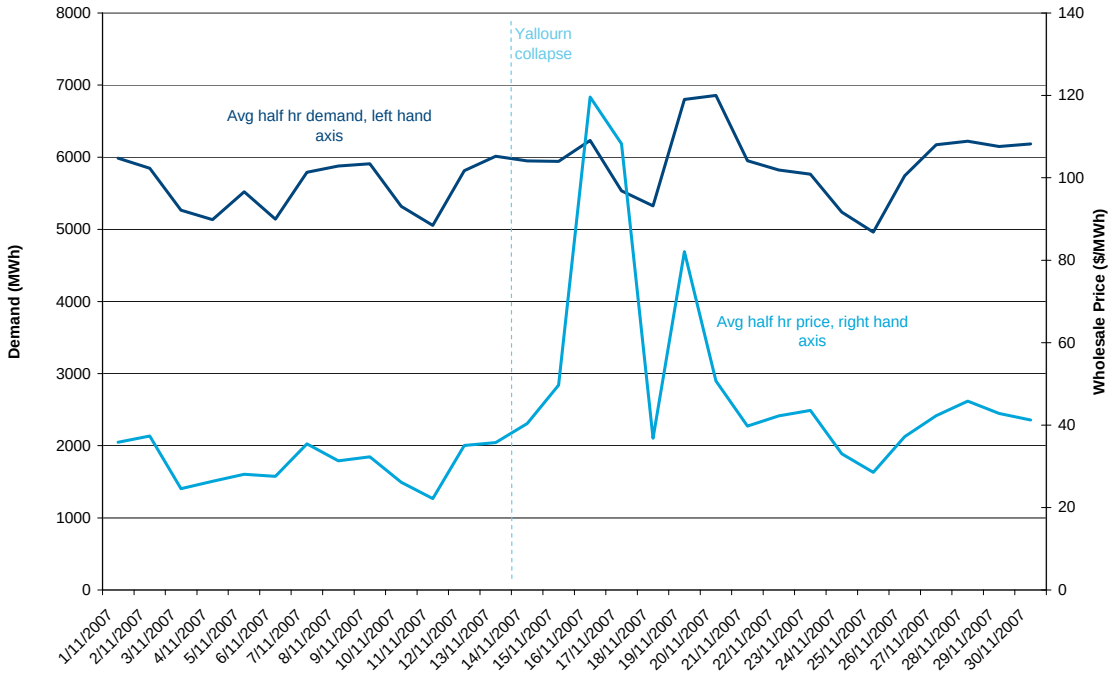
[82] 16,500 GWh / 365 days = 45.21 GWh/da.

[83] $52,054 x 45,205 MWh = 2,353,101,070.

[84] Value of customer reliability is: $1.31 for agricultural sector, $4.46 for residential sector, $11.26 for industrial sector and $30.82 for commercial sector. CRA International (2008), *Assessment of the Value of Customer Reliability,* http://www.electricitycommission.govt.nz/pdfs/advisorygroups/tag/25Sep08/VCR-Final-Report.pdf (accessed November 2009).

[85] See Appendix B for further detail

Figure 5.6 Average wholesale electricity prices (November 2007)[86]



If a collapse were to occur at the Loy Yang mine within a period of peak electricity demand (which occurs yearly in approximately 1.5 per cent of cases) and electricity outages were sustained for three days then the estimated cost of the loss of electricity supply would be approximately $105,900,000.[87] In addition to the cost of electricity supply cuts, it is estimated that an increase of wholesale prices of 224 per cent would occur for five days after a collapse, (in approximately 80 per cent of cases), this is estimated to cost $51,760,000.[88] Therefore, the cost of a collapse is likely to comprise of almost $160 million in electricity supply costs.

Given the size of this estimate of the cost to consumers of the unplanned outages, and the occurrence of an increase in the wholesale price, it is clear that even a small reduction in their incidence will yield quite significant benefits. If additional unplanned outages were to occur—as could be the case if another mine collapse were to occur—then this could have significant consequences for domestic and business consumers in Victoria and in limited situations almost catastrophic economic consequences.

---

[86] Australian Energy Market Operator (2010), *Price and demand data sets,* http://www.aemo.com.au/data/price_demand.html.

[87] i.e. $2,353,101,070 x 3 days x 1.5% of cases = $105,889,548.15.

[88] i.e. $12,939,118.32 x 5 days x 80% of cases = $51,756,473.27.

5.2 Role of government—rationale for intervention

It is clearly in the commercial interest of the mines to ensure the stability of their mine—particularly as it would disrupt mine production. The resulting loss in income from inability to extract brown coal and produce electricity, the impact on the company brand, as well as the significant cost of re-establishing the mine to a workable condition would likely mean that there are large incentives in place to maintain mine stability. There are also, as already discussed, regulatory instruments that ensure that the mines mitigate these risks, for example, the general duties under OHS laws and work plans that must be approved before any excavation occurs.

The consequences of a mine collapse, however, could be severe (especially in relation to risks to life and the continuity of electricity supply in the state) and many of the costs set out above are not borne by the mine itself. A commercially minded business may not factor in all external costs such as impact on the public of a cut in electricity supply, damage to the environment and damage to public infrastructure when determining investment to mitigate risks of collapse. Relying on the commercial incentives may not be sufficient and certainly was not sufficient in 2007 when the Yallourn mine collapsed. It is particularly problematic to rely upon commercial incentive to manage risk if it is not known what is required to recognise and mitigate these risks.

Studies have shown that "on-going mindfulness about the possibility of failure and a determination to identify early warning signs of trouble and to learn from such incidents" is key to safety.[89] In the protection of OHS, it has been found that a "public fund workers' compensation system represents the most valid and reliable way of identifying occupational risks and severe occupational trauma".[90] The fund allows for the collection of data into causes and effects of problems, and can direct funds into researching specific areas of concern. For example, a number of traffic insurance and road safety organisation throughout the world, including Victoria's Transport Accident Commission, have successfully prevented road trauma through enforcement of easily interpretable rules combined with prevention activities aimed at specific problems determined by specific research into accidents.[91]

---

[89] Hopkins, A., and Hale, A. (2002), *Issues in the Regulation of Safety: Setting the Scene,* as cited in Kirwan, B., Hale, A., and Hopkins, A. (2002), *Changing Regulation: Controlling Risks in Society*, Elsevier Science Ltd, p. 5.

[90] Larsson, T.J. (2002), *New Technologies and Work: Pulverization of Risk – Privatization of Trauma?* as cited in Kirwan, B., Hale, A., and Hopkins, A. (2002), *Changing Regulation: Controlling Risks in Society*, Elsevier Science Ltd, p. 25.

[91] Ibid.

The on-going mindfulness of the possibility of failure and the identification of signs of failure appears to be a key area of concern in the case of the brown coal industry in the Latrobe Valley. According to the Government's response to the Mining Warden Yallourn Mine Batter Failure Inquiry, the fundamental cause of the mine batter collapse was an information deficiency:

> *[the] lack of sufficient expertise within the mining industry, both within the mining operator and external to the mine operator, to interpret the available information*.[92]

The Government's response adds that there is a lack of sufficient expertise within the mining industry to interpret data about the nature and behaviour of brown coal mines in the Latrobe Valley.

There are three main reasons for this information deficiency:

- insufficient incentives to collaborate and share existing information
- insufficient incentives to invest in establishing new knowledge and expertise
- uncertainty and risk associated with the uniqueness of the Latrobe Valley mines.

5.2.1 Insufficient incentives to collaborate and share existing information

Competitive forces in the private sector mean that businesses are likely to make commercial decisions independent of each other. While competitive forces influence a company's incentives to innovate and improve their practice, the nature of private sector decision making means that many companies can be well below industry standards and best-practice without being alerted to the fact. Even when companies close this gap, they will not necessarily share this information with their peers or competitors. Commercial entities in particular are less likely to give away information that has a market value. The parliamentary inquiry into the effects on research and development of public policy reforms in the past decade, found that:

> *[T]he new industrial requirements for confidentiality and control of intellectual property have prevented the publication of much research and development*.[93]

External bodies have in the past provided a mechanism to address the obstructions against the sharing of information. In

---

[92] Victorian Government Response (2008), Yallourn Mine Batter Failure Inquiry August, p. 1.

[93] Commonwealth Government — Standing Committee on Industry, Science and Resources (1999), *Inquiry into the effects on research and development of public policy reforms in the past decade*, p. 53.

the mining industry the Minerals Council of Australia (MCA) has taken a leadership role in safety and health that includes the publishing annual safety and health performance data, funding research initiatives (such as research into the relationship between sleep, working arrangements and fatigue) and publishing guidelines. The MCA's membership represents more than 85 per cent of annual mineral output and it is through the commitment of its members that it can fund and publicly publish the information on safety and health.

The ability for the mines to collaborate through a mechanism such as the MCA may be possible. However, compared with the information funded and shared publicly by the MCA in relation to safety and health, the provision of information in relation to brown coal mine stability is quite different. The three mines in the Latrobe Valley are competitors. Their stability measures are commercially sensitive and as such they are unlikely to share this information with other players. These dynamics mean that is it unlikely that the three mines will co-operate and negotiate in a competitive environment.

In the brown coal industry, some mines may have the appropriate stability measures in place to mitigate stability risks. However, two key obstructions stop these brown coal mines from sharing this information with other mines within the area.

First, the competitive nature of the brown coal mining industry in Victoria means that one mine is unlikely to share their commercial information with another mine. For example, if one mine has implemented an efficient and effective technique to stabilise their mine, they are unlikely to share this with their competitor. Second, there is an inability to commercialise this information without the holder of the information losing their competitive advantage.

This presents a problem not only to the extent to which each mine could individually improve the safety, environmental and electricity security outcomes from the collaboration of resources and information. It also is of concern because the nature and location of each of the brown coal mines in the Latrobe Valley means that their decisions have potential to impact on each other. DPI suggests that a collaborative approach needs to be undertaken in research and development. The competitiveness of the industry means that all research and development undertaken is in isolation and the knowledge is not freely shared. The decision of one mine can affect the stability of other mines in the Latrobe Valley.

5.2.2 Insufficient commercial incentives to invest in new expertise and knowledge

There may also be inadequate incentives for businesses to invest in establishing expertise and knowledge in the brown coal industry.

The regulation of employee safety is based on the acceptance that market forces will not produce satisfactory outcomes

because of the way that people process risk, and the lack of incentives for employers to adequately manage OHS risks. People may not account for the information required to assess job related risks because it may not be readily available, or may be costly to access. Or even with full information, assessment of risk may be distorted because of a range of aspects related to human behaviour such as the reliance on intuitive judgements rather than reason and the tendency to be optimistic about outcomes.[94]

In addition, employers and employees may have insufficient incentives to prevent injuries and diseases because the costs of these are often passed on to the general community. Even if corporate responsibility incentives encourage employers to manage risks, the outcomes may be inconsistent between workplaces.[95]

Managing public safety and environmental outcomes involves similar issues to OHS. There may be inadequate incentives for businesses to account for the costs to the community of their operations, or at least the remedies to fix problems once they occur are vastly inferior to the problem never happening in the first place. Public safety is likely to be compromised in the event of a collapse.

These general concerns are exacerbated in the specific example of the brown coal industry in Victoria.

The three brown coal mines in the Latrobe Valley extract 90 per cent of all brown coal in Australia. While the industry is concentrated to the three mines, they compete heavily with each other.

The unique characteristics of the brown coal industry in Victoria mean that they are limited in their ability to:

- Innovate — because the product (brown coal) is essentially the same between each mine
- Grow — while brown coal electricity generation is very low cost, it faces competition from generators in other states.

The limited ability for innovation and market growth means that businesses within the brown coal industry are competing on the cost effectiveness of their procedures to extract coal and generate electricity.

A report published by the MCA in 2007 acknowledged that as the majority of coal mined in the Latrobe Valley is converted to electricity, which has a low market value, the mines are under significant pressure to limit expenditure. This pressure, combined with limited scope to grow the operation via exports,

---

[94] WorkSafe (2007), *Regulatory Impact Statement: Proposed Occupational Health and Safety Regulations 2007, Proposed Equipment (Public Safety) Regulations 2007* ,http://www.vcec.vic.gov.au/CA256EAF001C7B21/WebObj/OHSRIS/$File/OHS%20RIS.pdf p.28–29 (accessed January 2010).

[95] Ibid., p.29–30.

gives little opportunity for the mines to use skills as a competitive advantage to grow market share or establish new contracts.[96]

Even if we assume that there are appropriate incentives to minimise the risk of an incident, certain factors can reduce the ability of private decision makers to combine and use resources in a way that maximises their own private benefit including:

- being unaware of the issues
- being unable, or not having the appropriate systems in place to appropriately monitor performance
- being constrained by commercial pressures—particularly if it is a non-core aspect of their business or involves high cost and hence there is a high opportunity cost of devoting management time to this issue.

In particular, the commercial incentives to invest in research and development may be inadequate. Returns from investment in research and development are more uncertain than from traditional investment, thus research and development is often underprovided by the private sector. In discussing OHS, Larsson, a Professorial Fellow at the Monash University Accident Research Centre, notes that "technological development, investment and innovation are critical factors in the reduction of occupational injury and disease".[97] This has often been achieved through a regulatory framework that allows for compliance by industry combined with reasonable levels of detection from inspectors. In the case of the brown coal mining sector, it appears that the incentives are not adequate to encourage research and development needed to ensure public safety and environmental protection.

This has meant that there has been under provision of research and development and insufficient incentives to share the limited information that is collected. Once knowledge has been created, it is almost freely appropriable; hence strong incentives to free ride are created.

While there is little commercial incentive to share information, there is also reduced commercial incentive to invest in the research and development of new information particularly if that information will be used by your competitors.

According to the Warden's report information failures exist because the skill and knowledge within the sector has declined to a point that there is a lack of sufficient expertise within the mining industry to interpret data and existing conditions in line with long established understanding of the nature and behaviour of brown coal mines in the Latrobe Valley. According to the

---

[96] Minerals Council of Australia (2007), *Provincial Victoria: Minerals Industry Skills Study*, May 2007, p. 15.

[97] Larsson, T.J. (2002), *New Technologies and Work: Pulverization of Risk – Privatization of Trauma?* as cited in Kirwan, B., Hale, A., and Hopkins, A. (2002), *Changing Regulation: Controlling Risks in Society*, Elsevier Science Ltd, p. 15.

Mining Warden's report on the Yallourn Mine Batter Failure Inquiry, the day before the collapse, consultants advised Yallourn mine management *'it was unlikely that a catastrophic failure will occur, resulting in an immediate safety hazard'*[98].

Mining companies are not in a position to critically evaluate or interrogate the information they are provided by consultants nor are they capable of ensuring all of the relevant issues are being addressed. This was an issue noted by the Mining Warden, who stated that in relation to a very large movement of the Morwell River Diversion in 2003 that went unnoticed until the annual monitoring survey, the movement "also highlighted other issues including:

1. The geotechnical model was incorrect as it did not include this fault.
2. It is unusual in construction of such an important piece of infrastructure to have such a large gap in monitoring."[99]

This inability to differentiate is an information gap experienced by mine operators, mining consultants and governments.

One of the key reasons behind this information gap is that tertiary education can be considered a non-pure public good (it has both private and public benefits). There are a number of reasons why the market may under invest in education:

- Imperfect information—investors in education lack information on the learning opportunities available and the benefits that may accrue from training.
- Time preference—individuals or organisations may be focused on the present and ignore longer-term benefits.
- Capital market imperfections—firms and individuals may experience difficulties in accessing funding for training.
- Externalities—skill formation may have wider benefits or spillovers that those financing it cannot fully capture for themselves and which those investing will have no incentive to account for in making their decisions. For example, having upskilled their staff, the staff can be poached by another employer. The first employer's investment is then lost as another "free-rides" on the back of their efforts.

The MCA found that 62 per cent of employees of the Yallourn mine are 45 years or older.[100] The other two mines in the Latrobe Valley had similar demographics, indicating that these mines are likely to face significant labour and skills issues over the five to ten years from 2007. At this time, it was reported that there appeared to be a low level of workforce planning in the

---

[98] Mining Warden, Yallourn Mine Batter Failure Inquiry, June 2008, p. v.

[99] Ibid., p.101.

[100] Minerals Council of Australia (2007), *Provincial Victoria: Minerals Industry Skills Study*, May, p. 33.

Latrobe Valley brown coal mines.[101] The aging demographic of the workforce in the Latrobe Valley mines suggests that as these workers retire, there is an even greater possibility of historic understanding of the unique characteristics of these mines being lost if action is not taken to build up skills specific to large, open cut brown coal mines in Victoria. The tertiary education sector in Victoria was also found to be suffering from a lack of teaching staff and graduates to fill teaching roles in the future.[102]

Existing operators were unable to secure the required level of expertise to sufficiently analyse data and provide advice to ensure mine stability is maintained at all times. The Mining Warden's report highlighted the loss of this specialist knowledge in the industry. There is a clear role for government to address this market failure by ensuring operators have access to the required expertise in geotechnical and hydrogeological issues.

5.2.3 Uncertainty and risk

The complex nature of mining structures and the continual improvement of mining techniques mean that it is important to continue to invest in ensuring the safety of the mines and surrounds.

As discussed in the introduction to this RIS, there are a number of characteristics which are unique to the Latrobe Valley mines. These characteristics differentiate the Latrobe Valley coal mines from other mining regions in Australia and mean that specialist knowledge is required to properly manage the risks associated with these mines.

As noted in Section 4.1, interacting and inter-related factors contributed to the collapse, namely:

- loss of understanding and knowledge
- removal of critical mine stability controls
- inability to interpret data.

While natural causes (water pressure, etc) contributed to the collapse, these natural causes were not exceptional and would be capable of mitigation to reduce the likelihood or severity of a collapse if the above factors were addressed.

A key issue in relation to the Yallourn mine batter collapse was the failure, over a period of several years, to interpret the available information to ensure mine stability was maintained. There was no requirement for Yallourn to report symptoms of the imminent failure, such as movements in the batter and cracking, to the DPI Inspectorate.

---

[101] Ibid., p 35.

[102] Ibid., p 49.

The Mining Warden found that in the case of the Yallourn, the failure had a long gestation period. It commenced with a new mining method and mine layout of the Yallourn East Field Mine in 2002. While the new technical challenges of the new mining method and layout appear to have been recognised, any concerns appear to have been superseded by other technical matters or issues over time.[103]

Despite the issues that led to the failure being well understood and documented in the past, the historic understanding of some characteristics of the Latrobe Valley mines had been lost. The collapse happened at a time when the Latrobe River had high flows–a one in two year event.[104] The Mining Warden found that the hazards and risks of mining near the Latrobe River and the measures required to ensure stability of this batter were well understood.[105] The Mining Warden found that errors had appeared to have arisen from a misinterpretation of the geotechnical conditions and situation at the time.[106] The Mining Warden recommended appropriate processes and procedures should be established to address the information gaps that resulted in the collapse to avoid similar incidents in the future.

Further, the Mining Warden also found that:

> *Somehow the historic understanding and knowledge became lost or was no longer properly appreciated in the years prior to the failure*.[107]

The Government's response to the Report states:

> *As identified by the Mining Warden, the fundamental cause of the mine batter failure was a lack of sufficient expertise within the mining industry, both within the mine operator and external to the mine operator, to interpret the available information to TRUenergy*[108]

The significance of the potential effects of a mine collapse means that it is important to continuously improve techniques of managing the stability of the mines, in particular, where there is a potential significant impact on the surrounding areas. For example, if the risk of a collapse within the next ten years is reduced by one per cent through additional research and development to help to inform and improve practices and allow for the sharing of this information to all mines this would significantly impact on the likely consequence of a collapse.

---

[103] Victorian Government (2008), Mining Warden, Yallourn Mine Batter Failure Inquiry, June, p. v.

[104] Mickelburough, P., Masanauskas, J., and Wotherspoon, S. (2007), *Mine operator aware of leak,* Herald Sun, 16 November.

[105] Victorian Government (2008), *Yallourn Mine Batter Failure Inquiry*, 30 June, p. 34.

[106] Ibid., p. 99.

[107] Ibid., p. 95.

[108] Government Response to the Mining Warden Inquiry into the Yallourn Mine Batter Failure, p.1.

Given the potential for a collapse to have a significant effect on lives lost, environment damaged, infrastructure damaged, and electricity supply made unavailable, the lowering of the likelihood by only a small percentage has a significant effect on the extent of the consequence. Using the value of the environmental costs in relation to the river diversion, the cost to electricity supply, and the possibility of a loss of life, this cost is over $162 million.[109]

5.3 Fees

The existence of a market failure and the additional requirements to address it will often involve additional resources. Cost recovery is the recovery by government of some or all of the costs of a particular activity.[110] A fee is generally defined as a charge levied in order to recover some or all of the cost of providing a service. The setting of fees within Victoria is governed by the *Cost Recovery Guidelines* issued by the Department of Treasury and Finance. The Guidelines establish a whole-of-government framework for cost recovery. Governments generally impose fees to fully recover the costs of administration associated with regulation to ensure that efficiency and equity objectives are met.[111]

Cost recovery is often implemented by fees. Fees are set according to units, which are assigned a monetary value which is fixed for a financial year by the Treasurer under section 5(3) of the *Monetary Units Act 2004*. The current value of a fee unit is $11.69.

Fees may be characterised as either regulatory fees or user charges. Regulatory fees are characterised by granting access rights to engage in a desired activity, such as a permit or licence enabling government to regulate an activity as an instrument of government policy[112]. In comparison, a user charge is the direct charge for the provision of a good or service by the government in an open market[113].

As noted in section 4.2 of this RIS, the MRSDA has been amended to provide for a mine stability levy to be prescribed in regulations. While the term “levy” has been used in the MRSDA, the structure of the levy is a “fee-for-service” because it is a direct charge for the provision of services by the Government.

It is general Government policy that regulatory fees and user charges be set on a full cost recovery basis because this ensures that both efficiency and equity objectives are met.

---

[109] i.e. $425,027.90 + $156,646,021 +$3,740,000 = $161,811,049.

[110] Department of Treasury and Finance (2007), *Cost Recovery Guidelines* September, p 4.

[111] Ibid., p. 6.

[112] Ibid., p. ii.

[113] Ibid.

However, it may be appropriate to recover at less than full cost in certain situations. In relation to cost recovery, horizontal equity generally requires “those who benefit from government activities or those who contribute to the need for government regulation, having to pay the associated costs.” As set out in this RIS, the management of the regulatory problem will result in benefits for both industry (safe operation, environmental care, reduced risk, certainty) and the public (reduced risk to the public, infrastructure and environment). Consequently, the appropriate level of cost recovery (in the form of fees for service) from industry for the regulations must be determined.

As noted in Section 4.2.5 some of the proposed activities are already taking place because of the nature of the risks associated with the regulatory problem outlined in this section. Industry will not be required to retrospectively contribute to the initial cost of the above activities. The costs are being met by Government in order to ensure risk management activities start as soon as possible and deliver benefits to industry and the community as soon as possible.

5.4 Enforcement of infringement offences

DPI undertakes enforcement to ensure compliance with legislation and regulations which apply to extractive activities. As stated in the *DPI Enforcement Procedure*, “DPI employs a range of responses that can escalate according to the severity of the contravention of the continuation of that contravention.”[114]

In relation to enforcement, the MRSDA currently prescribes a number of penalties for breaches of the MRSDA. The MRSDA also enables infringement notices to be issued for minor breaches of the MRSDA and for infringement penalties to be prescribed in the Regulations. Section 106 of the MRSDA, provides that an inspector who has reason to believe that a person has committed an offence against the MRSDA or the Regulations may serve an infringement notice on that person. Section 124 enables the Regulations to prescribe infringement offences for which infringement notices may be issued.

The infringements system enables minor offences to be dealt with by the issuing of a notice which gives the recipient the option of paying a fixed penalty, rather than proceeding to a court hearing. Infringement notices and penalties provide an appropriate, efficient and rapid response to lower level offences and fulfil a deterrence and punishment role.

It is not proposed that any new infringement penalties be introduced into the Principal Regulations in relation to this regulatory problem. However, it is proposed that an existing infringement penalty in relation to minor breaches of section

[114] Available at www.dpi.vic.gov.au

110(3) of the MRSDA (failure to comply with an order to cease work etc) be applied to situations where:

- the mining licence holder for a declared quarry does not vary the work plan to include mine stability requirements and processes
- the mining licence holder for a declared quarry does not submit six-monthly reports
- the mining licence holder for a mine does not provide a report about a reportable event to DPI.

Section 110 enables inspectors, under a delegated power from the Minister, to issue notices requiring an operator to undertake an action within a specified time. The notice can also require the operator to cease work until the specified action is undertaken. In relation to the above situations, the intention is that operators may be required to provide the information and may be required to cease operation until the necessary information is provided. This is particularly the case where a work plan variation has not been submitted in relation to a declared mine which has been declared as posing a risk to public safety, infrastructure or the environment. The notice will be issued when circumstances in section 110 (1)(a)-(c) have been met (e.g. a reasonable belief that the authority holder has or is likely to contravene the MRSDA or the Regulations).

Without regulation in relation to infringement offences, the enforcement of minor breaches in a manner that is commensurate with the nature of the breach would not be possible. Furthermore, there would be no appropriate deterrent in relation to such breaches.

In addition, the potential impacts of minor breaches can be serious, particularly in relation to breaches that may affect the environment, Crown land or nearby residents and communities and/or where notices or requests issued by inspectors are not complied with. Consequently, it is important to have appropriate, uniform penalties in place for industry as a whole in order to act as firm deterrents against such breaches.

5.5 Summary

The impacts related to the collapse of a mine, in particular, a brown coal mine in the Latrobe Valley, are significant. There are risks to the safety of the employees of the mine as well as to members of the public in the vicinity of the mine. There are risks to the safety of the public infrastructure surrounding the mines. In the case of the Latrobe Valley mines, each is located close to main roads. In the case of the Hazelwood mine, the town of Morwell (13,400 people) is particularly close. There are also risks to the environment surrounding the mine, with a collapse having an effect on vegetation, habitat, and in the case of the Yallourn failure, river flow. Therefore, there are grounds for government intervention on the basis of managing public risk.

The brown coal mines also supply 94 per cent of the electricity generated within Victoria. Coal from Loy Yang alone generates around 50 per cent of the electricity for the state. A major effect of a collapse of a mine is the potential disruption on electricity supply to the state.

While the risks associated with each of these consequences are managed by current mine, safety, planning and environmental regulations, the likelihood of these risks is not minimised by current practices. The structure and competition of the current brown coal mining industry means that there are insufficient commercial incentives to gain an outcome that would achieve the best results for society.

Competitive forces mean that there is an incentive for businesses to make decisions independent of each other, and they may be well below best practice without even knowing. This is because they may:

- be unaware of the issues
- be unable, or not having the appropriate systems to monitor performance.

Competitive forces also mean that there is not incentive to share existing information. Where a mine may have more efficient systems in place to manage their stability, they do not have an incentive to share this information with other mines.

There is also likely to be an underinvestment in new expertise and knowledge because there may be:

- imperfect information
- an ignorance of long term benefits
- difficulty accessing funding
- difficulty capturing the external benefits.

Without commercial incentives in place to ensure best practice by sharing information and by investing in further research, it is likely that the risks involved in the practice of mining will continue.

To the extent to which the problems exist the implementation of a mechanism to recover the costs of addressing the problem is required. The Department of Treasury and Finance provide *Cost Recovery Guidelines* to determine who should be responsible for the recovery of the costs, and for how much.

The current Regulations allow for the enforcement of infringement offences. To the extent to which options to address the problems outlined in this chapter are implemented, the use of the current enforcement powers can be used to impose penalties.

6 Objectives

Government intervention to minimise the risk of another mine collapse is consistent with the purpose of the MRSDA, which is to:

> *encourage an economically viable mining industry which makes the best use of mineral resources in a way that is compatible with the economic, social and environmental objectives of the State.*[115]

The purpose of the Proposed Regulations is to improve the management of mine stability so as to minimise the risk of another significant collapse in a mine occurring in future so that the following secondary objectives in relation to the mining industry can also be achieved in the earliest possible timeframe, and continue to be maintained:

- improved management of safety and infrastructure risks
- improved management of environmental risks
- improved management of the electricity supply risk
- sharing of knowledge to improve mine stability
- investment in knowledge to improve mine stability
- reduced uncertainty and risk of a mine collapse
- appropriate costs recovery from industry in relation to certain activities is implemented.

These objectives will be used to assess the relative merits of the various options for the regulation of mining in Victoria. The preferred option will match each of the objectives.

This intervention is linked to the Government's general triple-bottom line approach to policy, which seeks to balance economic, environmental and social objectives. It is also linked to the Victorian Government priorities listed in it vision statement, *Growing Victoria Together*[116]. This sets out a number of priorities related to these Regulations:

- thriving economy—thriving, innovative industries
- high quality education and training
- protecting the environment for future generations
- efficient use of natural resources
- building friendly, confident and safe communities. [117]

---

[115] Section 1 of the *Mineral Resources (Sustainable Development) Act 1990*.

[116] Department of Premier and Cabinet, *Growing Victoria Together (2005)*. Available at DPC website: http://www.dpc.vic.gov.au

[117] Department of Premier and Cabinet, *Growing Victoria Together (2005),* p.2.

In addressing the problems outlined in the previous chapter, the Regulations will help to achieve these priorities and benefits.

These Regulations will also help to achieve the first two of the Victorian Government's four energy policy objectives, which are to:

- ensure an efficient and secure energy system
- ensure those supplies are delivered reliably and safely
- ensure consumers can access energy at affordable prices
- ensure our energy supplies and the way we use them are environmentally sustainable and in particular, less greenhouse gas intensive. [118]

[118] Stated on the DPI website: http://new.dpi.vic.gov.au/energy/energy-policy2

7 Options

7.1 Stakeholder consultation

Following the release of the Mining Warden's Inquiry into the Yallourn Mine Collapse and the Government response to the Inquiry, the Government undertook extensive consultation with industry regarding its contents. An implementation committee was formed to explain how each element of the Government Response would be applied. Consultation was undertaken with the three Latrobe Valley brown coal mines who are the main parties to be affected by the Proposed Regulations. Consultation was also undertaken with the MCA, the peak representative body for the minerals industry.

During ongoing consultation, DPI took each of the mines through all the aspects of the Government Response to the Inquiry.[119] The following points summarise the discussions and outcomes from the consultation with officers from the Yallourn, Hazelwood and Loy Yang mines and the MCA:

- Mine stability requirements for work plans and reportable events—these requirements were discussed with industry and the MCA during consultation meetings. The reportable event requirements were agreed upon by industry after industry comments were addressed.
- Technical Review Board—Industry indicated its interest in the terms of reference and selection of the Technical Review Board. The Terms of Reference and the guidelines for the working of the Technical Review Board were considered in a meeting run by DPI with the three mines and the MCA.[120] Comments from industry were addressed at the meetings and incorporated into the documents. The MCA also acted as an industry participant on the selection panel for the Technical Review Board.

[119] For further detail on each of the Government Response initiatives see Section 14.2

[120] See Appendix G

- Levy—the three mines and the MCA indicated that they did not support the imposition of the levy and instead were of the view that any response should not be funded by industry. However, Government indicated that as the response would provide benefits to the industry, it was appropriate that industry should contribute to the cost of the response. Government then wrote to the mines and sought feedback from the mines regarding the following options for raising the cost of half of the levy from industry:
  - per tonne mined
  - divide equally between the mines
  - divide on formula reflecting size or volume of mine void as a proxy for risk.

7.2 Feasible Alternatives

The *Subordinate Legislation Act 1994* requires, amongst other things, a RIS to assess the costs and benefits of Proposed Regulations. This legislation also requires that a RIS identify practical alternatives to the Proposed Regulations and assess their costs and benefits compared to the Proposed Regulations. Conversely, the RIS is not required to identify alternatives that are not feasible or practical. This section describes the viable non-regulatory and regulatory options for achieving the objectives set out in Chapter 6.

The base case or “do nothing” approach assumes that the Principal Regulations remain unchanged. A number of feasible alternatives to address the problems discussed in Chapter 5 will be assessed relative to the base case.

These options are:

- Continue with existing Regulations (base case)
- Amend existing Regulations to:
  - include prescribed information in work plan to address mine stability and monitoring systems
  - require declared mines to provide biannual reports
  - require reports where a prescribed event occurs
  - establish a fee for service.
- Change licence conditions to:
  - include prescribed information in work plan to address mine stability and monitoring
  - require declared mines to provide biannual reports
  - require reports where a prescribed event occurs
  - require coal mines to establish their own Technical Review Board
  - establish a fee for service.

- Co-regulatory approach which includes:
  - the development of a code of practice by industry.
- Prescriptive Regulations regarding declared mines to:
  - prescribe precise geotechnical and hydrogeological requirements for all declared mines
  - establish a fee for service
  - require declared mines to provide biannual reports
  - require verbal report where a prescribed event occurs.
- Alternatives to the Technical Review Board including:
  - accreditation system for geotechnical and hydrogeological consultants
  - importing skill sets from other jurisdictions.

The costs and benefits of the feasible alternatives will be estimated as incremental to the current Regulations (base case). It is intended that any option to address the regulatory problem will run for ten years. This is consistent with representations made to industry when the initiative was developed. Furthermore, it is intended that there will be a review of various aspects in the fourth and fifth year of operation. However, the Principal Regulations sunset in 2012 and therefore, in effect, this RIS is considering changes that may only be in place for two years. However, it is likely that long term potential impacts will not fully present themselves within a two year timeframe. Potential long term benefits include further knowledge and expertise, where maintenance of a Technical Review Board, research and development, and additional DPI capacity will mean that acquired knowledge and expertise will continue, develop and be retained. With this additional knowledge and expertise, DPI and the industry will be better equipped to reduce the likelihood of a collapse and respond more appropriately if a collapse occurs. As such, each of the options sets out consequences over a ten year period. Nevertheless, the changes will require reassessment at the time when the Principal Regulations sunset and more data is available on whether the changes should be retained for a longer period.

7.2.1 Option 1: Continue with existing Principal Regulations (Base Case)

For the purposes of this RIS, the base case to which the following options are to be compared is the current set of Principal Regulations. These regulations cover a range of requirements including royalties and production returns, licence application requirements, infringements, general duties and information requirements, fees and rentals and so on. The base case does not include any regulations in relation to additional risk management and reporting requirements for declared

mines, description of reportable events for notification purposes or details relating to the mine stability levy.

This option would, in effect, be tantamount to a non-regulatory approach; it is assumed that the market will correct the failure that has occurred and will also address the management of public risk.

Under this option, the supply of geotechnical and hydrogeological expertise relevant to brown coal mining would be left to market forces. The coal mines would devise their own risk management approaches to dealing with geotechnical and hydrogeological risks, with no regulatory oversight by DPI or any other regulator, beyond the current work plan requirements.

There would be no oversight by DPI of new regulatory requirements under this option and thus no need for funding to deliver new regulatory requirements. The Technical Review Board, and research and development would only be in place if industry chose to implement such measures. Industry would also determine the cost of such measures pursuant to market forces. Therefore, a levy would not be imposed under this option.

The provision of information regarding “reportable events” would also be at the discretion of the mines. There would be no regulations nor guidance material regarding what constitutes a reportable event.

7.2.2 Option 2: Amending the Principal Regulations

Each of the sub-options of Option 2 involves the amendment of the Principal Regulations to allow for the following additions.

Additional work plan requirements for declared mines

If declared, a mine would be subject to additional monitoring and reporting requirements. Declared mines will be required to undertake a risk assessment as to their geotechnical stability and will be required to develop and implement a mine stability plan. The Government Response to the Mining Warden Inquiry into the Yallourn Mine Batter Failure stated that the mines to be declared initially are the three Latrobe Valley coal mines at Yallourn, Hazelwood and Loy Yang.[121] At this stage, there is no proposal to declare any other mines.

The risk assessment and risk management requirements are proposed to be implemented through the work plan requirements of declared mines. The work plan (one of the key regulatory documents for mining under the MRSDA) describes the activities to be undertaken on a mine site. Generally, the

[121] Victorian Government (2008), *Mining Warden Yallourn Mine Batter Inquiry: Government Response*, 30 June, p. 3.

information in the work plan will be used by DPI to ensure that appropriate operational standards and systems are in place. Under the MRSDA, all licensees must have an approved work plan in order to do any work other than low impact exploration.

The amended Regulations would outline the additional work plan requirements of stability plans in Part 2 of Schedule 13 to include a:

- clear identification of the extraction area of the declared mine
- description of the geological information about the declared mine and any variation of the geological information across the rest of the location plan
- plan showing cross sections and long sections of the proposed extraction area of the declared mine
- risk assessment of the geotechnical stability and hydrogeological features of the declared mine
- description of the controls relating to mine stability that will be implemented and monitored, including any proposed groundwater control system
- description of the process to be implemented for the monitoring and review of the mine stability requirements of the declared mine
- description of the process for the review of the information under this Part relating to the declared mine.

If a work plan was approved before the mine became a declared mine, requirements also include a:

- description of any proposed changes to the information under item 4 of Part 1 of Schedule 13 of the Principal Regulations.
- description of any infrastructure or plant proposed to be associated with the declared mine.

The above requirements and processes reflect well established risk management process, starting with some description of the underlying circumstances, then an assessment of identified risks, development of control measures to manage those risks and ongoing monitoring and review.

The variation will be considered and approved by DPI. The Technical Review Board will also have an opportunity to review work plan variations and provide advise to DPI. Once the work plan variation to include the above information has been approved, the MRSDA required the declared mines to implement the systems etc and operate (in the long term) in accordance with the varied work plan.

Declared mines will also be expected to submit six monthly reports to DPI (see immediately below).

Government would expect to conduct inspections, audits and other enforcement activities in respect to the work plans and work plan variations.

Additional reporting requirements for declared mines

As noted above, declared mines will also be required to provide regular reports to DPI about any geotechnical and hydrogeological issues, and the outcomes of monitoring that the mine undertakes. These reports will be required to be submitted to DPI in relation to each period of six months ending 30 June or 31 December, unless the Department Head nominates a different period. Such lengthening or shortening of the periods of the reports will generally be at the discretion of the Department Head, and may be changes to take into account any variations in risk over time (i.e. decrease or increase).

Such reports would be submitted within three months of the end of the period it relates to. This will provide certainty regarding the contents and process for the reports, and will ensure that provision of such reports is enforceable.

The reports will be required to demonstrate that risks to the environment, public safety and infrastructure have been given appropriate geotechnical consideration and are being appropriately managed in the design for mining, appropriate stability modelling and operations. The report should include details of:

- outcomes of reviews of the assessment, plan and controls for the mine
- the implementation of control measures
- any stability modelling undertaken
- any significant changes in the operation of the declared mine
- the mine design components
- results of the monitoring plan set out in the work plan
- the implementation of the monitoring and review process set out in the declared mine stability requirements.

Once the report is provided to the Department Head, the report will then be provided by DPI to the Technical Review Board for review as part of the additional reporting requirements for declared mines outlined in the section immediately below. The findings of the Board will be referred to DPI for action with any recommendations.

The Technical Review Board will provide an additional level of review to satisfy the regulator (DPI) that the systems and monitoring is sufficiently rigorous.[122] It is expected that the mine

[122] Ibid,

companies will need to enhance their geotechnical expertise (or ensure consulting expertise is of a high enough standard) to meet the new reporting requirements.[123]

A failure to undertake the geotechnical monitoring and review, or submit the report to DPI at the requested time, will result in enforcement action by DPI under existing provisions in the MRSDA.

Funding for geotechnical and hydrogeological expertise

Under each of the sub-options of Option 2, revenue will be raised. This revenue will be raised via a “mine stability levy” (fee-for-service) which will be imposed on certain mines (known as “Latrobe Valley region coal mines”) which are prescribed in the Regulations. The amount of the mine stability levy and how the levy is to be paid will be prescribed in the Regulations. The revenue will be raised to:

- establish a Technical Review Board comprised of eminent technical experts to ensure appropriate peer review of the geotechnical consulting advice received by the mines.
- enhance geotechnical and hydrogeological research and development areas relevant to brown coal mining through the establishment of a foundation chair and three PhD students at the Churchill Campus of Monash University
- strengthen DPI’s capability through new geotechnical and hydrogeological expertise and additional training for existing DPI inspectors.

Establishment of a Technical Review Board

The existence of a Technical Review Board is not an uncommon occurrence in areas where very specific expertise is required. The following table outlines some examples of current bodies which provide technical advice to governments and industry.

[123] Ibid.

Table 7.1 Examples of Technical Advice Boards

NSW Government – Dams Safety Committee
The NSW Government established a Dams Safety Committee (DSC) under the *Dams Safety Act 1978* to ensure the safety of dams within New South Wales. The DSC was established following the establishment of a NSW Inter-departmental Committee for the Safety of Dams and an inquiry into coal mining under or in the vicinity of the stored waters of five dams owned by the Metropolitan Water, Sewerage and Drainage Board, Sydney. In 1977, the NSW Cabinet approved the establishment of a DSC because of a general concern about the safety of dams, and a need to establish control over coal mining in the vicinity of dams and storages.[124] Somewhere in the world there is usually at least one major dam failure each year and many near-failures. In Australia, there has only been one major dam failure—over 70 years ago in Tasmania—where 14 people were killed.[125] The vision of the DSC is that: • all dams meet a level of safety that is acceptable to the community • we inspire confidence in our stakeholders and are recognised for our technical excellence. The DSC has the following goals to implement this vision: • ensuring the DSC functions under the Dams Safety Act and Mining Act are met • formulation of measures to ensure the safety of dams and promotion of the progressive reduction of risk across all prescribed dams • ongoing examination and audit of the safety management of prescribed dams • maintenance of a relevant and current knowledge of the safety status of NSW dams • promotion of dam safety awareness through the direction, education and training of stakeholders • continual improvement of the DSC's effectiveness in managing its resources (e.g. staffing and budgets). Under the *Dams Safety Act 1978* and the *Mining Act 1992* the DSC has been given the role to: • protect the safety, welfare and interests of the community from dam failure by ensuring that risks from prescribed dams are tolerable • ensure that DSC requirements are met, that risks are regularly reviewed, and further reduced if reasonably practicable • protect the security of dams and their stored waters from the effects of mining or other activities.[126]

[124] Dams Safety Committee (2009), *History,* http://www.damsafety.nsw.gov.au/DSC/About/history.shtm (accessed 14 December 2009).

[125] Dams Safety Committee (2005), *General Information,* http://www.damsafety.nsw.gov.au/DSC/Download/Info_Sheets_PDF/General/DSC01.pdf (accessed 14 December 2009).

[126] Dams Safety Committee (2009), *About Us,* http://www.damsafety.nsw.gov.au/DSC/About/index.shtm (accessed 14 December 2009).

Hong Kong Technical Review Board

In 1995, the Hong Kong Government set up a Slope Safety Technical Review Board to review Government work in slope safety management and advise on technical aspects of the slope safety system.[127] While the Hong Kong government has had a Geotechnical Engineering Office within the Civil Engineering and Development Department since 1977, the Technical Review Board was established due to a lack of available geotechnical expertise.[128]

The Slope Safety Technical Review Board comprises of three Board Members who have been selected based on their high international standing in the geotechnical engineering profession, possession of appropriate knowledge and experience related to slope safety, and no involvement in commercial projects in Hong Kong. The Technical Review Board allows for review and benchmarking of the work of the Geotechnical Engineering Office from an international perspective.[129] The Hong Kong Technical Review Board has had a positive impact on reducing landslides and slope failures.[130]

The Technical Review Board will be comprised of five eminent technical experts who are appointed by the Minister. The members are required to be "experts in their field" and will have high level experience and expertise in one or more of:

- geotechnical engineering skills with experience in large open cut mines
- engineering geology skills with experience in large open cut mines
- hydrogeological skills with experience in large open cut mines
- mining engineering and mine planning and development skills with experience in the mining sector
- application of risk assessment and mitigation principals to mine stability, geotechnical and environmental issues
- civil engineering, and regional infrastructure planning.

The primary purpose of the Technical Review Board is "to provide advice to the Minister and Department on mine stability issues, specifically in relation to reducing risk to the environment, public safety, infrastructure and the continuity of

---

127 Chan, RSK and Lau, TMF (2007), *Slope Safety System and Landslide Risk Management in Hong Kong*, Geotechnical Engineering Office, Civil Engineering and Development Department, Hong Kong.

128 Victorian Government (2008), *Mining Warden Yallourn Mine Batter Failure Inquiry: Government Response*, pp. 3–4.

129 Civil Engineering and Development Department (2008), *Slope Safety in Hong Kong,* July 2008, http://www.cedd.gov.hk/eng/publications/leaflets/doc/27slope_safety_july2008_downloadedfromgovbb.pdf (accessed: 15 December 2009)

130 Victorian Government (2008), *Mining Warden Yallourn Mine Batter Failure Inquiry: Government Response*, pp. 3–4.

operations where coal supply to Victorian Power Stations may be affected."[131]

The activities which the Technical Review Board will undertake include:

- review and interpret mine stability reports, including monitoring data, that has been submitted to the Department and provide written advice to the Minister and the Department
- assess work plans and variations to work plans and provide written advice to the Department on mine stability and related geotechnical and hydrogeological issues
- written and/or verbal advice on DPI's strategies and regulatory approach to mine stability and geotechnical issues
- written and/or verbal advice on new development in technology and science relating to the understanding, monitoring or management of mine stability and related geotechnical and hydrogeological issues
- other activities include:
  - advise the Minister and the Department in formulating appropriate response to significant events relating to mine stability and related geotechnical and hydrogeological issues
  - advise the Minister and the Department on appropriate guidelines and educational initiatives relating to stability
  - with the knowledge and agreement of the Minister, interact directly with industry on mine stability and related geotechnical and hydrogeological issues, including participation in site visits, presentations and dialogue, particularly with respect to communicating findings of reviews with relevant stakeholders
  - in conjunction with DPI, interact directly with Monash University in relation to the research and development program on brown coal geotechnical and hydrogeological issues.

In relation to the above activities, the Technical Review Board will normally have biannual meetings, which may last up to two weeks on each sitting. The sittings will primary be concerned with the first two activities listed above. However, it is expected that, in total, the Technical Review Board members will undertake 40 days of work. This includes the sitting days each year, work (reading and preparation) for sittings, and work associated with the other activities above.

The Technical Review Board will interact with industry and Monash University directly, where appropriate.

---

[131] Technical Review Board (2010), *Terms of Reference*, p. 2. For a copy of the Terms of Reference see Appendix G

The Technical Review Board is subject to Terms of Reference and Guidelines.[132]

As noted above, the Technical Review Board will provide verbal and written feedback to the Minister and Department on an ongoing basis. The advice will be considered and implemented as required upon receipt. For example, advice about the need for a mine to vary its work plan in relation to mine stability will be considered by DPI and the variation will be requested where appropriate.

The Technical Review Board will also report to the Minister on an annual basis.

The Technical Review Board will be reviewed after the first 18 months of operation.

An independent review of the Technical Review Board will be undertaken after four years of operation. The review will consider the role of the Technical Review Board and the need for the Technical Review Board. The review will consider reports of the Technical Review Board, data and statistics (such as incidents/events in mines), the delivery of outputs and milestones as per the Terms of Reference, stakeholder feedback and outcomes of mine audits.

When the primary legislation was being amended, other alternatives to the Technical Review Board were considered by DPI; such options would in turn affect the level of funding required under any levy. However, these alternatives were not considered feasible, as the discussion in sections 7.2.12 and 7.2.13 illustrates.

Research and Development

The mine stability levy will also fund research and development intended to foster research and innovation in coal geotechnical and hydrogeological areas. As noted in the Government Response, the program will enhance the capability of graduates by developing a brown coal specific curriculum and will also contribute to the ongoing education of existing mining professionals.[133] DPI and mines will be expected to develop knowledge and skills as a result of the findings of the research and development program.

The use of research and development in this manner occurs at a national level, for example through Safe Work Australia shown in the following table:

[132] See Appendix G

[133] Ibid., .p. 8.

Table 7.2 Example of research and development

Safe Work Australia
Research is fundamental to the continuous improvement of Australia's performance in OHS and workers' compensation arrangements. Safe Work Australia ensures that research findings are disseminated and the knowledge gained is used to effectively inform OHS policy and practice.

Industry proposed that it should establish a direct relationship with Monash University to develop a research and development program. However, as the Government Response indicated, this initiative is intended to address a lack of knowledge and expertise within both industry and government. Therefore, government will remain involved in the research and development to ensure that government and public needs and priorities, including the development of key skills and the establishment of a critical mass of earth resources researchers in Victoria, are met.

The research and development program will establish and maintain a world class geotechnical and hydrogeological engineering research group at the Gippsland campus of Monash University.

The program will be comprised of a Professor in geotechnical/hydrogeological engineering (Chair), a senior research fellow, a research fellow, a technical assistant and at least three PhD students (including scholarships).

The purpose of the program is to:

- provide ongoing expertise and advice
- assist in preventing mine failures in the Latrobe Valley region.

As noted on the Monash University website, activities undertaken by the program will be as follows:

> *The group will foster research and innovation in coal geotechnical engineering and hydrogeology, particularly in the areas of mine stability, mine monitoring systems and interpretation, and ground subsidence. It will also have the capability to review and develop a systems modelling approach to planning, involving issues such as mine water quality, quantity, contamination, ground subsidence, safety risks and the potential effects of bushfires.*
>
> *The research group will also develop short course training programs for mine personnel in the region.*[134]

The Government and the University will also meet on a quarterly basis.

[134] Monash University (2009), Centre of Geotechnical engineering for Gippsland campus, 25 September, http://www.monash.edu.au/news/newsline/story/1511 (accessed 7 April 2010)

An industry committee has also been established to provide advice and relevant research and development topics and issues to the program.

The program will provide six monthly progress reports to Government.

The program will also be subject to an extensive and robust review after five years. The review will consider the role of the Technical Review Board and the need for the Technical Review Board. The review will consider reports of the program, the delivery of outputs and milestones, stakeholder feedback and data.

Additional DPI Capacity

Given the above model, funding is also required to strengthen DPI capacity and capability to deliver the new regulatory requirements, particularly to review risk assessments and management plans that will be incorporated into work plans for declared mines and in relation to responding to reportable events. Such work will require the improved education of DPI staff, increased site visits, audits and other enforcement activities. DPI will also deliver additional education and information to industry (i.e. guidelines, lessons learnt workshops etc).

Levy Required

The use of a levy to fund such initiatives has occurred in other Australian jurisdictions, as shown in Table 7.3.

Table 7.3 Examples of Levy

Queensland Government–Safety and Health Levy
The Queensland Government have established a Safety and Health Levy that recovers the cost of the safety and health services provided by the Government to mining, quarrying and explosives operations across the State. All mining, quarrying and explosives operations regulated under the *Coal Mining Safety and Heath Act 1999,* the *Mining and Quarrying Safety and Heath Act 1999* and the *Explosives Act 1999* are required to pay the Safety and Health Levy. These operations are required to supply information including the number of workers employed on a quarterly basis.[135] The fee is charged to recover the safety and health service provided to the mine, quarry and explosives industries including: • safety and health inspections and audits • investigation of mine and explosives accidents • collection and reporting of safety and health statistics • provision of safety and health advice, and explosives security • collection and maintenance of mining employee health records • dissemination of mining and explosives safety and health standards • research, development, and training in mining safety and health • provision of mine emergency services. The fee will also fund emerging safety and health services, including: • an increase in inspectorial and investigation Safety and Health staff • reforms to the Queensland Mines and Quarries Annual Safety Performance and Health Report • implementation of a small mines safety and health strategy. The fee was introduced on 1 October 2008, and therefore the fee will only apply for three quarters in the first year (that is, 1 October 2008 to 30 June 2009). The fee will be based on the budgeted cost of safety and health services for the relevant financial year and divided on a per capita basis.[136]

In relation to the initiatives in Option 2, the total cost of delivering the initiatives is estimated at $2,500,000. The original estimate was:

- Technical Review Board: $1 million per annum, payment for services (plus travel and accommodation costs) for four experts, including a Chair. Substantial preparation (analysis of reports and information) will be required in preparation for each meeting. It is also anticipated that other consultants may be required to provide specialist services (i.e. provide reports etc) to the Technical Review Board.
- Research and Development: $0.5 million per annum, for the creation of a geotechnical and hydrogeological engineering research group at the Gippsland campus of Monash University. The group will be comprised of a Professor in geotechnical/hydrogeological engineering, a senior research fellow, a research fellow, a technical assistant and at least three PhD students per year.

[135] Queensland Government (2009), *Safety and Health Levy,* http://www.dme.qld.gov.au/mines/safety___health_levy.cfm (accessed: 14 December 2009).

[136] Ibid.

- Enhanced DPI capability:$1 million per annum, comprised of:
  - Approximately $750,000 for the appointment of two experts (one hydrogeologist, one geotechnical engineer) and two additional inspectors, including associated on costs.
  - Approximately $250,000 for additional regulatory costs incurred by DPI including training for new inspectors, extension activities for stakeholders, publication of guidance notes, occasional expert consultancies and management of new data and reports.

Table 7.4 shows the most recent estimates of the cost components.

Table 7.4 Components of funding required (per annum)

Funding Component	Amount ($)
Technical Review Board (TRB)	
TRB sitting fees	$400,000
TRB on costs	$250,000
Professional services	$300,000
Research and Development	
Staffing for Monash University[137]	$510,000
Office support / overheads and equipment	$ 40,000
Strengthen and deliver new regulatory requirements	
Departmental staffing (hydrologist, geotechnical engineer, two inspectors – including overheads)	$665,500
Operating expenditure (external studies, expanded audit program, preparation of guidelines and regular stakeholder workshops)	$334,500
Total	**$2,500,000**

It is expected that the spending of the levy will benefit industry, government and the community.

Industry benefits include:

- ability to receive reviews from the technical review board regarding mine stability, mine monitoring systems and interpretation, ground subsidence and geotechnical advice
- innovation outcomes from research and development undertaken at Monash University and expansion of brown coal curriculum
- attendance at Monash University short course training programs for mine personnel
- benefits from additional DPI capacity through expert review of bi-annual reports and response to reportable events
- benefits from additional DPI capacity via ongoing education and capacity building for stakeholders.

[137] The chair of the TRB is also a member of the Research and Development program.

Government benefits include:

- advice from the technical review board regarding geotechnical and hydrogeological issues at coal mines, assistance with the interpretation of reports, assistance with the review of mine stability elements of work plans for declared mines and other advice
- any new research findings from Monash University that will allow DPI to better regulate the industry
- funds used to employ new staff including a hydrologist, geotechnical engineer and two inspectors and provide ongoing education and capacity building.

Community benefits include:

- improvement of the management of the risks associated with the working of the mines through technical review board advice, research and development and better regulation of the industry.

This RIS will consider the different alternatives for the allocation of these costs. The analysis of the alternatives will include the merits of the Government sharing the cost of the policy changes, research and future risk management.

Reportable events

The amended Regulations would require notification of any reportable event, being an event which is abnormal to the expected or usual operations and results in or is likely to result in significant impacts on the environment, infrastructure or the public. Initial notification will be required at the time of a “reportable event” occurrence. A reportable event may include, but is not limited to:

- an explosion or major outbreak of fire
- slope failure, unexpected creep, progressive slope collapse or failure of slope stability control measures
- injury to a member of the public caused by the carrying out of mining or associated operations
- uncontrolled outburst of gas
- unexpected or abnormal inrush of groundwater, other water or other fluid
- ejection of flyrock outside the approved work plan area from blasting
- escape, spillage or leakage of a harmful or potentially harmful —
    - substance
    - slurry
    - tailings
- a breach of a condition of the mining licence

- any occurrence that results in, or may result in, non-compliance with the work plan or work plan conditions relating to the mining licence.

The reporting requirements would have two distinct stages. Operators would be required to provide verbal or written notification of the reportable event to Chief Inspector after the event occurs or as soon as the operator becomes aware of the event. This notification would provide initial details of the event and the steps taken to reduce its impact. An operator may then be required upon request to provide a comprehensive written report detailing the circumstances of the event, its likely cause, its likely impacts, steps taken to reduce its impact and steps that will be taken to prevent its future recurrence.

After receipt of such reports, DPI would respond as appropriate, depending on the nature and scale of the event.

All Victorian mines will be required to comply with this requirement.

This model is based on a similar model currently prescribed in the Commonwealth *Petroleum (Submerged Lands) (Management of Safety on Offshore Facilities) Regulations 1996* and the *Petroleum (Submerged Lands) (Management of Environment) Regulations 1999*.

7.2.3 Option 2 (a): Amend Principal Regulations–50% Government funding / 50% Industry funding for ten years

Under this option, the funding would be established through a fee for service that would apply only to Latrobe Valley region coal mines, currently the coal mines at Yallourn, Hazelwood and Loy Yang. The fee for service would apply equally to each of the three mines, such that each mine would be liable for approximately $417,000 per annum (equal share of fee units annually). The fee for service would be paid in respect of each financial year and would generally be payable within four weeks of the end of the financial year, unless the Minister nominates an alternative date.

Under this option, the fee for service would apply for ten years.

7.2.4 Option 2 (b): Amend Principal Regulations–100% Government funding

This option is the same as Option 2 (a), however, instead of funding being raised 50 per cent between industry and government the levy will be paid 100 per cent by government.

Under this option, the funding would be made available for ten years.

7.2.5 Option 2 (c): Amend Principal Regulations–Full cost recovery over all mining businesses

This option is the same as Option 2 (a), however, funding will be sought from all industry participants.

This option is not considered to be equitable, as fees (in the form of the levy) would be imposed on parties who have not generated the need for Government services and who do not receive a major benefit from the Proposed Regulations.

7.2.6 Option 2 (d): Amend Principal Regulations–Full cost recovery from Latrobe Valley region coal mines

This option is the same as Option 2 (a), however, funding will be sought from only the Latrobe Valley region coal mines.

Under this option, the funding would be made available for ten years.

7.2.7 Option 2 (e): Amend Principal Regulations–50% Government funding / 50% Industry with only two years intervention

This option is the same as Option 2 (a), however, the introduction of the compulsory fee for service is only required in the first two years of the regulations.

7.2.8 Option 2 (f): Amend Principal Regulations–100% Government funding with only two years intervention

This option is the same as Option 2 (b), however, Government funding will only be provided in the first two years of the regulations.

7.2.9 Option 2 (g): Amend Principal Regulations–Full cost recovery over from Latrobe Valley region coal mines with only two years intervention

This option is the same as Option 2 (d), however, funding will be sought from only the Latrobe Valley region coal mines in the first two years of the regulations.

7.2.10 Option 3: Changes to licence conditions

Under this option, additional reporting is imposed on certain mines through changes to individual licence conditions. The regulations would be amended to implement certain requirements.

The regulations would prescribe the mine stability plan requirements as per Option 2, which must be included in the declared mine's varied work plan.

Declared mines would also have conditions imposed on licences requiring six monthly reports (and such conditions may be varied at a later date to require reports in either shorter or longer time periods).

Licence conditions would be amended to require the coal mines to establish their own Technical Review Board. The levy would also be imposed via a condition on the licence of declared mines. It is expected that this Board would undertake the same or comparable activities as the Technical Review Board in Option 2. The levy would address the cost of the Technical Review Board and the DPI capacity required to implement the new regulatory requirements. The levy would not address the cost of research and development, as research and development would be at the discretion of industry under this option.

Each licence for each mine in Victoria would be varied to include a condition requiring the mine to notify DPI of any major event which occurs. This would be a high level requirement.

7.2.11 Option 4 – Co-regulatory approach

Under this option, industry would develop a code of practice for addressing risk factors within declared mines (that is, mine stability requirements and stability processes). The code would provide generic guidance about the types of risk factors and how these should be addressed.

A code of practice would also be developed for "reportable events" to assist industry in identifying what constitutes such events and providing a recommended process for advising DPI of these events.

The implementation of a Technical Review Board and research and development would be at the discretion of industry and there would be no certainty that either of these initiatives would be undertaken. Consequently, a levy would not be implemented under this option.

These codes of practice would be developed by industry, with government assistance. However, the code would not be made under legislation by the Government nor would it be enforceable by government.

7.2.12 Option 5–Prescriptive Regulations regarding declared mines

Consideration is given to including highly prescriptive regulations in relation to mine stability requirements and processes which would be applicable to declared mines in all circumstances. Such regulations would specifically state each and every operational, geotechnical and hydrogeological requirement that each declared mine must put in place (that is, requisite batter steepness, specific groundwater management systems). This would be “one size fits all” in terms of the requirements imposed.

The regulations would also include further specifications regarding the contents of reports in relation to declared mines and reportable events.

A mine stability levy would be imposed on industry under this option as the Technical Review Board, research and development and increased regulatory capacity would continue to be required under this option.

This option is not considered to be feasible because it would involve overly restrictive requirements that would be applied uniformly to declared mines. It would be extremely difficult to achieve an optimal outcome for the individual circumstances of each declared mine (particularly in relation to geotechnical and hydrogeological features unique to each site) if this approach were adopted. Consequently, this option is not considered to be feasible and will not be considered further in this RIS.

7.2.13 Option 6–Alternatives to Technical Review Board

An accreditation system for geotechnical and hydrogeological consultants in conjunction with regular reporting by declared mines is considered as an alternative to the Technical Review Board. Under such a system, consultants would be accredited by an independent board convened by the Government and would be regularly reviewed regarding their ongoing accredited status. Declared mines would prepare six monthly reports with the use of consultants and submit these to DPI. It is likely that these reports would then be reviewed by another independent board. This model is not considered feasible as it would involve additional cost and administrative burden for industry and Government.

Consideration is also given to other alternative arrangements, including each mine individually importing skills sets from other jurisdictions or the mines collectively importing skills sets from other jurisdictions. However, it would not be cost effective for each mine to individually import skills sets, particularly as noted earlier in Sections 3.4 and 5.2.1 of this RIS) the skills do not generally exist within other Australian states and the skills sets would be required from other international jurisdictions.

Furthermore, the historical and current situation also shows a lack of incentive to do so because mines have not undertaken this to date. While the collective model of importing skills sets would be more cost effective than importing skills sets individually, it is also unlikely to prove cost effective enough to act as an incentive in the market. Furthermore, there is little incentive to do so because the three declared mines are competitors in the market.

Finally, consideration was given to the Government undertaking the review. However, the Government does not currently possess the requisite level of expertise. It would be costly and time consuming to build comparable expertise within the Department as the Technical Review Board is comprised of eminent and experienced experts in their field.

Furthermore, it is considered that independent review under a Technical Review Board would be more appropriate than either industry or government review. As stated in the Government response, “the TRB will have an emphasis on lifting the performance of the geotechnical and hydrogeological profession rather than functioning as a regulator” and “the Technical Review Board will provide an additional level of review to satisfy the regulator that monitoring is sufficiently rigorous [within the mine]”. [138]

These options are not considered to be feasible and will not be considered further in this RIS.

[138] Victorian Government (2008), *Mining Warden Yallourn Mine Batter Failure Inquiry: Government Response*, p. 3.

8 Analysis of costs and benefits

The Proposed Regulations and each of the feasible alternatives have the potential to impose quantitative and qualitative costs and benefits both directly and indirectly.

The main stakeholder groups that will be affected by any changes to regulation are the three brown coal mines in the Latrobe Valley, the government and the community. Other mines will also be affected by aspects of the regulations (primarily in relation to reportable events). The nature and extent of the impact will depend on the option being considered.

The cost-benefit analysis in this RIS is based on best available information and is therefore illustrative of the likely costs and benefits. The assessment of benefits represents only conservative assumptions because it draws only on the analysis available about the impact on river flows, electricity supply risk and public safety. It does not capture other benefits such as improvements to the wider environment, improvements to the safety of public infrastructure and more generally security of freight and passenger transport routes that may arise from improved to mine stability. Supporting evidence and discussion of the model assumptions are provided in Appendix B. The costs and benefits assessed for the alternatives are assessed against the base case of “do nothing” which in effect is the status quo or current regulatory requirements. Costs and benefits are presented in net present terms using a discount rate of 3.5 per cent and as the first year costs and benefits generated by the alternatives will be experienced in the 2009-10 financial year, the total annual costs and benefits have been discounted back to 2009-10 dollars.

8.1 Costs associated with each option

8.1.1 Option 1: Continue with existing Principal Regulations (Base Case)

Under the base case, there are no additional costs associated with the regulations. There will be no attempt to address the sharing of knowledge, commercial incentives and uncertainty associated with a mine collapse.

The base case represents the costs currently imposed on industry by the regulations as they stand. A description of the current regulations has been provided in this RIS. It is not necessary to quantify the total costs imposed on industry from the current regulations as long as the cost of the proposed option and other feasible options are considered incremental from the base case.

8.1.2 Option 2: Amending the Principal Regulations

Under each of the sub-options of Option 2, the costs are the same. The costs are associated with the following changes to the current regulations:

- additional work plan requirements for declared mines
- additional reporting requirements for declared mines
- investment in geological and hydrogeological expertise
- the notification process for reportable events.

The responsibility for the cost of the investment in geological and hydrogeological expertise and how the expertise is in place distinguishes each sub-option under Option 2.

Additional work plan requirements for declared mines

It is proposed that there will be additional monitoring and reporting requirements for declared mines as part of the preparation of work plans. This proposed change will affect the three coal mines in the Latrobe Valley that will be classified as declared (Yallourn, Hazelwood and Loy Yang).

The proposed changes require declared mines to complete a risk assessment about the geotechnical stability and develop and implement a mine stability plan.

Industry consultation and DPI advice has indicated that the extra cost of these additions to a work plan is estimated at $150,000 per plan as a one off cost.[139] Therefore the estimated cost of these additional work plan requirements for the industry (the three declared mines) is $450,000 as a one off cost in 2009-10.

The above cost estimate only relates to the cost associated with the preparation of the mine stability plan, which is the cost attributable to the requirements of the Proposed Regulations. The requirement to implement the work plan is set out in the MRSDA, and therefore the cost associated with implementation of the variation is not included in the above cost estimate.

Additional reporting requirements for declared mines

Under this option, declared mines would be required to provide regular reports (usually every six months) to DPI about any geotechnical issues and monitoring that the mine undertakes.

The details of this option are discussed in Chapter 7 which outlines that this requirement would only apply to the three coal mines in the Latrobe Valley.

---

[139] See Appendix B for more detail.

As indicated by industry through consultation, the cost of collecting this information and sending it to DPI is estimated at $50,000 per report (two reports will be required each year). This was a global average and therefore it is assumed this includes all staff and on-costs, infrastructure costs and consultants.

The total cost per year to a declared mine is estimated at approximately $100,000 per annum.[140] Therefore the total cost to the industry of collecting the information set out in the proposed amendments is $300,000 per annum or $2.6 million as a ten-year Net Present Value (NPV).

However, industry initially reported the total cost of preparing the report, and did not take into account that most of the information required is already collected by the mines. Therefore, this should not be considered the cost to industry imposed by the amendments. In the following question, industry indicated the majority (90 per cent) of information requested by DPI is collected as business as usual and therefore does not impose an additional cost on the industry. Therefore, it is expected that 10 per cent of the total cost of these additional reports is considered imposed by the regulations.

For example, if 90 per cent of the proposed regulatory requirements are business as usual, only 10 per cent or $30,000 per annum is imposed on industry. Industry indicated that it was difficult to determine the level of business as usual and therefore were only able to provide a high level estimate.

Investment in geotechnical and hydrogeology expertise

Under this option, there will be additional investment in geotechnical and hydrogeology expertise (that is, for the Technical Review Board, DPI capacity and research and development). DPI has estimated the required amount to cover the costs of geotechnical and hydrogeology expertise will be $2.5 million. As discussed in Chapter 7, each of the sub-options of Option 2 allow for the incidence of this cost to be borne by different groups, and for different time periods.

The total cost of the investment in geotechnical and hydrogeology is estimated to be $2.5 million per annum.

Notification of reportable events

A new requirement set out in the Proposed Regulations will require all mines to notify DPI of any incident that is abnormal to the expected or usual mining operations and results in or is likely to result in significant impacts on the environment or the public. An incident report may also be required if requested by the Chief Inspector. This is in addition to the twice annual reports that are also proposed under these amendments.

[140] It should be noted that DPI estimates have indicated that these reports would cost approximately $25,000 per report, totalling $50,000 per year.

In the first instance, operators must provide verbal or written notification to DPI after the event has occurred. Operators must, if requested by DPI, provide a comprehensive written report detailing the circumstances of the event, the event's likely cause and impacts, steps taken to reduce its impact, and the steps taken to prevent future recurrence.

During consultation, it was indicated that the time taken to collect and report the information to DPI is difficult to estimate because the majority of these requirements would be undertaken as business as usual. That is, all information on incidents would be collected, analysed and solutions addressed in the absence of regulation. As such, only the administrative time required to contact DPI is considered a regulatory burden.

Experts within DPI suggest that the requirement to contact and pass on relevant information would only take approximately one hour per reportable event. It is also expected that there would be 100 reportable events per annum. Using the default hourly rate for a given job of administrative cost per hour as a proxy, it is possible to calculate the cost imposed on the industry. It assumed that the reporting of each event would require one hour of the operator's time at a cost of $64.00.[141]

The total cost of this requirement imposed on industry each year is $6,400.

Experts within DPI also suggest that there is a cost associated with DPI responding to reportable events. As noted above, there is expected to be approximately 100 reportable events which will require action by DPI. DPI suggests that it takes 7.6 hours to respond to a reportable event (half a day for a site visit and half a day for reporting). It is assumed that 60 per cent of these events can be responded to by a Grade 5 level staff member and 40 per cent by a Grade 6 level staff member. Based on these assumptions, the cost imposed on DPI of responding to reportable events is expected to be $62,425 per year.[142] However, this amount would be met by a portion of the funding attributable to DPI capacity (that is, from the $1 million component).

The total cost of the proposed amendments to the current regulations is estimated at approximately $2.99 million for the first year (2009-10). The time period of the investment and who is responsible for funding the investment in new knowledge and expertise are discussed in Options 2(a) to 2(g).

---

[141] Australian Bureau of Statistics (2009) *Average Weekly Earnings, Australia, Nov 2009 Cat. No. 6302.0;* Victorian Government (2007), *Victorian Guide to Regulation*, Section C-5.

[142] See Appendix B for more detail.

8.1.3 Option 2 (a): Amend Principal Regulations

Under this option all of the costs outlined above apply. However, under this option the costs of investment in geotechnical and hydrogeology expertise will be borne 50 per cent by Latrobe Valley region coal mines and 50 per cent by government. Therefore the cost of the expertise will be approximately $417,000 per mine per annum. Under this option, the investment in geotechnical and hydrogeology expertise will continue over a ten year period.

The total cost to industry of the investment in geotechnical and hydrogeology expertise is estimated to be $1.25 million per annum and $10.8 million as a ten year NPV. The cost to government will be the same.

Table 8.1 Option 2 (a): Amending Principal Regulations–50% Latrobe Valley region coal mines/ 50% Government for ten years

Cost	2009-10 ($)	10 year NPV ($)
Additional work plan requirements	$450,000	$450,000
Additional reporting requirements to DPI	$30,000	$258,231
Investment in geotechnical and hydrogeology expertise (industry)	$1,250,000	$10,759,608
Investment in geotechnical and hydrogeology expertise (government)	$1,250,000	$10,759,608
Reportable events	$6,400	$55,089
Total	$2,986,400	$22,282,536

Table note: Cost data has been sourced from consultation with industry participants and DPI estimates. The investment in geotechnical and hydrology expertise has been set out by DPI.

8.1.4 Option 2 (b): Amend Principal Regulations—100% Government funding

Under this option all of the costs outlined in 8.1.2 above apply. However, the costs of investment in geotechnical and hydrogeology expertise will be borne 100 per cent by Government. The investment in geotechnical and hydrogeology expertise will continue over a ten year period.

The total cost of the investment in geotechnical and hydrogeology expertise to Government is estimated to be $2.5 million per annum and $21.5 million as a ten year NPV.

Table 8.2 Option 2 (b): Amending Principal Regulations – 100% Government for ten years

Cost	2009-10 ($)	10 year NPV ($)
Additional work plan requirements	$450,000	$450,000
Additional reporting requirements to DPI	$30,000	$258,231
Investment in geotechnical and hydrogeology expertise (government)	$2,500,000	$21,519,216
Reportable events	$6,400	$55,089
Total	$2,986,400	$22,282,536

Table note: Cost data has been sourced from consultation with industry participants and DPI estimates. The investment in geotechnical and hydrology expertise has been set out by DPI.

8.1.5 Option 2 (c): Amend Principal Regulations—Full cost recovery over all mining businesses

Under this option all of the costs outlined in 8.1.2 above apply. However, the costs of investment in geotechnical and hydrogeology expertise will be borne 100 per cent by all of the mines across Victoria. There are 236 mining licences in Victoria, so each mine would be responsible for funding $10,593 each year. The investment in geotechnical and hydrogeology expertise will continue over a ten year period.

The total cost of the investment in geotechnical and hydrogeology expertise to industry is estimated to be $2.5 million per annum and $21.5 million as a ten year NPV.

Table 8.3 Option 2 (c): Amending Principal Regulations–Full cost recovery over all mining businesses for ten years

Cost	2009-10 ($)	10 year NPV ($)
Additional work plan requirements	$450,000	$450,000
Additional reporting requirements to DPI	$30,000	$258,231
Investment in geotechnical and hydrogeology expertise (all mining businesses)	$2,500,000	$21,519,216
Reportable events	$6,400	$55,089
Total	$2,986,400	$22,282,536

Table note: Cost data has been sourced from consultation with industry participants and DPI estimates. The investment in geotechnical and hydrology expertise has been set out by DPI.

8.1.6 Option 2 (d): Amend Principal Regulations—100% from Latrobe Valley region coal mines over ten years

Under this option all of the costs outlined in 8.1.2 above apply. However, the costs of investment in geotechnical and hydrogeology expertise will be borne 100 per cent by Latrobe Valley region coal mines. There are three Latrobe Valley region coal mines, so the cost of the expertise will be approximately $830,000 per mine per annum. The investment in geotechnical and hydrogeology expertise will continue over a ten year period.

The total cost of the investment in geotechnical and hydrogeology expertise to industry is estimated to be $2.5 million per annum and $21.5 million as a ten year NPV.

Table 8.4 Option 2 (d): Amending Principal Regulations–Cost recovery from Latrobe Valley region coal mines for ten years

Cost	2009-10 ($)	10 year NPV ($)
Additional work plan requirements	$450,000	$450,000
Additional reporting requirements to DPI	$30,000	$258,231
Investment in geotechnical and hydrogeology expertise (Latrobe Valley region coal mines)	$2,500,000	$21,519,216
Reportable events	$6,400	$55,089
Total	$2,986,400	$22,282,536

Table note: Cost data has been sourced from consultation with industry participants and DPI estimates. The investment in geotechnical and hydrology expertise has been set out by DPI.

8.1.7 Option 2 (e): Amend Principal Regulations—50% Government funding / 50% Latrobe Valley region coal mineswith only two years intervention

Under this option all of the costs outlined in Section 8.1.2 apply. However, the costs of investment in geotechnical and hydrogeology expertise will be borne 50 per cent by the Latrobe Valley region coal mines and 50 per cent by Government, and will only be in place for two years. Therefore the cost to the Latrobe Valley region coal mines of the expertise will be approximately $417,000 per mine per annum for two years.

The total cost to industry of the investment in geotechnical and hydrogeology expertise is estimated to be $1.25 million per annum and $2.46 million as a ten year NPV. The cost to Government will be the same.

The additional reporting requirements to DPI by the Latrobe Valley region coal mines, additional work plan requirements and additional reporting requirements for reportable events will also be guaranteed for only two years under this option.

Table 8.5 Option 2 (e): Amending Principal Regulations – 50% Latrobe Valley region coal mines/ 50% Government for two years

Cost	2009-10 ($)	10 year NPV ($)
Additional work plan requirements	$450,000	$450,000
Additional reporting requirements to DPI	$30,000	$58,986
Investment in geotechnical and hydrogeology expertise (industry)	$1,250,000	$2,457,729
Investment in geotechnical and hydrogeology expertise (government)	$1,250,000	$2,457,729
Reportable events	$6,400	$12,584
Total	$2,986,400	$5,437,028

Table note: Cost data has been sourced from consultation with industry participants and DPI estimates. The investment in geotechnical and hydrology expertise has been set out by DPI.

8.1.8 Option 2 (f): Amend Principal Regulations—100% Government funding with only two years intervention

Under this option, all of the costs outlined in 8.1.2 above apply. However, the costs of investment in geotechnical and hydrogeology expertise will be borne 100 per cent by Government. The investment in geotechnical and hydrogeology expertise will only continue for two years.

The total cost of the investment in geotechnical and hydrogeology expertise to Government is estimated to be $2.5 million per annum and $4.9 million as a ten year NPV.

The additional reporting requirements to DPI by the declared mines, additional work plan requirements and additional reporting requirements for reportable events will also be guaranteed for only two years under this option.

Table 8.6 Option 2 (f): Amending Principal Regulations–100% Government for two years

Cost	2009-10 ($)	10 year NPV ($)
Additional work plan requirements	$450,000	$450,000
Additional reporting requirements to DPI	$30,000	$58,986
Investment in geotechnical and hydrogeology expertise (govt)	$2,500,000	$4,915,459
Reportable events	$6,400	$12,584
Total	$2,986,400	$5,437,029

Table note: Cost data has been sourced from consultation with industry participants and DPI estimates. The investment in geotechnical and hydrology expertise has been set out by DPI.

8.1.9 Option 2 (g): Amend Principal Regulations—Full cost recovery from Latrobe Valley region coal mines with only two years intervention

Under this option, all of the costs outlined in 8.1.2 above apply. However, the costs of investment in geotechnical and hydrogeology expertise will be borne 100 per cent by the Latrobe Valley region coal mines. There are three Latrobe Valley region coal mines, so the cost of the expertise will be approximately $830,000 per mine per annum. Under this option the investment in geotechnical and hydrogeology expertise will only continue for two years.

The total cost of the investment in geotechnical and hydrogeology expertise to the Latrobe Valley region coal mines is estimated to be $2.5 million per annum and $4.9 million as a ten year NPV.

The additional reporting requirements to DPI by the declared mines, additional work plan requirements and additional reporting requirements for reportable events will also be guaranteed for only two years under this option.

Table 8.7 Option 2 (g): Amending Principal Regulations–100% Latrobe Valley region coal mines for two years

Cost	2009-10 ($)	10 year NPV ($)
Additional work plan requirements	$450,000	$450,000
Additional reporting requirements to DPI	$30,000	$58,986
Investment in geotechnical and hydrogeology expertise (Latrobe Valley region coal mines)	$2,500,000	$4,915,459
Reportable events	$6,400	$12,584
Total	$2,986,400	$5,437,028

Table note: Cost data has been sourced from consultation with industry participants and DPI estimates. The investment in geotechnical and hydrology expertise has been set out by DPI.

8.1.10 Option 3: Changes to licence conditions

This option would require a change to the mining licence conditions for selected mines imposing additional reporting requirements and the need to establish and fund a Technical Review Board. The requirement to establish a research and development fund would not be required under changes to licence conditions. Research and development would instead be left to the market forces (that is, non-regulatory approach). However, it is considered unlikely that there is sufficient commercial incentives to enable the coal mines to work collaboratively (see section 5 of this RIS) and therefore it assumed that a research and development program is unlikely to occur.

This option will have the same costs as Option 2 for work plan requirements, additional six monthly reports and reportable events. The cost for industry to set up and maintain a Technical Review Board is expected to be lower than Option 2. Another potential additional cost will be the negotiations between businesses and DPI when varying licenses, although this is believed to be a minimal cost (because only the three declared mines will be required to vary a licence). For the analysis, it is assumed an extra week of administrative time will be required to vary a licence which will result in an annual cost on the industry of approximately $11,000.

It has been estimated that the cost of establishing and maintaining a Technical Review Board is $1 million per annum.

Table 8.8 Option 3: Changes to licence conditions

Cost	2009-10 ($)	10 year NPV ($)
Administrative cost of changing licence conditions	$7,200	$61,977
Work plan variation requirements	$450,000	$450,000
Cost of additional reporting requirements with altered licence	$30,000	$258,231
Cost of establishing a TRB	$1,000,000	$8,607,687
Reportable events	$6,400	$55,091
Total	$1,493,600	$9,432,985

Table note: Cost estimates are based on DPI and industry consultation. The estimated $1 million for the TRB is estimated by DPI and is only one aspect of the proposed amendments. This excludes improvements in research and development and enhanced DPI capabilities.

8.1.11 Option 4—Co-regulatory approach

Under this option, industry would develop a code of practice in conjunction with Government. Costs associated with developing the code of practice are a one-off cost of $160,000 in 2009-10 (Please refer to Appendix B). It is expected that the code of practice would set out what is a reportable event and therefore costs associated with reporting events will be incurred, as presented in Option 2.

Table 8.9 Option 4: Co-regulatory approach

Cost	2009-10 ($)	10 year NPV ($)
Development of Code of Practice	$160,000	$160,000
Reportable events	$6,400	$55,091
Total	$166,400	$215,091

Table note: DPI estimates used for the cost of the codes of practice. Reportable events have been sourced from consultation with industry participants and DPI estimates.

8.2 Benefits associated with each option (avoided costs)

Benefits generated from the proposed options are difficult to quantify for three reasons. First, regulatory oversight in the industry has been in place for a significant amount of time. Second, industry collects a lot of information as business as usual. Third, industry found it difficult to predict future changes. There are a number of approaches that could be used to value the benefits of each option. Lowering the risk of an incident in the brown coal sector is the major outcome for the proposed changes. As such, this analysis uses an estimate of the avoided cost associated with preventing a collapse. Benefits are based on lowering the risk of an incident that may impact electricity supply, the environment and public safety as compared to the base case. The likelihood of an incident occurring in one of the brown coal mines is low, but the impact of an incident has the potential to be significant, as demonstrated by the Yallourn mine incident described in section 4.1 and shown in the risk matrix in Appendix D.

It is likely that if a collapse were to occur, the majority of the costs associated with the collapse would be concentrated within one year. Therefore, benefits could be associated with the costs of avoiding one event. However, it is unknown when, this event will occur within the analysis period. As such, this analysis uses an average of the expected cost of a collapse over the ten years, and therefore, the average avoided cost under each option when the risk of a collapse is identified. Costs will be spread across each year, so this approach allows a comparison between the costs and benefits in each year. It is important not to focus too much on the averaged benefits, this approach was selected to represent the differences between each option, because it allows comparison of both the costs and the benefits of the options over the ten year period.

Potential impacts of the proposed regulatory changes and the magnitude of potential incidents are discussed below.

8.2.1 Option 1: Continue with existing Principal Regulations (Base Case)

Under the base case, it is expected that without addressing the risk associated with a mine collapse there will be a small chance of a mine collapse and this will have an associated effect on public safety, the surrounding environment and electricity supply. In order to measure the benefits of each option, the cost of this risk is compared to the cost under each option, so that the difference between the base case and each option represents the avoided costs or benefits.

As identified earlier in this RIS, the regulatory problem involves the following issues:

- uncertainty and risk associated with a mine collapse
- the lack of commercial incentives
- lack of knowledge sharing.

Without any attempt to address these particular issues, it is expected that there would be a 3 per cent likelihood of a mine collapse each year for the next ten years (see Appendix B). The associated consequences are expected to have a cost on the economy. The calculation of the likelihood and consequence are set out in Appendix B.

Cost = (A x B) + (A x C) + (A x D)

Where:

A: is the likelihood of a collapse occurring

B: is the consequence of a collapse on the environment in terms of the health of the river

C: is the consequence of a collapse on the economy due to a loss in electricity supply in 1.5 per cent of cases and an increase in the wholesale price in 80 per cent of cases

D: is the consequence of a collapse if one life is lost.

Without amending the current Regulations, the cost of a collapse in the next ten years will be approximately $41.78 million (refer to Table 8.10). This cost includes the estimated cost of environmental river damage, loss of electricity supply, increase in wholesale electricity prices and public safety costs associated with a mine collapse. It does not include other costs which may be associated with a collapse such as broader environmental damage, loss of public infrastructure and the flow on effects such as freight and passenger transport restrictions.

Table 8.10: Cost of a collapse under the base case

Cost of collapse	2009-10 ($)	10 year NPV ($)
Environmental	$12,751	$109,755
Electricity supply	$4,729,381	$40,709,026
Public safety	$112,200	$965,782
Total	$4,854,331	$41,784,564

Table note: Data has been sourced from DPI experts, VenCorp, AEMO, Bennett, Dumsday, Howell & Sturgess and DTF.

The majority of this cost is associated with the loss of electricity supply. Moreover, approximately 64 per cent of this value is attributable to the loss in supply to electricity to the commercial sector. The likelihood of an event occurring in the next ten years is uncertain. Each option will impact the likelihood of a collapse occurring in the next ten years. Under each option, the probability of a collapse is lower than that of the base case. By reducing the probability of a collapse, the potential costs of a collapse are reduced or avoided. These avoided costs are compared to the base case (status quo) of making no amendments to the current Regulations.

8.2.2 Option 2: Amending the Principal Regulations

Each initiative set out in section 8.2.2 reduces the probability of a mine collapse in the next ten years as compared to the base case. The initiatives include:

- variations to work plans to address risk and ongoing monitoring by DPI
- six-monthly reporting by declared mines for the purposes of review by the Technical Review Board
- Technical Review Board to undertake review of six-monthly reports and work plans
- reporting of reportable events by declared mines to DPI
- other regulatory functions[143]
- research and development.

[143] Includes audits, technical training of an inspector to undertake inspections, lecture series for industry, ongoing education for industry (including guidance materials, significant incident reports and lessons learnt workshops.

8.2.3 Option 2 (a): Amend Principal Regulations

Under this option, the likelihood of a collapse is estimated to reduce by 85 per cent when compared to the base case.[144] The likelihood of a collapse each year for the next ten years is 0.45 per cent. This reduction in probability (compared to the base case of not amending the current Regulations), avoids $35.5 million in costs (NPV over ten years). The majority of these avoided costs are associated with the continuation of electricity supply and its associated value to the state.

Table 8.11 Cost of Collapse for Option 2 (a): Amending Principal Regulations–50% Industry / 50% Government for ten years[145]

Cost of collapse	2009-10 ($)	10 year NPV ($)
Environmental	$1,913	$16,463
Electricity supply	$709,407	$6,106,354
Public safety	$16,830	$144,867
Total	$728,150	$6,267,685

Table note: Data has been sourced from DPI experts, VenCorp, AEMO, Bennett, Dumsday, Howell & Sturgess and DTF.

Table 8.12 Avoided Costs compared with the base case: Option 2 (a): Amending Principal Regulations–50% Industry / 50% Government for ten years[146]

Benefit compared with the base case	2009-10 ($)	10 year NPV ($)
Base Case costs	$4,854,331	$41,784,564
Option 2(a) costs	$728,150	$6,267,685
Benefit (avoided cost)	$4,126,182	$35,516,879

8.2.4 Option 2 (b): Amend Principal Regulations – 100% Government funding

This option has the same probability of a collapse as Option 2(a) (0.45 per cent). It is expected that the responsibility for the funding of the initiatives does not affect the probability of a collapse. The reduction in the probability of a collapse compared to the probability of collapse under the base case avoids $35.5 million in costs (NPV over ten years).

---

144 DPI has undertaken an analysis to determine the likelihood of collapse for each option. This analysis takes into account a panel of experienced DPI staff, including a mining engineer, a risk manager, a senior hydrologist and the Chief Inspector. In preparing the analysis, these figures have been based on this advice. For further detail see Appendix B.

145 The table represents avoided costs (that is, benefits) compared with the base case.

146 The table represents avoided costs (that is, benefits) compared with the base case.

Table 8.13 Cost of Collapse for Option 2 (b): Amending Principal Regulations–100% Government for ten years

Cost of collapse	2009-10 ($)	10 year NPV ($)
Environmental	$1,913	$16,463
Electricity supply	$709,407	$6,106,354
Public safety	$16,830	$144,867
Total	$728,150	$6,267,685

Table note: Data has been sourced from DPI experts, VenCorp, AEMO, Bennett, Dumsday, Howell & Sturgess and DTF.

Table 8.14 Benefit compared with the base case: Option 2 (b): Amending Principal Regulations–100% Government for ten years

Benefit compared with the base case	2009-10 ($)	10 year NPV ($)
Base Case costs	$4,854,331	$41,784,564
Option 2(b) costs	$728,150	$6,267,685
Benefit (avoided cost)	$4,126,182	$35,516,879

8.2.5 Option 2 (c): Amend Principal Regulations – Full cost recovery over all mining businesses

Under this option, the probability of a collapse is 0.45 per cent (same as Option 2(a)). Under the option the initiatives are guaranteed for ten years and all 236 mines in Victoria are required to fund the establishment of the Technical Review Board and additional research and development. This dispersion in the responsibility of funding may make enforcement of the requirements more difficult. It is assumed however, that there is 100 per cent compliance of all requirements. Avoided costs associated with option are expected to be almost $35.5 million compared to the base case (NPV over ten years).

Table 8.15 Cost of Collapse for Option 2 (c): Amending Principal Regulations–Full cost recovery over all mining businesses for ten years

Cost of collapse	2009-10 ($)	10 year NPV ($)
Environmental	$1,913	$16,463
Electricity supply	$709,407	$6,106,354
Public safety	$16,830	$144,867
Total	$728,150	$6,267,685

Table note: Data has been sourced from DPI experts, VenCorp, AEMO, Bennett, Dumsday, Howell & Sturgess and DTF.

Table 8.16 Benefit compared with the base case: Option 2 (c): Amending Principal Regulations – Full cost recovery over all mining businesses for ten years

Benefit compared with the base case	2009-10 ($)	10 year NPV ($)
Base Case costs	$4,854,331	$41,784,564
Option 2(c) costs	$728,150	$6,267,685
Benefit (avoided cost)	$4,126,182	$35,516,879

8.2.6 Option 2 (d): Full cost recovery from Latrobe Valley region coal mines

Under this option, the likelihood of a collapse in the next ten years is 0.45 per cent. The avoided costs associated with this option are expected to be $35.5 million as compared to the base case (NPV over ten years).

Table 8.17 Cost of Collapse for Option 2 (d): Amending Principal Regulations–Full cost recovery over Latrobe Valley region coal mines for ten years

Cost of collapse	2009-10 ($)	10 year NPV ($)
Environmental	$1,913	$16,463
Electricity supply	$709,407	$6,106,354
Public safety	$16,830	$144,867
Total	$728,150	$6,267,685

Table note: Data has been sourced from DPI experts, VenCorp, AEMO, Bennett, Dumsday, Howell & Sturgess and DTF.

Table 8.18 Benefit compared with the base case: Option 2 (d): Amending Principal Regulations–Full cost recovery over Latrobe Valley region coal mines for ten years

Benefit compared with the base case	2009-10 ($)	10 year NPV ($)
Base Case costs	$4,854,331	$41,784,564
Option 2(d) costs	$728,150	$6,267,685
Benefit (avoided cost)	$4,126,182	$35,516,879

8.2.7 Option 2 (e): Amend Principal Regulations–50% Government funding / 50% Industry with only two years intervention

Under this option, the initiatives set out in section 8.1.2 are only guaranteed for two years. The new knowledge and expertise acquired by both DPI and the mines is expected to lapse after this initial period. Therefore, the likelihood of a collapse in the next ten years is expected to only decrease by 75 per cent compared with the base case. It is estimated that the likelihood of a collapse occurring under this option is 0.75 per cent. This option is expected to avoid costs of $31.3 million compared to the base case (NPV over ten years).

Table 8.19 Cost of Collapse for Option 2 (e): Amending Principal Regulations–50% Government funding / 50% Industry for two years

Cost of collapse	2009-10 ($)	10 year NPV ($)
Environmental	$3,188	$27,439
Electricity supply	$1,182,345	$10,177,256
Public safety	$28,050	$241,446
Total	$1,213,583	$10,446,141

Table note: Data has been sourced from DPI experts, VenCorp, AEMO, Bennett, Dumsday, Howell & Sturgess and DTF.

Table 8.20 Benefit in comparison to the base case: Option 2 (e): Amending Principal Regulations–50% Government funding / 50% Industry for two years

Benefit compared with the base case	2009-10 ($)	10 year NPV ($)
Base Case costs	$4,854,331	$41,784,564
Option 2(e) costs	$1,213,583	$10,446,141
Benefit (avoided cost)	$3,640,749	$31,338,423

8.2.8 Option 2 (f): Amend Principal Regulations–100% Government funding with only two years intervention

Under this option, the initiatives set out in section 8.1.2 are only guaranteed for two years. Similar to Option 2 (e), it is expected that new knowledge and expertise acquired by both DPI and the industry may lapse after the initial two years. The likelihood of a collapse in the next ten years is expected to be 0.75 per cent. Therefore, it is estimated that this option avoids costs of $31.3 million compared to the base case (NPV over ten years).

Table 8.21 Cost of Collapse for Option 2 (f): Amending Principal Regulations–100% Government funding with only two years intervention

Cost of collapse	2009-10 ($)	10 year NPV ($)
Environmental	$3,188	$27,439
Electricity supply	$1,182,345	$10,177,256
Public safety	$28,050	$241,446
Total	$1,213,583	$10,446,141

Table note: Data has been sourced from DPI experts, VenCorp, AEMO, Bennett, Dumsday, Howell & Sturgess and DTF.

Table 8.22 Benefit compared with the base case: Option 2 (f): Amending Principal Regulations–100% Government funding with only two years intervention

Benefit compared with the base case	2009-10 ($)	10 year NPV ($)
Base Case costs	$4,854,331	$41,784,564
Option 2(f) costs	$1,213,583	$10,446,141
Benefit (avoided cost)	$3,640,749	$31,338,423

8.2.9 Option 2 (g): Amend Principal Regulations–Full cost recovery from Latrobe Valley region coal mines with only two years intervention

Under this option, the initiatives set out in section 8.1.2 are only guaranteed for two years. As with Options 2 (e) and 2 (f), it is expected that new knowledge and expertise acquired by both DPI and the industry may lapse after the two year period. The likelihood of a collapse in the next ten years is 0.75 per cent. This option is expected to avoid costs of $31.3 million compared to the base case (NPV over ten years).

Table 8.23 Cost of Collapse for Option 2 (g): Amending Principal Regulations–Full cost recovery from Latrobe Valley region coal mines for two years

Cost of collapse	2009-10 ($)	10 year NPV ($)
Environmental	$3,188	$27,439
Electricity supply	$1,182,345	$10,177,256
Public safety	$28,050	$241,446
Total	$1,213,583	$10,446,141

Table note: Data has been sourced from DPI experts, VenCorp, AEMO, Bennett, Dumsday, Howell & Sturgess and DTF.

Table 8.24 Benefit compared with the base case: Option 2 (g): Amending Principal Regulations–Full cost recovery from Latrobe Valley region coal mines for two years

Benefit compared with the base case	2009-10 ($)	10 year NPV ($)
Base Case costs	$4,854,331	$41,784,564
Option 2(g) costs	$1,213,583	$10,446,141
Benefit (avoided cost)	$3,640,749	$31,338,423

8.2.10 Option 3: Changes to licence conditions

Under this option, the following initiatives affect the probability of a mine collapse:

- variations to work plans to address risks and funding for DPI capacity
- six-monthly reporting for the purposes of review by the Technical Review Board
- Technical Review Board to review six-monthly reports
- reporting of reportable events to DPI
- other regulatory activities.[147]

These initiatives are implemented by a change in licence conditions. Additional research and development is not guaranteed under this option because this is at the discretion of the industry and is not enforceable. Under this option, the likelihood weighting has been affected by uncertainty about the capabilities of an industry-run Technical Review Board in the future. There is also uncertainty as to whether such conditions would be enforceable. Legal advice has discouraged imposing a licence requirement to establish and fund a Technical Review Board. Consequently, there is limited certainty associated with this option, as the Technical Review Board may not be implemented as per the condition; particularly if there is no enforcement mechanism.

Based on these assumptions, experts within DPI estimate that the likelihood of a collapse in the next ten years will reduce by around 70 per cent compared with the base case. Therefore, it

[147] Includes audits, technical training of an inspector to undertake inspections, lecture series for industry, ongoing education for industry (including guidance materials, significant incident reports and lessons learnt workshops).

is expected that the likelihood of collapse is 0.90 per cent. Given this likelihood the avoided costs of this option compared with the base case are expected to be $30.2 million (NPV over ten years).

It should also be noted that section 2.04 of the *Subordinate Legislation Act 1994 Guidelines* (the Premier's Guidelines) states that where the authorising Act dictates the form of subordinate legislation required, for example, where the authorising legislation provides for fees to be prescribed by statutory rule, there is no discretion to set those fees by another method.[148] Therefore, while the fee for service in relation to the Technical Review Board could conceivably be prescribed by a condition, this is not to be undertaken where the Act specifically states that the fee is to be prescribed. This is the case for the mine stability levy.

Table 8.25 Cost of Collapse for Option 3: Changes to licence conditions

Cost of collapse	2009-10 ($)	10 year NPV ($)
Environmental	$3,825	$32,927
Electricity supply	$1,418,814	$12,212,708
Public safety	$33,660	$289,735
Total	$1,456,299	$12,535,369

Table note: Data has been sourced from DPI experts, VenCorp, AEMO, Bennett, Dumsday, Howell & Sturgess and DTF.

Table 8.26 Benefit compared with the base case: Option 3: Changes to licence conditions

Benefit compared with the base case	2009-10 ($)	10 year NPV ($)
Base Case costs	$4,854,331	$41,784,564
Option 3 costs	$1,456,299	$12,535,369
Benefit (avoided cost)	$3,398,032	$29,249,196

8.2.11 Option 4: Co-regulatory approach

Under the co-regulatory approach, industry would establish two codes of practice to define additional reporting requirements.

The codes will be developed by industry, with the assistance of Government; however, they will not be mandatory or enforceable. Therefore, there is limited certainty that the codes will be adhered to.

The implementation of a Technical Review Board and additional research and development will not be guaranteed and is at the discretion of the industry. The probability of a mine collapse in the next ten years (based on these assumptions) is expected to decrease by around 30 per cent to 2.10 per cent compared with the base case. The avoided costs of this option are expected to be $12.5 million compared to the base case (NPV over ten years).

[148] Subordinate Legislation Act 1994 Guidelines, Revised 2007, section 2.04.

Table 8.27 Cost of Collapse for Option 4: Co-regulatory approach

Cost of collapse	2009-10 ($)	10 year NPV ($)
Environmental	$8,926	$76,829
Electricity supply	$3,310,566	$28,496,318
Public safety	$78,540	$676,048
Total	$3,398,032	$29,249,195

Table note: Data has been sourced from DPI experts, VenCorp, AEMO, Bennett, Dumsday, Howell & Sturgess and DTF.

Table 8.28 Benefit compared with the base case: Option 4: Co-regulatory approach

Benefits compared with the base case	2009-10 ($)	10 year NPV ($)
Base Case costs	$4,854,331	$41,784,564
Option 4 costs	$3,398,032	$29,249,195
Benefit	$1,456,299	$12,535,369

8.3 Sensitivity analysis

While the expected 3 per cent likelihood under the base case has been estimated on advice from DPI industry experts, it is subject to uncertainty. As such, a range of likelihood is presented. The range is based on a lower end estimate of 2.3 per cent, when it is considered that the three mines have operated for 130 years.[149] The higher end of the range is based on the fact that there has been one event since the privatisation of the mines about ten years ago, and therefore there is a likelihood of a collapse of about 10 per cent.[150]

[149] The lower end range likelihood is based on the number of years of operation of the three mines of around 130 years with only one event occurring within those years. This gives a probability of an event occurring of around 1/130. Therefore the likelihood of an event occurring in Victoria (at any one of the three mines) in a given year is around 2.3 per cent.

[150] This higher end of the range likelihood takes into account the fact that there have been some structural changes since privatisation about ten years ago, suggesting a likelihood of an event of 1/30. Therefore the likelihood of an event occurring in Victoria (at any one of the three mines) in a given year is around 10 per cent.

Table 8.29 Sensitivity analysis on results

	Costs 10 yr NPV ($)	Benefits 10 yr NPV ($ range)	Net outcome 10 yr NPV ($ range)
Option 2 (a)	$22,282,538	$27,229,607 – $118,389,597	$4,947,070 – 96,107,059
Option 2 (b)	$22,282,538	$27,229,607 – $118,389,597	$4,947,070 – 96,107,059
Option 2 (c)	$22,282,538	$27,229,607 – $118,389,597	$4,947,070 – 96,107,059
Option 2 (d)	$22,282,538	$27,229,607 – $118,389,597	$4,947,070 – 96,107,059
Option 2 (e)	$5,437,028	$24,026,124 – $104,461,409	$18,589,096 - $99,024,381
Option 2 (f)	$5,437,028	$24,026,124 – $104,461,409	$18,589,096 - $99,024,381
Option 2 (g)	$5,437,028	$24,026,124 – $104,461,409	$18,589,096 - $99,024,381
Option 3	$9,432,985	$22,424,382 - $97,497,315	$12,991,397 - $88,064,330
Option 4	$215,091	$9,610,450 - $41,784,564	$9,395,359 - $41,569,473

The sensitivity analysis shows that all options produce a net benefit in comparison to the base case.

8.4 Summary of Costs and Benefits

Table 8.30 provides a summary of the costs of, and benefits (avoided costs) associated with each of the options.

Table 8.30 Summary of costs and benefits

	Costs 10 yr NPV ($)	Benefits 10 yr NPV ($)	Net outcome 10 yr NPV ($)
Option 2 (a)	$22,282,538	$35,516,879	$13,234,341
Option 2 (b)	$22,282,538	$35,516,879	$13,234,341
Option 2 (c)	$22,282,538	$35,516,879	$13,234,341
Option 2 (d)	$22,282,538	$35,516,879	$13,234,341
Option 2 (e)	$5,437,028	$31,338,423	$25,901,394
Option 2 (f)	$5,437,028	$31,338,423	$25,901,394
Option 2 (g)	$5,437,028	$31,338,423	$25,901,394
Option 3	$9,432,985	$29,249,195	$19,816,209
Option 4	$215,091	$12,535,369	$12,320,278

9 Evaluation of alternatives

9.1 Summary of options

The alternatives have been assessed relative to the base case of continuing with the current Regulations. Table 9.1 provides a summary of the analysis presented in Chapter 8, which highlights that all options result in a net benefit relative to retaining the current Regulations.

Table 9.1 Summary of all options (ten year NPV)

Options	10 year net outcome ($)
Option 2 (a)	$13,234,341
Option 2 (b)	$13,234,341
Option 2 (c)	$13,234,341
Option 2 (d)	$13,234,341
Option 2 (e)	$25,901,394
Option 2 (f)	$25,901,394
Option 2 (g)	$25,901,394
Option 3	$19,816,209
Option 4	$12,320,278

Industry expects that the initiatives will continue for at least four to five years. However, the current Regulations are due to sunset in 2012, so the current Regulations will be reviewed to ensure that they are timely and appropriate in 2012.

As set out in section 7.2 it is likely that long term potential impacts will not fully present themselves within a two year timeframe. These benefits include further knowledge and expertise via a Technical Review Board, research and development, and additional DPI capacity. This additional knowledge and expertise better equips DPI and industry to reduce the likelihood of a collapse and respond more appropriately if a collapse occurs. As such, each of the options set out consequences over a ten year period.

9.2 The preferred option

Assuming a constant level of risk Options 2 (e), (f) and (g) present the highest net benefit over the ten year period. It is expected that the initial two year implementation of the proposed changes (that is, the additional work plan requirements, research and development, Technical Review Board, additional DPI capability and reportable events provisions) will be sufficient to maintain a low level of risk over the ten year period.

Options 2 (a), (b), (c) and (d) present higher benefits over the ten year period, although, the benefits are not sufficient to outweigh the cost of the additional requirements over the ten year period (compared with costs for just two years).

The relativities between each option are heavily dependant on the assumptions made about the benefits. The assumptions about the risk of a collapse are based on advice from a panel of experienced DPI staff, including a mining engineer, a risk manager, a senior hydrologist and the Chief Inspector. This analysis assumed the risk is constant over time, although in reality, it is likely that it will fluctuate over time.

It is possible that additional requirements proposed in this RIS may affect the relativities of each option.

The analysis assumed a 75 per cent decrease in the likelihood of collapse for Options 2 (e), (f) and (g)—that is, a decrease from 3 per cent to 0.75 per cent. This equates to a decrease from a likelihood of an event every 33 years to an event once every 130 years. However, analysis has shown that only a 12.3 per cent decrease in the level of likelihood (from 3 per cent to 2.6 per cent over the ten years) is required to justify the regulations for two years. That is, we only need to reduce the likelihood of an event from a one in 30 year probability to a one in 38 year probability in order to justify the Regulations for two years.

The difference between each of the options with the highest net benefit (Options 2 (e), (f) and (g)) is determined by the costs:

- Option 2 (e) shares the costs equally between the Latrobe Valley region coal mines and Government
- Option 2 (f) imposes all costs on the Government
- Option 2 (g) imposes all costs on the Latrobe Valley region coal mines.

One of the objectives set out in Chapter 6 is to set a fee that recovers some or all of the cost of providing a service. The Government estimates that the cost of establishing a Technical Review Board, additional DPI capability and enhancing geotechnical and hydrogeological research will be $2.5 million per annum.

The initiatives will provide benefits to the declared mines, through increased research and development, increasing knowledge within the sector about brown coal through the Technical Review Board process and increased expertise within DPI. This will also deliver benefits to the Victorian community by managing the risks to public safety, public infrastructure and the environment. Because the benefits will be split between the declared mines and community, it is expected that the costs should be shared between industry and government.

Option 2 (e) allows for a sharing of the costs equally between the Government and the Latrobe Valley region coal mines. The fee will be collected annually and the payees will submit the payment to DPI within four weeks of the end of the financial year. Each of the prescribed mines will pay an equal share of the levy. This ensures an appropriate and efficient mechanism for the collection of the levy.

How Option 2 (e) achieves the Government's stated objectives compared with the current Regulations is outlined below.

Public safety, environmental and electricity supply risk

- introducing mine stability requirements and processes to ensure risk factors in declared mines are reviewed, assessed and addressed
- introducing ongoing reporting requirements for declared mines to ensure mine stability plans and outcomes of ongoing monitoring systems are appropriately managed and interpreted correctly (see dot point below)
- establishing a Technical Review Board which will allow for peer review of ongoing monitoring data and geotechnical consulting advice received by the mines.
- introducing reporting requirements to ensure that early notification of actual or potential incidents in all mines, including coal mines, to enable the regulator to assist or intervene as necessary
- encourage research and development which will help to improve understanding and practices to allow for increased mine stability, this, in turn, will minimise risks to public safety, the environment and electricity supply
- improve the capability of DPI inspectors which will help to respond appropriately to reported events, and allow for regulatory understanding of risk factors.

Collaborate and share existing information

- provide for a mechanism in which to share information through a Technical Review Board
- provide for a mechanism in which to share information and knowledge through a research and development program.

Establish new knowledge and expertise

- provide for a mechanism to invest in new research and development.

Address uncertainty and risk unique to Latrobe Valley mines

- reduce the uncertainty surrounding the risk of another collapse by directly targeting research and development and expertise in the brown coal mining in the Latrobe Valley.

The need to implement appropriate costs recovery from industry in relation to certain activities

- provision of a 50/50 cost recovery mechanism between industry and government to reflect the respective benefits received.

The preferred option will be made according to the legislative authority contained in section 124 of the MRSDA. The preferred option will amend the Principal Regulations through the introduction of new regulations which support new requirements in the MRSDA.

The proposed Regulations do not conflict with or duplicate any existing Regulations or requirements. The proposed Regulations will continue to relate to operational aspects of mines, which other existing regulation will continue to regulate offsite environment impacts, OHS and planning aspects of mining.

9.3 Summary

The analysis finds that Option 2 (e) is the preferred option. Please refer to Appendix F for a copy of the proposed Regulations under the preferred option. The expected benefits of this option (which are calculated using the avoided cost of a catastrophic event occurring spread over ten years) are greater than the expected costs over ten years. However, the real value is the decrease in the likelihood of one catastrophic event occurring within the next ten years. It is expected that Option 2 (e) will decrease the likelihood of an event occurring by 75 per cent compared with the base case, although only a 12 per cent decrease is necessary to justify the costs.

This option also allows for an equitable allocation of costs between industry and Government.

10 Impacts on small business and competition

10.1 Impact on small business

The *Victorian Guide to Regulation* provides a definitive guide to developing regulation in Victoria within the context of the Victorian Government's vision of well-targeted, effective and appropriate regulation. While not a requirement for RIS, it is recommended as good practice to examine the impact of Proposed Regulations on small business[151] because the compliance burden of regulation often falls disproportionately on that sector of the economy.[152]

The cost to small business of this proposal is expected to be negligible. The mine stability fee for service does not apply to any small business. It is unlikely that a small business would operate a mine that could be found to pose a significant risk to public safety, the environment or infrastructure and as such be declared and subject to additional reporting requirements.

Under Section 40(2AA) of the MRSDA, there is a separate work plan option for licensees of a mine that covers five hectares or less. For this RIS, DPI draws on this inferred distinction between a small and large mine site from the MRSDA to define a small business (that is, small mine site) as one that holds a mining licence that covers an area of five hectares or less.

The only amendment to affect small business is the notification requirements for reportable events. The cost associated with the initial notifying report (telephone call or short email/letter) is expected to cost $64.00 per event. In the event that a subsequent report is requested, it is expected that the cost would also be minimal. It is expected that there will only be eight events that would trigger the notification requirement each year.

DPI records indicate that there are 100 small mine sites. This represents 42.37 per cent of the 236 mining licences.[153] Historically, there are few calls annually to DPI from small mines reporting events that would represent a significant event under the proposed Regulations. Therefore, DPI has estimated that on average only 5 per cent of these might be required to telephone the Department and submit a significant event report. This reflects that only a minority of small mines are anticipated to ever be required to submit a significant events report and thus concludes that the impact on small business is expected to be low.

---

[151] The ABS defines a small business as a business employing less than 20 people. (ABS, *Small Business in Australia*, Cat. No. 1321.0).

[152] Victorian Government (2007), *Small Business Regulatory Impact Assessment Manual*, Melbourne, April .

[153] DPI Records valid as at 21 September 2009.

10.2 Competition impacts

The *Victorian Guide to Regulation* establishes the fundamental principles that any new legislation in Victoria cannot restrict competition unless it can be demonstrated that the:

- benefits of the restriction, as a whole, outweigh the costs
- objectives of the legislation can only be achieved by restricting competition.

The fee for service is to apply to all prescribed brown coal mines in the Latrobe Valley as well as any future prescribed brown coal mines. The three large coal mines in the Latrobe Valley will be the only mines to be prescribed as declared mines for the purpose of additional reporting requirements because of the particular characteristics and risks associated with these mines. The requirement to notify DPI of any reportable events will apply to all licensees under the MRSDA.

This RIS concludes that there is nothing in the proposed Regulations which:

- allows only one participant to supply a product or service
- requires producers to sell to a single participant
- limits the number of producers of goods and services to less than four
- limits the output of an industry or individual producers
- discourages entry by new persons into an occupation or prompts exit by existing providers
- imposes restrictions on companies entering or exiting a market
- introduces controls that reduce the number of participants in a market
- affects the ability of businesses to innovate, adopt new technology, or respond to the changing demands of consumers
- imposes higher costs on a particular class or type of products or services
- locks consumers into particular service providers, or makes it more difficult for them to move between service providers
- imposes restrictions that reduce range or price or service quality options that are available in the marketplace.

No restrictions on competition have been identified in connection with the proposed Regulations. The Proposed Regulations are considered to satisfy the competition test set out in the *Victorian Guide to Regulation*.

However, it may be observed that in a very strict sense, the Proposed Regulations may impose a restriction on participants entering a market. That is, businesses must satisfy certain

operational and environmental requirements. These requirements are imposed on all businesses (or specific categories of businesses deemed to represent a higher risk) and therefore do not discriminate between players within the industry.

10.3 Administrative burden

It has been determined that the regulatory framework of the *Mining Resources Development (Mining) Amendment Regulations 2009* is not sufficiently detailed to measure the administrative burden using the Regulatory Change Measurement (RCM) for this RIS. An ex-post measurement of the changes to the administrative burden will be conducted and an RCM Report will be provided to the VCEC within three months of the commencement of the proposed Regulations.

11 Description of preferred model

11.1 Proposed model

The Proposed Regulations are the most effective in achieving the desired policy outcomes of reducing the regulatory uncertainty associated with risks to the public, environment and infrastructure from mine collapses whilst imposing least costs on business and Government. Under the Proposed Regulations, the following changes will occur:

- additional work plan requirements in relation to mine stability
- additional reporting requirements
- funding for the establishment of a technical review board
- funding for research and development
- additional capability for DPI inspectors.

It is expected that the proposed Regulations will reduce the likelihood of a mine collapse. The benefits of preventing these events will outweigh the costs, resulting in the proposed Regulations offering a net benefit to the community.

11.2 Implementation and enforcement

11.2.1 Implementation and enforcement

The changes made to the Regulations will commence in early July 2010. DPI will continue to provide information to industry to ensure that operators are aware of the Proposed Regulations (that is, via the DPI website, industry forums etc). It is not anticipated that there will be any transitional issues in relation to the commencement of these amendments.

Mines will be required to undertake actions as a result of the Proposed Regulations:

- the mine stability plan will require declared mines to take action to vary the existing work plan
- the reporting for declared mines will involve some additional actions – industry indicated that much of the requirements (90 per cent) would be business as usual, however, the actual creation of the report will be an additional step
- records would be expected to be maintained in relation to reportable events for all mines, however, as indicated in this RIS, industry largely considers this to be “business as usual”.

The requirements do not present any transitional difficulties for pre-existing licences.

It is expected that there will be uniform compliance with the Proposed Regulations. However, DPI will enforce these requirements where necessary through existing, established enforcement mechanisms already available under the MRSDA. In particular, current enforcement activities under the existing Section 110 of the MRSDA (that is, order to cease work) on the grounds of a reasonable belief that the Act and/or Regulations have been contravened.

A failure to vary a work plan to include the prescribed mine stability requirements and processes would result in the work plan variation not being approved. A failure to lodge a variation would be enforced with a Section 110 notice under the MRSDA prohibiting work until the variation is approved. Failure to comply with a section 110 notice, once issued, could result in a penalty of 1000 penalty units ($11,690) for a corporation or 200 penalty units ($2,338) in other cases under section 110, depending on the nature of the breach. A default penalty may also be applied at the rate of 20 penalty units ($233.80) for a corporation or ten penalty units ($1,169) in other cases. A penalty of 20 penalty units ($233.80) may be issued under section 116 for a failure to provide prescribed information.

Similarly, a failure to provide six-monthly reports in relation to declared mines also be treated as a breach of section 116 and would attract the penalty set out above. It would also be enforced via Section 110.

A failure to report a reportable event would also result in enforcement via Sections 116 and 110.

Enforcement via the existing infringement penalty system in the Principal Regulations would also be applied, where appropriate. Therefore, the existing Regulation 37 and item 6240 of Schedule 22 of the Principal Regulations would apply. Failure to comply with a section 110 notice, once issued, could result in an infringement penalty of ten penalty units ($1,169.00) which would be issued in accordance with DPI's escalating enforcement policy and procedure. The proposed Regulations will not introduce any new infringement penalties to the existing Principal Regulations.

Under the MRSDA, a failure to pay the mine stability levy as prescribed will result in the levy payable being subject to interest at the rate prescribed under the Penalty Interest Act 1983.

The penalties have been considered against the relevant Attorney General's Guidelines. The Human Right Unit, Infringements System Oversight Unit and Criminal Policy Unit of the Department of Justice have been consulted about the appropriateness of the existing penalties being applied to breaches of the proposed Regulations.

The penalties will encourage compliance with the MRSDA and provide an outcome which is commensurate with the nature of the offence.

It is expected that the incremental costs associated with the implementation and enforcement of the Proposed Regulations will be associated with the review of the reportable events. This time is included in the cost for additional DPI capacity.

Table 11.1 Incremental cost for implementation and enforcement

	Incremental costs
Reportable events (Government)	$62,425—100 events per year, one day to review an event, 60 per cent Grade 5, 40 per cent Grade 6[154]

11.3 Evaluation strategy

DPI is committed to ensure that regulation is regularly reviewed to ensure that it is appropriate and effective. DPI proposes the following evaluation strategy in relation to the amendments that will be made to the *Mineral Resources Development Regulations 2002*.

DPI will collect baseline data and information on an ongoing basis. The baseline data and information will be informed by analysis of the following key information:

- industry data
- data regarding the number of reports received from declared mines and the outcomes of the review of those reports by the DPI and the Technical Review Board
- data regarding the number of reportable events that are reported to determine whether the amendments are adequately capturing the types of events that may or will pose risks to the public, the environment or public infrastructure
- data regarding the number of reportable events that are not reported at the required time
- data regarding the fee for service
- infringement and enforcement data—to indicate the level of compliance among industry
- audit reports.

DPI will use the following key performance indicators to measure the effect of the amendments:

- effectiveness of mine stability plans
- implementation of mine stability plans
- audit and review of critical controls.

[154] Note that this time is included in the time allocated for additional DPI capacity ($1 million of the $2.5 million).

As part of its evaluation strategy to monitor the performance of the proposed amendments, DPI will review the outcomes of the amendments on a regular basis as set out below.

Other measures will also be undertaken for evaluation. The fee for service and the initiatives it is to fund will be ongoing activities, subject to periodic review. Ongoing consultation with the MCA and the declared mines will also occur about the effectiveness of the amendments.

DPI will review the statistical outcomes of incidences of reporting of “reportable events” to determine whether the amendments are adequately capturing the types of events that may or will pose risks to the public, the environment or public infrastructure. This will occur on an ongoing basis within DPI.

Ongoing consultation with the MCA and the declared mines will also occur about the effectiveness of the amendments. DPI will also continue to arrange stakeholder forums on a regular basis to discuss the effectiveness of the amendments and any suggestions for change. DPI will also undertake ongoing auditing of declared mines and other major mines to ensure that risks are identified and appropriately managed.

According to the *Subordinate Legislation Act 1994*, evaluation of the overall performance of the proposed Regulations must take place ten years after the making of the Regulations (that is, at the time the Regulations sunset). The Principal Regulations which will incorporate the amendments, are due to sunset 22 October 2012. A robust review of the Regulations prior to this will reconsider the nature and extent of the problem and whether there is a continuing need for Government intervention.

The Technical Review Board will be appointed for an initial 18 month term, at which time its terms of reference and operation will be reviewed and amended if necessary. DPI has also made an undertaking to industry that the need for the Technical Review Board (and hence some of the levy) will be reviewed during the Board’s fourth year of the operation (that is, 2013). The review will consider the role of the Technical Review Board and the need for the Technical Review Board. The review will consider reports of the Technical Review Board, data and statistics (such as incidents/events in mines), the delivery of outputs and milestones as per the Terms of Reference, stakeholder feedback and outcomes of mine audits.

The Technical Review Board will provide verbal and written feedback to the Minister and Department on an ongoing basis. The advice will be considered and implemented as required upon receipt. For example, advice about the need for a mine to vary its work plan in relation to mine stability will be considered by DPI and the variation will be requested where appropriate.

The Technical Review Board will also report to the Minister on an annual basis.

The government and the University will also meet on a quarterly basis in relation to the research and development program.

Monash University will submit six monthly progress reports which will be considered by Government upon receipt.

DPI has also undertaken to review the research and development prior to recruiting a second round of Ph.D. students.

The program will also be subject to an extensive and robust review after five years. The review will consider the role of the Technical Review Board and the need for the Technical Review Board. The review will consider reports of the program, the delivery of outputs and milestones, stakeholder feedback and data.

11.4 Additional amendments – mineral exploration and cultural heritage

The proposed amendments to the Principal Regulations contain an amendment that is unrelated to the implementation of the Government Response to the Mining Warden Inquiry into the Yallourn mine batter failure. This amendment concerns a change to procedure for area work plans to enable what was intended to streamline some exploration approvals to work effectively with cultural heritage requirements under the *Aboriginal Heritage Act 2006* (AHA).

The Code of Practice for Mineral Exploration and the Memorandum of Understanding on Exploration Work Plan Consultation between DPI and the Department of Sustainability and Environment (DSE) establishes an administrative process for streamlining exploration work plan approvals. This streamlined process allows exploration licence holders to submit a more generic area work plan in place of a full work plan.

An area work plan is a broad plan for the approval of a range of exploration activities within a defined project area. An area work plan does not require specific detail of the activities for individual worksites within the project area. Prior to work being carried out on the ground, an area work plan schedule is submitted to DPI and DSE. The work plan describes the activities and locations proposed in a forthcoming program of work and is enforced via licence conditions.

This process was intended for instances where an exploration licence is granted over a very large area and the licence holder intends to develop the specific details and locations of the program of work based on progressive results of drilling and other activities. It provides greater flexibility than the standard work plan process and avoids an exploration licence holder having to submit multiple work plan variations in order to change specific locations or aspects of the work program which may not be known when the original work plan application is submitted. It is strongly supported by industry.

However, if a cultural heritage management plan (CHMP) is required under the AHA for exploration work in a particular area, the area work plan arrangement cannot be used because a

CHMP must be prepared and approved before the work plan is approved. To assess whether a CHMP is required, the exact location and details of proposed works must be known. The streamlined area work plan arrangements would be more useful if the CHMP could be prepared and approved with a generic area work plan.

Amendments to the MRSDA will result from the Energy and Resources Legislation Amendment Act 2009 which will improve the area work plan arrangements. These amendments define the area work plan arrangement in legislation and require that where a licensee has lodged an approved area work plan, work must not be carried out not less than 21 days before an area work plan schedule is submitted to DPI. This schedule must include a copy of an approved CHMP and be consistent with the CHMP (where required).

The formalisation of this process in legislation does not change the obligations faced by industry, it merely changes the time at which a CHMP must be prepared. This change is intended to make the streamlined exploration approvals process (the area work plan system) more accessible and therefore of greater benefit to industry. The amendment to the Principal Regulations prescribes the information to be contained in an area work plan schedule. This information is the same as the information currently required as set out in DPI's Area Work Plan Guidelines. The amendments being introduced are intended to address practical impediments by providing flexibility in relation to the current process.

The Department of Sustainability and Environment and Aboriginal Affairs Victoria have been consulted in relation to this amendment.

This change does not impose "an appreciable burden" on any sector of the public because it does not impose any additional requirements or obligations. Therefore, this aspect of the amendments to the Principal Regulations will not be covered in any further detail as part of this RIS.

11.5 Additional amendments – removal of references to occupational and health safety

Since 1 January 2008, OHS in the mining industry has been regulated by the OHS Act. Until recently, DPI was the delegated regulator for OHS in the mining industry under the OHS Act. As of 1 January 2008, the delegation ceased and Victorian Workcover became regulator of OHS in mines.

References to OHS, which were complimentary to DPI's former delegated responsibility for OHS, are being removed from earth resources legislation.

The Proposed Regulations will remove references to OHS and OHS plans in the principal Regulations. This will not impose any

additional requirements or obligations and is being undertaken to avoid duplication. Therefore, this aspect of the amendments to the Principal Regulations will not be covered in any further detail as part of this RIS.

12 Consultation

12.1 Consultation to prepare the RIS

Consultation with relevant stakeholders began following the tabling and public release of the Mining Warden's Inquiry into the Yallourn Mine Collapse and the Government Response on 4 December 2008.

DPI undertook consultations with representatives of the MCA and the three Latrobe Valley brown coal mines who were the parties to be most affected by the proposed amendments. This consultation centred on the implementation of the Government's response to the Mining Warden's Inquiry of the Yallourn Mine batter failure.

During ongoing consultation, DPI took each of the mines through all the aspects of the Government Response to the Inquiry.[155] The following points summarise the discussions and outcomes from the consultation with officers from the Yallourn, Hazelwood and Loy Yang mines and the MCA:

- Mine stability requirements for work plans and reportable events—these requirements were discussed with industry and the MCA during consultation meetings. The reportable event requirements were agreed upon by industry after industry comments were addressed.
- Technical Review Board—Industry indicated its interest in the terms of reference and selection of the Technical Review Board. The Terms of Reference and the guidelines for the working of the Technical Review Board were considered in a meeting run by DPI with the three mines and the MCA.[156] Comments from industry were addressed at the meetings and incorporated into the documents. The MCA also acted as an industry participant on the selection panel for the Technical Review Board.
- Levy—the three mines and the MCA indicated that they did not support the imposition of the levy and instead were of the view that any response should not be funded by industry. However, Government indicated that as the response would provide benefits to the industry, it was appropriate that industry should contribute to the cost of the response. Government then wrote to the mines and sought feedback from the mines regarding the following options for raising the cost of half of the levy from industry:
  - per tonne mined
  - divide equally between the mines

[155] For further detail on each of the Government Response initiatives see Section 14.2

[156] See Appendix G

- divide on formula reflecting size or volume of mine void as a proxy for risk.

Two of the mines replied, stating that their preference was to split the levy equally between the three mines. The legislative provision and the proposed Regulations were developed in line with industry's preference. Industry also raised concerns regarding the timing and costs of preparing reports for the Technical Review Board and opposed the introduction of the reports. Industry indicated that if reports were to be required, industry preferred 12 monthly reports. Given that the reports are to manage risk, DPI advised that it would start with six monthly reporting and then review the effectiveness and necessity of this frequency. This has been incorporated into the Regulations, which provide the Department Head with the capacity to vary the reporting periods. The Department of Treasury and Finance has also been consulted in relation to the levy.

- Research and Development—industry noted that they were supportive of the initiative to establish a research group to provide research and development support industry as well as developing training courses for mine personnel. Industry however preferred to develop a direct relationship with Monash University. Once the rationale for Government participation was established (i.e. to address a lack of knowledge and expertise within both government and industry), industry and the MCA was consulted in the development of the Government agreement with Monash University. A Geotechnical and Hydrogeological Engineering Research Group Advisory Committee made up of industry and other stakeholders including DPI has been set up to provide advice and relevant research and development topics and issues.

A survey of options developed as part of the RIS process was also conducted (see Appendix C). The three declared mines in the Latrobe Valley were contacted about the impact of the current Regulations and the proposed changes. An undeclared mine, the Bendigo gold mine, was also surveyed.

As noted in Section 4.2.5 the Government has undertaken aspects of the Regulations because of the nature of the risks associated with the regulatory problem. As set out in Section 4.2.5 the following has occurred or is currently taking place:

- the Technical Review Board has been established, and four members of the Board have been appointed. Three meetings have taken place. The Board has undertaken work to familiarise itself with the mine's current stability programs (including site visits) and have undertaken reviews of reports of mines that will be declared. The Board has also undertaken some informal consultation with stakeholders and discussions with Monash University.
- the funding agreement for five years with Monash University has been executed and the program plan has been developed. The first progress report has been provided. A

Geotechnical and Hydrogeological Engineering Research Group Advisory Committee made up of industry and other stakeholders, including DPI, has also been set up to provide advice and relevant topics and issues.

- the employment of a Senior hydrogeologist and two inspectors within DPI and the undertaking of initial mine audits. DPI has also provided “lessons learnt” workshops for stakeholders. Guidelines are also being drafted in relation to mine stability for work plan variations. DPI is in the process of engaging a geotechnical engineer.

In addition to Government action, it should be noted that the mines have voluntarily commenced some actions in anticipation of the commencement of the Proposed Regulations. In particular, the three mines are working on work plans for variation and have submitted their first six-monthly report. One of the mines has submitted a variation of the work plan (including a mine stability plan) which has been approved.

Work plans are often prepared and amended by consultants, so two consultants (Sinclair Knight Mertz and GHD) were contacted. Information obtained from this consultation process was limited and is unable to be relied upon for the following reasons:

- Work plans (or amendments to work plans) are not completed regularly and vary significantly based on the nature and extent of the proposed plan. Surveyed mines suggested that work plans were only undertaken every few years.
- Work plans are not undertaken solely by one party but are often undertaken collaboratively by the mine and various consultants.
- The stakeholders consulted were not able to provide estimates on the effect of any proposed changes to the Regulations with accuracy because of the uncertainty surrounding the practicality of the options.

Therefore, the estimates obtained were varied and anecdotal, although they have been incorporated where possible. In particular, the cost for the variation of a work plan to include a mine stability plan has been based upon the actual costs provided by one of the mines to be declared. The cost, which includes the cost of the mine stability plan and other variations to the work plan, has been used as an estimate within this RIS. The other two mines have commenced a variation which has not yet been approved and are yet to commence the variation respectively. Consequently, the cost estimates from these mines were not based on actual costs and were not used within this RIS.

12.2 Future consultation

This RIS represents another step in the consultation process. According to the Subordinate Legislation Act 1994, the public must be given at least 28 days with which to provide comments or make submissions about the information contained within this RIS. It is proposed that the following stakeholders be directly informed of the availability of the RIS:

- Minerals Council of Australia (MCA)
- TRUenergy Yallourn Pty Ltd, Yallourn mine
- International Power Pty Ltd, Hazelwood mine
- Loy Yang Power Ltd, Loy Yang mine
- Department of Premier and Cabinet
- Department of Sustainability and Environment
- Department of Treasury and Finance.

A 28 day consultation period is proposed for this RIS. This is considered sufficient given the consultation that has already occurred to assess the proposed Regulations and prepare the RIS. DPI welcomes comments or suggestions about the nature, extent, and likely impacts of the proposed amendments in the form of a written submission which is required by no later than 5pm on Monday 14 June 2010.

All submissions will be treated as public documents and will be made available to other parties upon request.

In addition to consultations that are required as part of this RIS, pending the establishment of the proposed levy and Technical Review Board, ongoing consultation will continue to take place primarily with the MCA and the declared mines about the effectiveness of the amendments.

Appendices

Appendix A Chronology of key dates

Table12.1 Chronology of dates leading to the Yallourn Mine Batter Collapse[157]

Date	Key Details
Pre -1996	**SECV responsible for mine stability management [158]** Latrobe Valley mines were collectively managed by the SECV. SECV had extensive geotechnical and hydrogeological resources resulting in a very good understanding of Latrobe mines and their ground movements. In 1992 part of SECV was corporatised and became GeoEng which undertook SECV's geotechnical and hydrogeological service contracts. Experience and knowledge of mine stability was retained by SECV because GeoEng was staffed by ex SECV employees.
1996	**Privatisation of Latrobe Valley Mines and dissemination of SECV[159]** Reviews and enquiries resulted in privatisation of the Latrobe Valley Mines which became separate power generation businesses. The SECV was disaggregated and privatised.
1997 onwards	**Breakdown of knowledge of Latrobe Valley mines** Extensive knowledge and understanding of geotechnical and hydrogeological aspects of the Latrobe Valley mines diminished and the model for mine stability management became less clear as the skills required to correctly interpret data became scarce and were outsourced to consultants.
2002 – 2003	**Yallourn introduces new mining methods** Yallourn introduces a new mine layout and the implementation of new mining methods to improve mine efficiency. These changes affected the monitoring of the slope and groundwater drainage. These impacts were, in part, recognised at the time. External advice resulted in a halt to the routine drilling of horizontal drainage bores (critical for mine stability) in NE Batter.
2004	**Further changes to Yallourn's mining methods** External assessment and advice from various consultants resulted in the deep aquifer dewatering bores in the mine floor being switched off. Implications of this were not fully appreciated at the time.
Early 2007	**Cracks observed in and around NE Batter** In early 2007, cracks were observed in and around the NE Batter. In July 2007 major cracks were observed on the Latrobe River Levee. Significant rises in groundwater in two bores were also observed in September. Water also appeared on the slope. DPI was not informed of the situation.
October 2007	**Extensive review of cracking ordered** Cracks continued to appear, extend and become worse leading up to the failure. Consultants were sought to conduct an extensive review of the cracking. DPI not informed.

[157] This chronology was predominantly sourced from the Victorian Government (2008), *Mining Warden Yallourn Mine Batter Failure Inquiry*

[158] Based upon information provided by DPI officers.

[159] Based upon information provided by DPI officers.

Date	Key Details
7 & 8 November 2007	**Consultant's assessment** Large water flows are observed on the NE batter. Significant rises in groundwater were again observed in November. A further review of the cracks and stability of the NE batter is undertaken by consultants. Consultants advised that NE Batter had a high factor of safety and was safe to mine. Cracks were attributed to normal stress relief movements and that the water on the slope was not from the Latrobe River. DPI not informed.
13 November 2007	**Increase of water flows into the mine** Water flows increased to 500 litres per second. Consultants were called back to reassess declining situation. Consultants advised that although a major stability risk was apparent catastrophic failure was unlikely. DPI is contacted for the first time and made aware of situation.
14 November 2007	**Yallourn Mine collapse** Yallourn coal mine experiences a major collapse of the northern batter of the East Field pit diverting the Latrobe River into the mine, damaging equipment and temporarily halting electricity production.

Appendix B Model Assumptions

All assumptions used to estimate the costs of the Proposed Regulations and the feasible alternatives are summarised in this Appendix. The following tables summarise the assumptions and calculations used in the RIS.

General assumptions

General assumptions are summarised in Table 12.2 below. It should be noted that costs and benefits have been calculated beginning in the 2009-10 financial year.

Table 12.2 General assumptions

Category		Assumption	Source / explanation
Financial	Discount Rate (%)	3.5	Victorian Guide to Regulation
	Dollars	2009-10	Current year
Time	Average hourly earnings	$64.00[160]	ABS AWE Nov 09, adjusted using Guide to Regulation
	VPS Grade 5	$41.94	DPI
	VPS Grade 6	$54.43	DPI
	On costs	1.75	Victorian Guide to Regulation
Minerals industry	Number of mining licences	236	2007-08 DPI Statistical Review
	Number of declared mines	3	DPI
	2007-08 brown coal production (tonnes)	66,033,000	2007-08 DPI Statistical Review
Population	Number of families in Latrobe Valley area	19,564	ABS

[160] ABS (2009), *Average Weekly Earnings, Full time adult total earnings, trend Cat. No. 6202.0, November,* $1270.60. Using Guide to Regulation suggested calculation = $1270.60 x 52 weeks / 44 working weeks / 41 working hours x on-cost factor of 1.165 x overhead factor of 1.5 = $64.00.

Costs

Additional reporting requirements

Under each of the sub-options of Option 2, the Regulations will include the requirement to provide additional information. The additional information includes:

- once-off additional work plan requirements for declared mines
- additional bi-annual reporting requirements for declared mines

The assumptions regarding the cost of these additional requirements are set out in Table12.3.

Table12.3 Additional reporting requirements Option 2 (a, b, c, d, e, f & g), Option 3

	Option 2 (a), Option 2 (b), Option 2 (c), Option 2 (d), Option 2 (e), Option 2 (f), Option 2 (g), Option 3	Source
Additional work plan requirements	$150,000—once off for declared mines	DPI, Industry estimate
Additional reporting requirements	$50,000—twice a year for declared mines	DPI, Industry estimate
Reportable events (industry)	$9,587 – 100 events per year, 1 hour per event, Victorian Guide to Regulation default with on-costs	DPI
Reportable events (Government)	$62,425—100 events per year, one day to review an event, 60 per cent Grade 5, 40 per cent Grade 6[161]	DPI

Under Option 3, changes to licence conditions will require DPI time to establish. Assumptions for the time required to amend licence conditions are outlined in Table 12.4.

Table 12.4 Administrative cost of changing licence conditions

	Option 4	Source
Cost of Administrative time	$10,785 - 38 hours, 3 businesses, Victorian Guide to Regulation default with on-costs	DPI, Vic Govt

Funding of Technical Review Board and research and development

Under each of the sub-options of Option 2, the Regulations will include the requirement to raise money to support a Technical

[161] Note that this time is included in the time allocated for additional DPI capacity ($1 million of the $2.5 million).

Review Board and research and development. Assumption about the split of this money and the length that it will be in place are set out in Table 12.5.

Table 12.5 Fee for service assumptions

	2 (a)	2 (b)	2 (c)	2 (d)	2 (e)	2 (f)	2 (g)
Government contribution	$1.25m	$2.5m			$1.25m	$2.5m	
Latrobe Valley region coal mines contribution	$1.25m			$2.5m	$1.25m		$2.5m
All mines contribution			$2.5m				
Length contribution in place[162]	10 years	10 years	10 years	10 years	2 years	2 years	2 years

Under Option 3, the industry will fund its own Technical Review Board. The investment in research and development will not occur.

Table12.6 Industry operated Technical Review Board

	Option 3	Source
Industry levy	$1,000,000	DPI

Under Option 4, industry would establish two codes of practice to define additional reporting requirements.

The first code of practice would involve intensive consultation with industry to reach agreement on the code of practice. Costs would also be incurred in editing and publishing the code of practice and education and awareness campaigns about the code.

The first code of practice would broadly outline the types of geotechnical and hydrogeological factors within a mine which can pose a risk to the environment, infrastructure and public safety and how such factors can be identified. The code of practice would also include guidance about how such factors should be assessed, addressed and monitored to ensure that risk associated with those factors is reduced.

The second code of practice would relate to matters that are “reportable events” under the proposed option. The code would outline the types of events that would be considered reportable

[162] DPI has undertaken that the need for the continuing role of the TRB (and hence some of the levy) will be reviewed during the fourth year of operation. Research and Development is to be reviewed in the fifth year.

events and the circumstances in which it is recommended that the events be voluntarily reported to DPI. The second code of practice would require DPI and industry time to develop and reach agreement upon. Costs would also be incurred in editing and publishing the code of practice and education and awareness campaigns about the code.

It is estimated that the codes would cost $160,000 in total to produce.[163]

It is expected that without a requirement to set up a Technical Review Board, and research and development that industry would not instigate the mechanism which would allow for collaboration and sharing of knowledge. Enhanced DPI capacity would continue to be required under this option to respond to reports.

Table 12.7 Code of practice

	Option 4	Source
Code of practice	$160,000	DPI

Benefits

Environmental

As discussed in Section 5.1.2 a collapse in a mine is likely to lead to some environmental damage. If a collapse were to result in the diversion of a river the value of the environmental damage is set out in Table B.7.

Table12.8 Environmental damage from loss of river[164]

	Environmental cost	Source
Fish species and populations	$2.19 and $5.56	Bennett, Dumsday, Howell & Sturgess
Healthy vegetation on both sides of the river	$2.91 and $5.56	Bennett, Dumsday, Howell & Sturgess
Native waterbird and animal species	$3.04 and $22.07	Bennett, Dumsday, Howell & Sturgess
River suitable for primary contact recreation without threat to public health	$0.00 and $2.12	Bennett, Dumsday, Howell & Sturgess
Total	$8.14 to $35.31 per household	

[163] DPI estimate based upon actual costs provided by consultants for guidelines. These costs are calculated at $2,700 per day, with approximately 30 days of work for each code of practice.

[164] Bennett, J., Dumsday, R., Howell, G., Sturgess, N. (2008), *The Value of Improved Environmental Health in Rivers.*

If each household is willing to pay between $8.14 and $35.31 for improved health of rivers and the fish, animals and vegetation surrounding the rivers, then this would mean that the value of a one per cent increase in these factors to this area would be between $159,251 and $690,805. Or, on average, $425,028.

Public Safety

The VCEC suggested statistical value of a life is $3.74 million.[165]

Table 12.9 Value of life

	Public safety	Source
Value of life	$3.74 million	VCEC

Electricity supply

As discussed in Section 5.1.3 VENCorp estimated the average value of the losses sustained by customers as a result of a non supply of electricity to be $47,850 per MWh in 2007.[166] Accounting for inflation, the value of customer reliability is expected to be $52,054 per MWh in 2009.[167]

An incident at Loy Yang that interrupted electricity supply would reduce electricity supply by 45 GWh (or 45,205 MWh) per day.[168] Using the VENCorp value of customer reliability and value of social disruption of $52,054 per MWh, this cut would represent a loss of $2.3 billion per day.[169] About 64 per cent of this value is attributed to the loss in supply to electricity to the commercial sector.[170]

DPI has estimated that over the year there is a 1.5 per cent risk that a collapse would occur in a peak period, where demand would not be able to be fulfilled by alternative suppliers through the national energy market. If the collapse were to occur during peak period, DPI estimates that supply would be restricted for three days.

---

[165] Victorian Competition and Efficiency Commission (2007), *Suggested value of a statistical life in RISs and BIAs – practice note*

[166] VenCorp (2008), *The Value of Customer Reliability used by Vencorp for Electricity Transmission Planning – Consultation Paper,* 5 September, p.2.

[167] RBA Consumer Price Index Figures are 4.4% for 2007-08 and 4.2% for 2008-09.

[168] 16,500 GWh / 365 days = 45.21 GWh/day.

[169] $52,054 x 45,205 MWh = 2,353,101,070.

[170] Value of customer reliability is: $1.31 for agricultural sector, $4.46 for residential sector, $11.26 for industrial sector and $30.82 for commercial sector. CRA International (2008), *Assessment of the Value of Customer Reliability,* http://www.electricitycommission.govt.nz/pdfs/advisorygroups/tag/25Sep08/VCR-Final-Report.pdf (accessed November 2009).

Therefore, the value of electricity supply lost is:

Cost = A X B X C

Where:

A: The value of one day of electricity supply lost ($2,353,101,070)

B: The likelihood that supply would be lost (1.5 per cent)

C: The number of days in which supply would be lost (3 days)

Table 12.10 Value of electricity supply lost

	Electricity supply	Source
Value of electricity supply	$105,889,548	VENCorp, DPI

Wholesale electricity prices

As discussed in Section 5.1.3 Victoria participates in a national electricity grid, so while it is expected that only in an extreme case would we experience significant cut to electricity supply, it is likely that a collapse that affects electricity will increase wholesale electricity prices. During the Yallourn collapse there was a notable change in electricity prices. Compared to the rest of the month, the wholesale prices for the five days after the collapse were, on average, 224 per cent above the average wholesale price. In November 2007, the cost of the difference between the average wholesale price (excluding the five days of increase) and the average price for the rest of the month was $12,939,118. DPI estimates that if there was a collapse there would be an increase in wholesale electricity prices by 224 per cent for five days in 80 per cent of cases.

Table 12.11 Value of wholesale electricity price increases

	Wholesale electricity price increase	Source
Value of wholesale electricity price increase	$51,756,473	AEMO, DPI

Percentage risk under each option

The above values for environment, public safety and electricity supply set out the consequence if an incident were to occur. There is some uncertainty about the likelihood of an event occurring. Each option is likely to impact on the likelihood of an event occurring. Discussions with a panel of experienced DPI staff, including a mining engineer, a risk manager, a senior hydrologist and the Chief Inspector, have set out a number of quantitative values of the probability of a catastrophic event occurring in the next ten years under each option. The approximate percentage change in each of the values provided by DPI experts has been used in the analysis to estimate the likelihood of an event.

Table 12.12 Likelihood of an event in the next ten years

%	1	2 (a)	2 (b)	2 (c)	2 (d)	2 (e)	2 (f)	2 (g)	3	4
Likelihood of event in next 10 years	3.00	0.45	0.45	0.45	0.45	0.75	0.75	0.75	0.90	2.10

Option 1 represents the base case. The estimate of a 3 per cent chance of a collapse is based on:

- one event has occurred since the privatisation of the mines (approximately ten years), giving a 10 per cent chance each year for the next ten years
- one event has occurred since the establishment of the mines (operation of approximately 130 years), giving a 2.3 per cent chance each year for the next ten years.

The above likelihood also encompasses the estimate provided by the Technical Review Board regarding the likelihood of another collapse occurring. The Board consider that the annual probability of a major adverse event happening in and or around the Latrobe Valley coal mines is between 1/10 years and 1/30 years.

While the expected 3 per cent likelihood under the base case has been estimated on advice from DPI industry experts, it is subject to uncertainty. As such, a range of likelihood is presented. The range is based on a lower end estimate of 2.3 per cent, when it is considered that the three mines have operated for 130 years. The higher end of the range is based on the fact that there has been one event since the privatisation of the mines about ten years ago, and therefore there is a likelihood of a collapse of about 10 per cent.

To be conservative, a 3 per cent chance was used, that is, under the current Regulations, it is expected that there will be a collapse in the next 33 years.

The assumption is made on the following basis:

- Without prescribing mine stability plan requirements, this is no legal force for mines to supply information. Additionally, there would be no certainty risks factors within the mine minimised with appropriate controls and monitoring systems. Such factors are unlikely to be identified and managed at an early stage, so there is no reduction in the likelihood of an event caused by those factors. The regulator would have no basis to determine whether such systems and controls were in place, which also affects the administration of the MRSDA. This is considered to be a significant contributor to risk associated with geotechnical and hydrogeological factors within mines and hence the likelihood of a catastrophic event occurring.
- Without a requirement to prepare and provide reports to DPI, mines would not be required to undertake six monthly reviews. There would be no certainty that risk factors within a mine were being regularly reviewed. Furthermore, there would be no

certainty that mines will engage appropriate consultants or expertise to undertake such assessments. Consequently, the early identification and management of risks to the public, environment and infrastructure would not occur.

- Without a Technical Review Board to review the six monthly reports of the mines, an additional level of review of risk management would not take place. Risks may not be managed in the most efficient and effective manner and the likelihood of an event occurring would not reduce. Furthermore, the Technical Review Board is likely to improve the sharing and co-ordination of information among an industry sector which otherwise has little incentive to do so. Information sharing will enable the mines to apply lessons learnt from one mine to their own. This is also likely to improve safety and risk management outcomes. The function of the Technical Review Board is considered to be important in terms of ensuring appropriate controls and monitoring are in place and to ensure that the outcomes of such systems are interpreted as accurately as possible. This is considered a key factor in ensuring risk is managed in an appropriate way.
- Without prescribing reportable events, mines would not have any guidance to report any specific symptoms or matters within the mine which may either be the pre-cursor or sign of an imminent event, or the commencement of an event. It would also be difficult to enforce the provision of information to DPI without prescribed particulars. In turn, information would not be provided and the regulator would not be able to assess the situation and intervene or assist.
- Without DPI capacity to undertake additional regulatory functions, DPI could not effectively undertake relevant enforcement activities (inspections, audits etc) or provide additional information and education to industry.

It is expected that under Options 2 (a) to (d) reduce the likelihood of an event occurring by 85 per cent. Therefore, the likelihood of an event occurring is 0.45 per cent. This assumption is based on:

- The requirement to prepare and submit a variation of the work plan to include a mine stability plan is considered to greatly reduce the probability of an occurrence. Preparing a plan requires the mine operator to consider factors in the mine, identify risk and develop tailored risk management and monitoring systems. These plans are then submitted to DPI and assessed by DPI before being approved. The information enables DPI to determine whether appropriate systems are in place and will enable the effective administration of the MRSDA. It also provides operators with certainty about the regulator's requirements. This significantly reduces the likelihood of an event by putting in place systems at an early stage.
- Preparing reports on a six monthly (or other nominated basis) will require operators to regularly review and assess factors within the mine that are identified as constituting a geological or hydrogeological risk. The operator must consider whether the risk is adequately managed and whether there are appropriate

systems in place to monitor the risk on an ongoing basis and provide a report outlining the appropriateness of the controls and system. This regular review will contribute to the reduction of the likelihood of events by ensuring that early warning signs are considered and that appropriate systems are in place and evolve to appropriately meet the conditions of the specific mine.

- Review by a Technical Review Board will provide an additional level of expert and independent review to assure the regulator that the mines are implementing the mine stability plans in an appropriate manner and to assess whether the plans continue to address the risk within the mine. The process requires mines to undertake ongoing assessment of the risk within the mine and the systems in place to monitor and manage that risk. It is considered that substantial benefits will be delivered by a Technical Review Board, particularly once ongoing reviews are undertaken and the outcomes of the reviews are shared between the mines to enable them to identify and understand factors which are likely to be common between the mines.
- Reporting of significant events at an early stage will assist in the risk management by allowing the regulator to consider, assess and issue directions to manage the situation, thereby minimising the risk and severity of outcomes (and reducing the number of catastrophic events). Prescribing the requirements will also provide certainty for industry, the Government and the public about reporting requirements.
- Funding of other regulatory functions will enable DPI to undertake more inspections and audits to ensure compliance and detect matters which will require directions, notices or enforcement. Providing support and education for the industry will also deliver benefits through increased awareness of issues and risks, and improved education.
- Funding research and development is likely to be most effective in the long term because the benefits of a research and development program will be realised as the program becomes established and research and development activities can be developed over time. Such research will encourage innovation and information-sharing and education among the mines to address geotechnical and hydrogeological factors which are unique to brown coal. Brown coal will also receive increased attention within the curriculum.

Compared with the base case, it is expected that Options 2 (e) to (g) will reduce the likelihood of an event by 75 per cent. Under these options, the likelihood of an event occurring is 0.75 per cent. This assumption based on:

- The requirement to prepare and submit a variation of the work plan to include a mine stability plan is considered to greatly reduce the probability of an occurrence because preparing the plan requires the mine operator to consider factors in the mine, identify risk and develop tailored risk management and monitoring systems. These plans are then submitted to DPI and assessed by DPI before being approved. The information enables DPI to determine whether appropriate systems are in

place and will enable the effective administration of the MRSDA. It also provides operators with certainty about the regulator's requirements. This requirement significantly reduces the likelihood of an event by putting in place systems at an early stage. The likelihood of an occurrence in this option is slightly higher than in Options 2(a) to (d) because the systems will only be established in the short term.

- Preparing reports on a six-monthly (or other nominated) basis will require operators to regularly review and assess factors within the mine that have been identified as constituting a geotechnical or hydrogeological risk. The operator must consider whether the risk is adequately managed and whether there are appropriate systems in place to monitor the risk on an ongoing basis and provide a report outlining the appropriateness of the controls and system. This regular review will contribute to the reduction of the likelihood of events by ensuring that early warning signs are considered and that appropriate systems are in place and evolve to appropriately meet the conditions of the specific mine. The likelihood in this option is slightly higher than in Options 2(a) to (d) because the benefits of the earlier reports may not yet be realised in the short time-frame and the outcomes of the reports may not be implemented.
- Review by a Technical Review Board will provide an additional level of expert and independent review to assure the regulator that the mines are implementing the mine stability plans in an appropriate manner and to assess whether the plans continue to address the risk within the mine. The process requires mines to undertake ongoing assessment of the risk within the mine and the systems in place to monitor and manage that risk. It is considered that substantial benefits will be delivered by a Technical Review Board, particularly once ongoing reviews are undertaken and the outcomes of the reviews are shared between the mines to enable them to identify and understand factors which are likely to be common between the mines. The likelihood of an event occurring in this option is slightly higher than in Options 2(a) to (d) because very few reports will have been prepared or reviewed. However, it would be expected that the initial reports will identify the most urgent factors in the mine that need addressing and make recommendations, and this will reduce the likelihood of an event.
- Reporting significant events at an early stage will help manage of risk by allowing the regulator to consider, assess and issue directions to manage the situation, thereby minimising the risk and severity of outcomes (and thus reducing the number of catastrophic events). Prescribing the requirements will also provide certainty for industry, the Government and the public about reporting requirements. This is expected to deliver similar reductions in the likelihood of events as Options 2 (a) to (d) because reporting signs and symptoms will enable early intervention to assist mines to avoid events or to minimise impacts of events.
- Funding of other regulatory functions will enable DPI to undertake more inspections and audits to ensure compliance

and detect matters which will require directions, notices or enforcement. The provision of support and education for the industry will also deliver benefits through increased awareness of issues and risks, and improved education. This is expected to deliver similar reductions in the likelihood of events as Options 2 (a) to (d) by allowing the regulator to undertake enforcement and education activities about the new regulatory functions.

- Funding research and development in the short-term is unlikely to be as effective as the long-term benefits of a research and development program that runs over 10 — 12 years. However, establishing such a program in the next two years of the Regulations will lay the foundations for benefits for the future. The short-term benefits will also assist in educating the profession and including greater amounts of brown-coal related matters in the general curriculum for students and will generally raise awareness about the unique characteristics of brown coal.

Changing of the licence conditions under Option 3 is expected to lower the likelihood of a collapse by 70 per cent compared with the base case. It is expected that the likelihood under this option will be 0.90 per cent. This has been established considering:

- The requirement to prepare and submit a variation of the work plan to include a mine stability plan is considered to greatly reduce the probability of an occurrence because preparing the plan requires the mine operator to consider factors in the mine, identify risk and develop tailored risk management and monitoring systems. These plans are then submitted to DPI and assessed by DPI before being approved. The information enables DPI to determine whether appropriate systems are in place and will enable the effective administration of the MRSDA. It also provides operators with certainty about the regulator's requirements. This requirement significantly reduces the likelihood of an event by establishing systems at an early stage.
- Preparing reports on a six-monthly (or other nominated) basis will require operators to regularly review and assess factors within the mine that have been identified as constituting a geological or hydrogeological risk. The operator must consider whether the risk is adequately managed and whether there are appropriate systems in place to monitor the risk on an ongoing basis and provide a report outlining the appropriateness of the controls and system. This regular review will contribute to the reduction of the likelihood of events by ensuring that early warning signs are considered and that appropriate systems are in place and evolve to appropriately meet the conditions of the specific mine.
- The weighting is affected by the Technical Review Board being developed and run by industry. Industry has lost historical understanding of risk issues and is currently unable to co-ordinate and share knowledge, so there is reduced certainty that the Board would reduce the likelihood of events occurring to the same extent as Option 2.
- Reporting significant events at an early stage will assist to manage of risk by enabling the regulator to consider, assess and

issue directions for each situation, thereby assisting in minimising the risk and severity of outcomes (and thus reducing the number of catastrophic events). Prescribing the requirements will also provide certainty for industry, the Government and the public about reporting requirements.

- Funding of other regulatory functions will enable DPI to undertake more inspections and audits to ensure compliance and detect matters which will require directions, notices or enforcement. Providing support and education for the industry will also deliver benefits through increased awareness of issues and risks, and improved education.
- This option was not considered to reduce risk via research and development because there would be no funding for such a program. Without this requirement, there is no certainty that industry would undertake research and development because of the difficulties sharing information and innovation with commercial competitors. This is particularly the case because the brown coal mines have not done so in the past.

Under Option 4, two codes of practice will be developed, one for the managing factors within the mine relating to stability, and the other for reportable events. There would be no Technical Review Board and no research and development. It is expected that under this option the likelihood of a collapse will reduce by only 30 per cent compared with the base case. Therefore, the likelihood of a collapse occurring is expected to be 2.10 per cent. This likelihood was developed considering:

- The codes of practice would be developed by industry, with the assistance of Government. The codes would not be mandatory or enforceable, nor would they be subject to the scrutiny required for regulations by the Subordinate Legislation Act 1994. Hence, there is limited certainty that the codes would be adhered to, leading to an increased likelihood of an event occurring. A further difficulty with the codes is that the mines, who are currently limited in their ability to assess risk factors within their mines, would continue to determine the level of risk and the response. Consequently, if the level of risk is not assessed correctly, this may result in insufficient risk management systems and controls and monitoring, thereby resulting in less reduction of the likelihood than under a mandatory regulatory mine stability plan.
- A recommendation in a code may prompt some mines to review their operations and systems every six months; however, there is no certainty that mines would undertake the review and no enforceable mechanism to ensure that such reviews occur. There would also be no certainty about the nature of the review that would be undertaken, because this would be at the discretion of the mine operator. Consequently, this was not considered to significantly reduce risk associated with factors within mines.
- The absence of a Technical Review Board means that there is no independent review mechanism to ensure that plans are

regularly and independently reviewed, and that industry shares information about geotechnical and hydrogeological issues.

- A code would outline what constitutes a reportable event and recommend reporting such events to DPI. This would provide some guidance to industry, the Government and the public about the types of events that should ideally be reported. However, the code would not be enforceable. There is no certainty that all mines would comply with the code. It is unlikely that all events would be captured at an early stage and, consequently, early intervention would not occur. Consequently, this component was not considered to significantly reduce the likelihood of events occurring in all types of mines.
- Enhanced DPI capacity would enable DPI to respond to those matters that are reported, and to undertake industry education. This would reduce the likelihood of an event.
- There would be no requirement to provide funding for research and development under this option. Without such a requirement, there is no certainty that industry would undertake a research and development program because of the difficulties sharing information and innovation with commercial competitors. This is particularly the case because the brown coal mines have not done so in the past.

Appendix C Questionnaire of Minerals Industry

Questions regarding the industry stakeholder:

Question	Response
On average, how many tonnes of minerals do you produce each year?	
What is the size, in hectares, of your operation?	
Are you a declared mine?	
When was the last time you prepared a work plan?	

Questions regarding the cost of Current Regulations

These questions will be used as a guide to our discussion with the aim of gathering cost data relating to work plans and associated documents.

Work Plan Requirements	Total cost of developing (the total time taken by internal staff and the costs associated with developing sections of the plan)	Prepared as business as usual (Yes/No/Partial) i.e. would still be prepared in the absence of regulation	If answered 'partial' – what proportion (%) is business as usual	Additional comments
Current Regulations				
What is the total cost associated with obtaining an exploration licence (including application)?				
What is the total cost associated with obtaining an approved work plan?				
What is the total cost associated with obtaining a mining licence (including application)?				
What is the total cost associated with obtaining an approved work plan?				
What are the total costs of variations to a work plan (if any are required)?				
What is the total cost of providing annual records and returns to DPI (expenditure returns and technical reports)?				
What is the total cost of providing annual royalty returns?				

Questions regarding the cost of Options

Question	Response
If a declared mine - Please estimate the total predicted cost of developing a mine stability plan	
If a declared mine – Please estimate the total predicted cost of complying with new additional reporting requirements	
Please estimate the total predicted cost associated with complying with new notification and reporting requirements (reportable events)	
If you are a declared mine, please estimate the cost of complying with an outcomes based approach where you would be required to demonstrate that geotechnical and hydrogeological data had been sufficiently analysed to manage these risks?	
If you are a declared mine, please estimate the cost of contributing to an industry-organised levy to fund additional research and development and improved capability in geotechnical and hydrogeological expertise.	
If you are a declared mine, please estimate the cost of complying with additional reporting requirements if they were imposed as new licence conditions rather than changes to regulation.	

Questions regarding the benefits:

Question	Response
If current regulations were in left in place, do you think: (a) current practices regarding safety, environmental protection and community consultation would **continue**? (b) current practices regarding safety, environmental protection and community consultation would **improve**? **By what percentage?** (c) current practices regarding safety, environmental protection and community consultation would **decline**? **By what percentage?**	
If the proposed changes to licenses and work planned are introduced would there be any changes in: (a) current practices regarding safety, environmental protection and community consultation would **continue**? (b) current practices regarding safety, environmental protection and community consultation would **improve**? **By what percentage?** (c) current practices regarding safety, environmental protection and community consultation would decline? By what percentage?	
If a Technical Review Board was set up to review geotechnical and hydrogeological data would there be any changes in: (d) current practices regarding safety, environmental protection and community consultation would **continue**? (e) current practices regarding safety, environmental protection and community consultation would **improve**? **By what percentage?** (f) current practices regarding safety, environmental protection and community consultation would **decline**? **By what percentage?**	
If industry set up their own levy would there be any changes in: (g) current practices regarding safety, environmental protection and community consultation would **continue**? (h) current practices regarding safety, environmental protection and community consultation would **improve**? **By what percentage?** (i) current practices regarding safety, environmental protection and community consultation would **decline**? **By what percentage?**	

If business only needed to demonstrate the ability to correctly analyse data, would there be a difference in: (a) current practices regarding safety, environmental protection and community consultation would **continue**? (b) current practices regarding safety, environmental protection and community consultation would **improve**? **By what percentage?** (c) current practices regarding safety, environmental protection and community consultation would **decline**? **By what percentage?**	
If the proposed changes were introduced would there be a decreased risk of an incident occurring at a mine that would lead to a decrease in electricity supply to Victoria? (please describe this risk)	

Appendix D Risk analysis

Risk-based regulation

Risk-based regulation is designed to enable both regulators and businesses to allocate their resources more appropriately than would otherwise be the case. It facilitates the allocation of resources, and development and implementation of risk mitigation strategies that are commensurate with the risk. This leads to a greater overall reduction of risk.

A risk analysis is used to determine what risk is associated with a particular hazard and estimating the probability that it will occur, and the consequence if it occurred. An adapted version of the Australian Standard for identification and assessment of risk has been used to identify the risks associated with the current Regulations and a variety of options for the proposed Regulations. The risk assessment uses an evaluation framework that uses:

- scales to describe a level of consequence of risk if it should happen
- a scale to describe the likelihood of suffering that level of consequence
- a means of assigning a level of risk given a level of consequence and likelihood.

Mine collapse is a potential hazard for the brown coal mining industry. Such a collapse has consequences for worker and public safety, the environment and the continuity of electricity supply. Worker safety is regulated under OHS legislation, so this risk assessment focuses on the external costs of a mine collapse.

The quantitative analysis used in the cost–benefit section of this RIS adopts a weighted approach to determining the consequences. In reality, the consequence could change under each option.

The consequence scale is described in Table 12.13.

Table 12.13 Consequence scale

Rating	Description
Catastrophic Consequence	There would be multiple lives lost There would be irreparable damage to the natural environment There would be significant loss in the continuity of electricity supply for weeks
High Consequence	There would be large numbers of serious injuries or loss of lives There would be damage to the natural environment There would be loss in the continuity of electricity supply for weeks
Moderate Consequence	There would be isolated or small instances of serious injuries There would be some damage to the natural environment There would be loss in the continuity of electricity supply for days
Minor Consequence	There is appearance of a threat There would be minor damage to the natural environment There would be loss in the continuity of electricity supply for hours or less
Insignificant Consequence	There is appearance of a threat but no actual harm There would be no damage to the natural environment

Rating	Description
	There would be no loss in the continuity of electricity supply

The likelihood of the mine collapse occurring in the next ten years is determined using the scale outlined in Table 12.14.

Table 12.14 Likelihood scale

Rating	Single event
Very High Likelihood	Probability 3 per cent
High Likelihood	Probability 2 per cent
Moderate Likelihood	Probability 1 per cent
Low Likelihood	Probability 0.5 per cent
Rare	Probability close to zero

The consequence and the likelihood are then used to form a level of risk as outlined inTable 12.15.

Table 12.15 Assessing level of risk

		Consequence				
		Insignificant	Minor	Moderate	High	Catastrophic
Likelihood	Very high	Medium risk	High risk	High risk	Extreme risk	Extreme risk
	High	Medium risk	Medium risk	High risk	High risk	Extreme risk
	Moderate	Low risk	Medium risk	Medium risk	High risk	Extreme risk
	Low	Low risk	Medium risk	Medium risk	Medium risk	High risk
	Rare	Low risk	Low risk	Medium risk	Medium risk	Medium risk
		Consequence				
		Insignificant	Minor	Moderate	High	Catastrophic
Likelihood	Very high	Medium risk	High risk	High risk	Extreme risk	Extreme risk
	High	Medium risk	Medium risk	High risk	High risk	Extreme risk
	Moderate	Low risk	Medium risk	Medium risk	High risk	Extreme risk
	Low	Low risk	Medium risk	Medium risk	Medium risk	High risk
	Rare	Low risk	Low risk	Medium risk	Medium risk	Medium risk

Risk assessment of options

A risk assessment of the options in the RIS has been undertaken in **Table 12.16**.

Table 12.16 Preliminary analysis of Regulations[171]

Identified risk	Likelihood	Consequence	Risk
1 Current Regulations	Very high	Catastrophic	Extreme risk
2(a) Amend Principal Regulations — 50-50 split between Government and Latrobe Valley region coal mines, for ten years	Low	Moderate/ High	Medium risk
2(b) Amend Principal Regulations — 100 per cent Government funding, for ten years	Low	Moderate/ High	Medium risk
2(c) Amend Principal Regulations — 100 per cent industry funding (all mines), for ten years	Low	Moderate/ High	Medium risk
2(d) Amend Principal Regulations — 100 per cent industry funding (Latrobe Valley region coal mines), for ten years	Low	Moderate/ High	Medium risk
2(e) Amend Principal Regulations — 50-50 split between Government and industry, for two years	Moderate	High	Medium risk
2(f) Amend Principal Regulations — 100 per cent Government funding, for two years	Moderate	High	Medium risk
2(g) Amend Principal Regulations — 100 per cent industry funding (Latrobe Valley region coal mines), for two years	Moderate	High	Medium risk
3 Changes to licence conditions	Moderate	High	High risk
4 Co-Regulatory approach	High	High	High risk

Option 1: Base case

Under the base case, it is expected that there will be a 3 per cent chance of collapse because there would be no additional reporting requirements for declared mines, leaving the potential hazard of a mine collapse to market forces. Without an attempt to address the uncertainty and knowledge gap surrounding a mine collapse, the consequences to the environment, public safety and the continuity of electricity supply could be catastrophic. That is, it is expected that there will be multiple lives lost, irreparable damage to the environment and loss in the continuity of electricity supply for weeks.

Under the current Regulations, the risk of a mine collapse in the next ten years is extreme.

[171] Analysis conducted through discussion with EPA staff.

Option 2: Amend Principal Regulations

Under this option, the three declared mines in the Latrobe Valley would be subject to additional reporting and monitoring requirements and would be required to undertake periodic risk assessments.

Funds would be raised for a Technical Review Board, additional research and development and enhanced DPI capability. These additional requirements apply to all sub-options under Option 2. The only difference between the sub-options is the way the funds are raised, and the length of time for which they are raised.

Option 2(a): Amend Principal Regulations — 50-50 split between Government and Latrobe Valley region coal mines, for ten years

This option would ensure the additional requirements for ten years, reducing the likelihood and consequence of a mine collapse. Both Government and industry would be funding the Technical Review Board and additional research and development, so they would both acquire knowledge and expertise for ten years, which would reduce the consequence of a mine collapse. The likelihood of a collapse in the next ten years is expected to be low and the consequence of a collapse is moderate/high (because acquired expertise and knowledge by industry and Government would mean that both would respond appropriately to collapse). Therefore, the risk of a collapse in the next ten years is at a medium level.

Option 2(b): Amend Principal Regulations — 100 per cent Government funding, for ten years

Under this option, the additional requirements are guaranteed for ten years, reducing the likelihood and consequence of a collapse. The likelihood of a collapse is low and the consequence of a collapse is moderate/high. Therefore, the risk of a mine collapse in the next ten years is medium.

Option 2(c): Amend Principal Regulations — 100 per cent industry funding (all mines), for ten years

This option would ensure the additional requirements for ten years reducing the likelihood of a collapse. Industry would be better informed about how to respond to a collapse reducing the consequences of a collapse.

Requiring all mines to fund the Technical Review Board and additional research and development may mean that it may be difficult to enforce funding requirements on mines that feel that they are receiving no benefit.

Therefore, the consequence of a collapse under this option is moderate/high. The risk of a collapse in the next ten years under this option is medium.

Option 2(d): Amend Principal Regulations — 100 per cent industry funding (Latrobe Valley region coal mines), for ten years

This option requires additional funding from the three Latrobe Valley region coal mines to fund the Technical Review Board and additional research and development. This option would ensure funding for ten years, guaranteeing the continuity of knowledge and expertise. This would reduce the likelihood of a mine collapse. Additionally, acquired expertise and knowledge would mean that industry would respond appropriately to a collapse. The consequence of a collapse under this option is high. The risk of a collapse in the next ten years under this option is medium.

Option 2(e): Amend Principal Regulations — 50-50 split between Government and industry, for two years

Under this option, the additional requirements are only guaranteed for two years. This means that knowledge and expertise acquired by the Technical Review Board and the additional research and development undertaken may not be continued after the two years. Therefore, the likelihood of a collapse is moderate, and the consequence is high. The subsequent risk of a mine collapse in the next ten years is medium.

Option 2(f): Amend Principal Regulations — 100 per cent Government funding, for two years

Under this option, the additional requirements are only guaranteed for two years. This means that knowledge and expertise acquired by the Technical Review Board and the additional research and development undertaken are not guaranteed after two years. Therefore, the likelihood of a collapse is moderate, and the consequence is high. The subsequent risk of a mine collapse in the next ten years is medium.

Option 2(g): Amend Principal Regulations — 100 per cent industry funding (Latrobe Valley region coal mines), for two years

Under this option, the additional requirements are guaranteed for only two years, increasing the likelihood of a collapse in the next ten years to moderate.

This option guarantees that the Technical Review Board and additional research and development are completely funded by industry. The likelihood of a collapse is moderate, and the consequence is high. The subsequent risk of a mine collapse in the next ten years is medium.

Option 3: Changes to licence conditions

Under this option, licence conditions of declared mines are changed to include additional monitoring and reporting requirements. A levy is imposed on Latrobe Valley region coal mines through their licence conditions is used to establish a Technical Review Board. However, research and development may not occur, because discretion about research and development is left with the mines and is not enforceable. Therefore the likelihood of a collapse is medium and the consequence of a collapse is high. It is expected that the risk of a collapse in the next ten years under this option is high.

4. Co-regulatory approach

Under this option, industry will develop a code of practice for addressing risk factors, although this is not enforceable or guaranteed. There is also no certainty that initiatives such as a Technical Review Board or additional research and development will occur. The likelihood and consequences of a collapse in the next ten years are high. The likelihood and consequences of a collapse in the next ten years are high.

Appendix E Bibliography

Australian Bureau of Statistics (2001), Small Business in Australia, Cat. No. 1321.0

Australian Bureau of Statistics (2009), Average Weekly Earnings, Full time adult total earnings, trend Cat. No. 6202.0, November

Australian Energy Market Operator (2010), Price and demand data sets, http://www.aemo.com.au/data/price_demand.html.

Bennett, J., Dumsday, R., Howell, G., Sturgess, N. (2008), The Value of Improved Environmental Health in Rivers.

Brown Coal (2009), Content maintained by Ron Sait, Australian Mines Atlas, www.australianminesatlas.gov.au (accessed 12 November 2009).

Chan, RSK and Lau, TMF (2007), Slope Safety System and Landslide Risk Management in Hong Kong, Geotechnical Engineering Office, Civil Engineering and Development Department, Hong Kong.

Civil Engineering and Development Department (2008), Slope Safety in Hong Kong, July 2008, http://www.cedd.gov.hk/eng/publications/leaflets/doc/27slope_safety_july2008_downloadedfromgovbb.pdf (accessed: 15 December 2009)

Commonwealth Government — Standing Committee on Industry, Science and Resources (1999), Inquiry into the effects on research and development of public policy reforms in the past decade

Commonwealth Government Printer (1991), Industry Commission Inquiry Report – Energy Generation and Distribution. http://www.pc.gov.au/ic/inquiry/11energy, (accessed February 2010)

CRA International (2008), Assessment of the Value of Customer Reliability, http://www.electricitycommission.govt.nz/pdfs/advisorygroups/tag/25Sep08/VCR-Final-Report.pdf (accessed November 2009).

Daily Mail Reporter (2009), Three people missing after two homes plunge over cliff during landslide, http://www.dailymail.co.uk/news/article-1200567/Three-people-missing-homes-plunge-cliff-landslide.html (accessed November 2009).

Dams Safety Committee (2005), General Information, http://www.damsafety.nsw.gov.au/DSC/Download/Info_Sheets_PDF/General/DSC01.pdf (accessed 14 December 2009).

Dams Safety Committee (2009), About Us, http://www.damsafety.nsw.gov.au/DSC/About/index.shtm (accessed 14 December 2009).

Dams Safety Committee (2009), History, http://www.damsafety.nsw.gov.au/DSC/About/history.shtm (accessed 14 December 2009).

Department of Primary Industries (2008), Statistical Review 2007-08.

Department of Primary Industries (2009), Victorian Minerals and Petroleum (Mining) and Energy Industries - At a glance 2009, June

Department of Sustainability and Environment (2010), Victorian Planning Provisions – 17 Economic Development, http://www.dse.vic.gov.au/planningschemes/aavpp/17_sppf.pdf (accessed 13 January 2010).

Department of the Environment, Water, Heritage and the Arts (2010), Environment Protection and Biodiversity Conservation Act, http://www.environment.gov.au/epbc/ (accessed 13 January 2010).

Department of Transport and Regional Services (2007), 2007 Melbourne-Sale Corridor Strategy – Building our National Transport Future, June.

Department of Treasury and Finance (2007), Cost Recovery Guidelines September.

Energy Supply Association of Australia (2009), Electricity/Gas Australia.

EPA Victoria (2010), Environment Protection Act 1970, http://www.epa.vic.gov.au/about_us/legislation/epa.asp (accessed 13 January 2010).

Essential Services Commission (2008), Electricity Distribution Businesses: Comparative Performance Report 2007, October 2008

Heritage Council of Victoria, Coal Mining Heritage Study in Victoria (March 2008).

Hopkins, A. and Hale, A. (2002), Issues in the Regulation of Safety: Setting the Scene, as cited in Kirwan, B., Hale, A., and Hopkins, A. (2002), Changing Regulation: Controlling Risks in Society, Elsevier Science Ltd.

IBISWorld (2009), Industry Report B1102, Brown Coal Mining in Australia, October.

International Power (2010), Loy Yang B Power Station, http://www.ipplc.com.au/Page.php?iPageID=141 (accessed 18 January 2010).

Larsson, T.J. (2002), New Technologies and Work: Pulverization of Risk – Privatization of Trauma? as cited in Kirwan, B., Hale, A., and Hopkins, A. (2002), Changing Regulation: Controlling Risks in Society, Elsevier Science Ltd.

Loy Yang Power (2010), Fast facts, http://www.loyyangpower.com.au (accessed 18 January 2010).

Mickelburough, P., Masanauskas, J., and Wotherspoon, S. (2007), Mine operator aware of leak, Herald Sun, 16 November.

Minerals Council of Australia (2007), Provincial Victoria: Minerals Industry Skills Study, May 2007.

Murphy, M., Kleinman, R., and Holroyd, J. (2007), Heatwave no threat to power, experts say, The Age, 16 November.

Pentley, D. (2009), Intriguing Landslide at Nachterstedt in Germany, http://daveslandslideblog.blogspot.com/2009/07/intriguing-landslide-at-nachterstedt-in.html (accessed November 2009)

Queensland Government (2009), Safety and Health Levy 2008, http://www.energy.qld.gov.au/zone_files/General_PDFs/sh_factsheet_levy08.pdf (accessed 14 December 2009).

The Local – Germany's News in English (2009), Clues emerge on cause of Nachterstedt landslide, http://www.thelocal.de/national/20090808-21123.html (accessed November 2009).

The Local (2009), Clues emerge on cause of the Nachterstedt landslide, www.the local.de/national/20090808-21123.html (accessed 23 February 2010).

TRUenergy (2007), Subsidence reduces production at Yallourn mine http://www.truenergy.com.au/About/News/News.xhtml?newsitem=191 (accessed: 19 August 2009).

TRUenergy (2008), Yallourn mine operations fully restored, http://www.truenergy.com.au/About/News/News.xhtml?newsitem=195 (accessed:19 August 2009).

VenCorp (2008), The Value of Customer Reliability used by Vencorp for Electricity Transmission Planning – Consultation Paper, 5 September

Victorian Competition and Efficiency Commission (2007), Suggested value of a statistical life in RISs and BIAs – practice note.

Victorian Government (2007), Small Business Regulatory Impact Assessment Manual, Melbourne, April .

Victorian Government (2007), Victorian Guide to Regulation

Victorian Government (2008), Mining Warden Yallourn Mine Batter Failure Inquiry.

Victorian Government (2008), Mining Warden Yallourn Mine Batter Failure Inquiry: Government Response.

WorkSafe (2007), Regulatory Impact Statement: Proposed Occupational Health and Safety Regulations 2007, Proposed Equipment (Public Safety) Regulations 2007 ,http://www.vcec.vic.gov.au/CA256EAF001C7B21/WebObj/OHSRIS/$File/OHS%20RIS.pdf p.28–29 (accessed January 2010).

Legislative instruments

Energy and Resources Legislation Amendment Act 2009.

Mineral Resources (Sustainable Development) Act 1990.

Mineral Resource Development Regulations 2002.

Occupational Health and Safety Act 2004.

Resources Industry Legislation Amendment Act 2009.

Appendix F Proposed Regulations

STATUTORY RULES 2010

Mineral Resources (Sustainable Development) Act 1990

MINERAL RESOURCES DEVELOPMENT (MINING) AMENDMENT REGULATIONS 2010

The Governor in Council makes the following Regulations:

Dated:

Responsible Minister:

Peter Batchelor MP

Clerk of the Executive Council

1. Objectives

The objectives of these Regulations are to amend the Mineral Resources Development Regulations 2002 to prescribe—

(a) various procedures relating to work plans, area work plans, work schedules, mines stability requirements, reportable events and declared mines; and

(b) matters pertaining to the calculation and payment of the mine stability levy ; and

(c) other matters authorised by the Act.

2 Authorising provision

These regulations are made under section 124 of the **Mineral Resources (Sustainable Development) Act 1990**.

3 Principal Regulations

In these Regulations, the Mineral Resources Development Regulations 2002 are called the Principal Regulations.

4. New regulation 24A inserted

After section 24 of the Principal Regulations **insert**-

"**24A Reportable events at mines**

(1) For the purpose of section 41AC(1) of the Act-

(a) a report of a reportable event notifying the Chief Inspector of the event must be made either orally or in writing as soon as practicable after the event and must include-

(i) the date, time and place of the event;
(ii) a description of the event;
(iii) the steps taken to minimise the impact of the event;

(b) if the Chief Inspector so requests, a written report of a reportable event must be given to the Chief Inspector as soon as practicable after the event occurs and must include-

(i) the date, time and place of the event;
(ii) the details of the event, including the impact, or likely impact of the event on public safety, the environment or infrastructure;
(iii) any known or suspected causes of the event;
(iv) details of the actions taken to minimise the impact of the event; and
(v) details of actions taken or to be taken to prevent a recurrence of the event.

(2) For the purpose of section 41AC(2) of the Act the following are reportable events-

(a) an event, abnormal to expected, or usual operations, that results, or may result, in significant impacts on public safety, the environment or infrastructure;
(b) an explosion or major outbreak of fire;
(c) slope failure, unexpected creep, progressive slope collapse or failure of slope stability control measures;
(d) an injury to a member of the public caused by the carrying out of mining or associated operations;
(e) an uncontrolled outburst of gas;
(f) an unexpected or abnormal inrush of groundwater, other water or other fluid;
(g) an ejection of fly rock, outside the approved work plan area, from blasting;
(h) escape, spillage or leakage of a harmful or potentially harmful-
(i) substance;
(ii) slurry; or
(iii) tailings;
(i) a breach of a condition of a mining licence;
(j) an occurrence that results in non-compliance with the work plan or work plan conditions relating to the mining licence.

5. New regulation 25A inserted

After regulation 25 of the Principal Regulations **insert**-

“25A Area work plans

(3) For the purposes of section 41AD(1) of the Act, a work schedule must include the following information—

(a) a description of the activities to be undertaken for the exploration works

(b) accurate site plans that show—

(i) the location of the exploration works; and

(ii) access routes in relation to identifiable geographic features, including but not limited to tracks, buildings and fences, waterways and vegetation;

(c) the location and conservation status of native vegetation and the presence of threatened flora and fauna.

(d) any other relevant site-specific information about impacts and proposed control or mitigation measures and rehabilitation.”

6. Variation of licence

In regulation 29(7) of the Principal Regulations **omit** "to ensure the health and safety of people at a mine in the licence area or".

7 New Part 3A inserted

After Part 3 of the Principal Regulations, **insert**-

“**PART 3A – REQUIREMENTS FOR DECLARED MINES**

32A Mine stability requirements for declared mines

For the purposes of section 40(3)(ab) and 41AE of the Act, the prescribed mine stability requirements and process are the requirements and processes set out in Part 2 of Schedule 13.

32B Reporting relating to declared mines

(1) The holder of a mining licence that relates to a declared mine must report in writing to the Department Head in respect of each period of six months—

(a) ending on 30 June or 31 December, or

(b) if the Department Head nominates other dates in writing to the holder, ending on a date so nominated—

and must provide the report to the Department Head within 3 months after the end of the period to which it relates.

(2) A report under subregulation (1) must include—

(a) the outcomes of reviews of the assessment, plan and controls for the management of geotechnical and hydrogeological risks for the declared mine, taking into account the results of monitoring carried out under the monitoring plan, and details of—

(i) the implementation of control measures;

(ii) any stability modelling undertaken;

(iii) any significant changes in the operation of the declared mine;

(iv) implications for the mine design components;

(b) the results of the monitoring plan set out in the work plan;

(c) a description of activities taken to implement the declared mine stability controls and the groundwater control system set out in Part 2 of Schedule 13 and any recommended changes to the work plan.

32C Mine stability levy

For the purposes of section 38AAA of the Act the mines set out in schedule 19A are prescribed for the purposes of the mine stability levy.

32D Amount of mine stability levy

For the purpose of section 38AAD of the Act the total amount of the mine stability levy is 35 643 fee units.

32E How the mine stability levy is to be paid

(1) For the purpose of section 38AAE of the Act—

(a) the mine stability levy must be paid in respect of each financial year;

(b) a licence holder in respect of a prescribed mine must pay the mine stability levy within 4 weeks of—
(i) 30 June in respect of a financial year ending on that day; or
(ii) any alternative due date specified by the Minister under subregulation (2)

(2) The Minister may by notice to the licensee, vary the period for which the mine stability levy must be paid and the due date on which the mine stability levy is payable.

(3) The amount of any mine stability levy that is not paid by the due date is subject to interest at the rate prescribed under the **Penalty Interest Rates Act 1983**.

(4) Any interest payable under subregulation (3) is to be calculated from the due date to the date of the payment of the mine stability levy and interest.

(5) In this regulation, ***due date*** means the date by which the mine stability levy is payable under subregulation (1)(b) or (2).

8 Schedule 12 amended

In Schedule 12 to the Principal Regulations, clause 6 is **revoked**.

9. Schedule 13 substituted

For schedule 13 to the Prinicpal Regulations **substitute**—

"SCHEDULE 13

PART 1 - INFORMATION REQUIRED IN WORK PLAN FOR A MINING LICENCE

For mining licences exceeding 5 hectares

1. A general description of geological information including, if available, estimates of ore resources and reserves.
2. A general location plan at scale of 1:100 000 or 1:50 000.
3. A regional plan at scale of 1:25 000 showing the extent of Crown lands, private lands, private land allotments for the proposed work plan area, and, where possible, parks and reserves, within 2 km of the site.
4. A site plan at 1:1000, 1:2500 or other appropriate scale, including cross-sections, showing and describing existing surface contours, etc., and also including—
   (a) the proposed buildings and surface facilities; and
   (b) the anticipated extent of open cut extraction, with proposed bench height, berm details and working batters; and
   (c) the sequencing of open cut extraction; and
   (d) the location of topsoil dumps, and waste dumps or stockpiles; and
   (e) proposals for landscaping of the site, including buffer zones; and
   (f) access roads; and

(g) if underground mining is proposed, a schematic drawing showing underground development and the proposed extent of stoping.

5. A description of the metallurgical and mineral recovery methods to be used.

6. A rehabilitation plan that—

   (a) addresses concepts for the end utilisation of the site; and

   (b) includes a proposal for the progressive rehabilitation and stabilisation of extraction areas, road cuttings and waste dumps, including re-vegetation species; and

   (c) includes proposals for the end rehabilitation of the site, including the final security of the site and the removal of plant and equipment.

7. An environmental management plan which—

   (a) identifies the key environmental issues for the proposal and includes details of background data, baseline studies or existing conditions in relation to environmental issues;

   (b) includes proposals for the management of environmental impacts including nomination of targets and proposals for the mitigation, control or reduction of impacts;

   (c) includes proposals for the management of wastes including consideration of the principles of waste minimisation;

   (d) includes a proposed monitoring program addressing the key environmental issues;

   (e) includes a proposal for reporting outcomes of the plan to the local community.

8. A description of any significant community facilities that may be affected by the proposed works.

9. A community engagement plan that—

   (a) identifies any community likely to be affected by mining activities authorised by the licence; and

   (b) includes proposals for—

      (i) identifying community attitudes and expectations; and

      (ii) providing information to the community; and

      (iii) receiving feedback from the community; and

      (iv) analysing community feedback and considering community concerns or expectations—

   in relation to mining activities authorised by the licence; and

   (c) includes a proposal for registering, documenting and responding to complaints and other communications from

members of the community in relation to mining activities authorised by the licence.

For mining licences not exceeding 5 hectares

10. A general description of any test work undertaken in the licence area.

11. A general location plan with a scale of 1:100 000, 1:50 000 or 1:25 000.

12. A plan of the licence area at an appropriate scale which shows—

    (a) the proposed buildings and surface facilities; and

    (b) access roads and tracks; and

    (c) the location of any proposed tailings dams and water dams; and

    (d) the general drainage pattern of the area; and

    (e) the anticipated sequencing and extent of any open cut extraction; and

    (f) if underground mining is proposed, a schematic drawing showing underground development and the proposed extent of stoping.

13. A description of proposed mineral recovery methods.

14. A description of rehabilitation proposals including—

    (a) proposals for the progressive rehabilitation and stabilisation of extraction areas; and

    (b) proposals for the removal of any plant or equipment (if relevant).

15. A description of any significant community facilities that may be affected by the proposed works.

16. A community engagement plan that—

    (a) identifies any community likely to be affected by mining activities authorised by the licence; and

    (b) includes proposals for—

        (i) providing information to the community; and

        (ii) receiving and considering feedback from the community—

    in relation to mining activities authorised by the licence; and

    (c) includes a proposal for responding to complaints and other communications from members of the community in relation to mining activities authorised by the licence.

PART 2 - DECLARED MINE STABILITY REQUIREMENTS AND PROCESSES

17 A description of the geological information that is relevant to the stability of the declared mine and any variation of the geological information across the rest of the location plan, including a plan showing cross sections and long sections of the proposed extraction area of the declared mine.

18 If a mining licence was granted before the mine became a declared mine—

(a) a description of any proposed changes to the information under item 4 of Part 1 for mining licences exceeding 5 hectares;
(b) description of any infrastructure or plant proposed to be associated with the declared mine.

19 An assessment of the geotechnical and hydrogeological risks for the declared mine.

20 A description of the controls that will be implemented to eliminate or reduce the geotechnical or hydrogeological risks to an acceptable level including:

(a) a description of any proposed groundwater control system;
(b) particulars of other measures to ensure the stability of the mine, associated infrastructure and adjacent land.

21 A plan for monitoring the stability and groundwater management of the declared mine.

22 A description of the process for reviews of the assessment, plan, actions and controls referred to in this Part relating to the declared mine."

10 New Schedule 19A inserted

After schedule 19 in the Principal Regulations, **insert**-

"SCHEDULE 19A

PRESCRIBED COAL MINES FOR THE PURPOSES OF THE MINE STABILITY LEVY

1. The following mines are prescribed for the purpose of section 38AAA of the Act—:

(a) the land constituting the mine known as Yallourn mine and authorised under mining licence MIN 5003;
(b) the land constituting the mine known as Hazelwood mine and authorised under mining licence MIN 5004; and
(c)the land constituting the mine known as Loy Yang mine and authorised under mining licence MIN 5189.

FEE UNITS

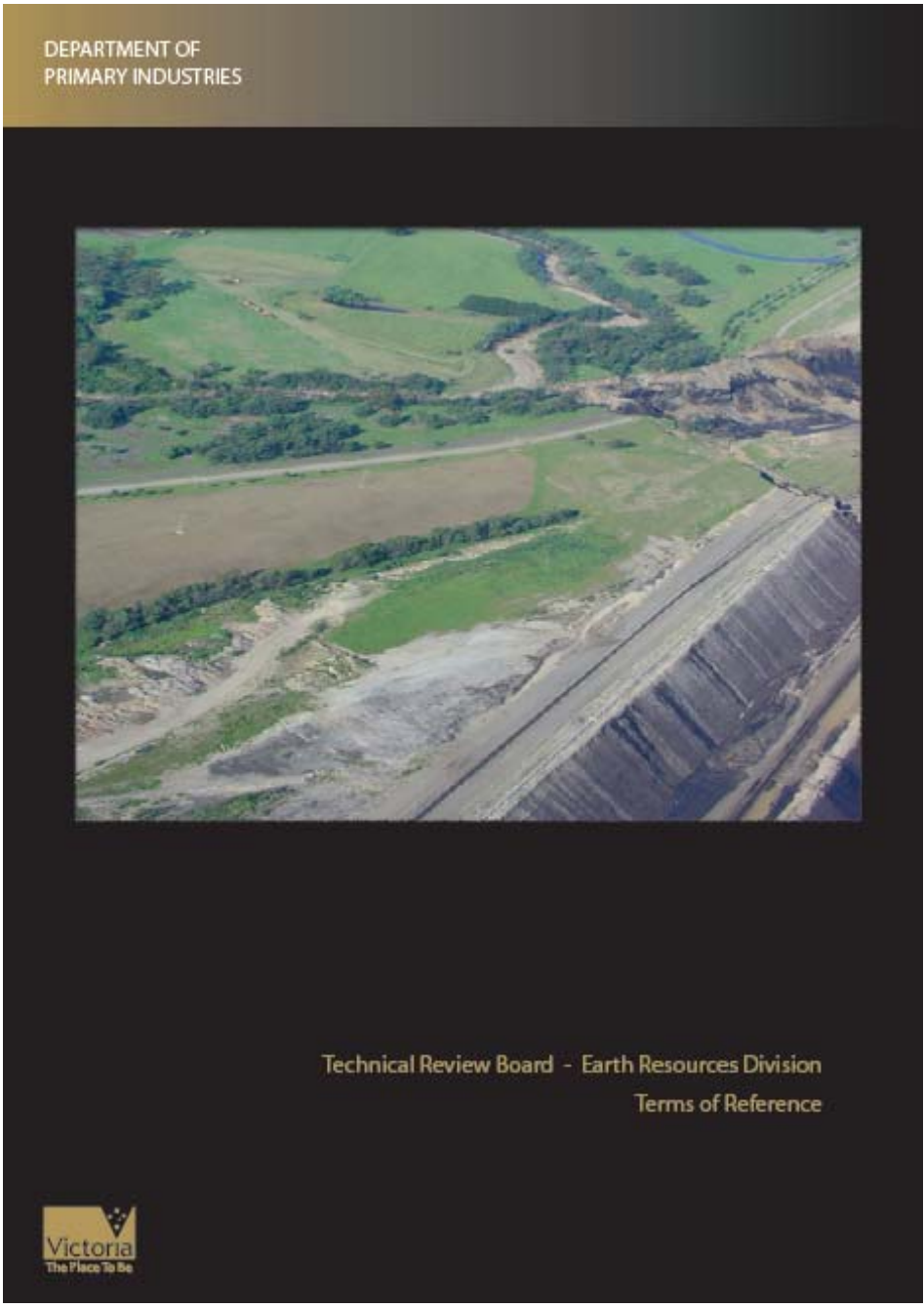
These Regulations amend the Mineral Resources Development Regulations to provide for the payment of a mine stability levy by reference to fee units within the meaning of the **Monetary Units Act 2004**.

The amount of the fee is to be calculated, in accordance with section 7 of that Act, by multiplying the number of fee units applicable by the value of a fee unit.

The value of a fee unit for the financial year commencing 1 July 2009 is $11.69. The amount of the calculated fee may be rounded to the nearest 10 cents.

The value of a fee unit for future financial years is to be fixed by the Treasurer under section 5 of the **Monetary Units Act 2004**. The value of a fee unit for a financial year must be published in the Government Gazette and a Victorian newspaper before 1 June in the preceding financial year.

Appendix G Technical Review Board Terms of Reference



CONTENT

1. DEFINITIONS

'Board' means the Technical Review Board.

'Department' means the Department of Primary Industries.

'Minister' means the Minister for Energy and Resources.

'Member' means a person appointed to the Board by the Minister.

2. PURPOSE

The purpose of the Board is to provide advice to the Minister and Department on mine and quarry stability issues, specifically in relation to reducing risks to the environment, public safety, infrastructure and the continuity of operations where coal supply to Victorian Power Stations may be affected.

2A AUTHORITY

The Board is established as an Advisory Panel, under Part 4A of the Mineral Resources (Sustainable Development) Act 1990.

3. TERMS OF REFERENCE

3.1 The Board will report to the Minister on an annual basis. The Minister may subsequently release the Board's report to the Department and relevant industry stakeholders.

3.2 The Board will periodically provide advice on mine and quarry stability, to the Minister and Department, in the following areas:

(a) Strategy

- Written and/or verbal advice on the Department's strategies and regulatory approach to mine and quarry stability and geotechnical issues.
- Written and/or verbal advice on new developments in technology and science relating to the understanding, monitoring or management of mine and quarry stability and related geotechnical and hydrogeological issues.

(b) Stability reports

- Review and interpret mine and quarry stability reports including monitoring data, that has been submitted to the Department and provide written advice to the Minister.

(c) Workplans

- Assess workplans and variations to Workplans and provide written advice to the Department on mine and quarry stability and related geotechnical and hydrogeological issues.

(d) Other Activities

- Advise the Minister in formulating appropriate response to significant events relating to mine and quarry stability, and related geotechnical and hydrogeological issues.
- Advise the Minister on appropriate guidelines and educational initiatives related to mine and quarry stability.
- With the knowledge and agreement of the Minister, interact directly with industry on mine and quarry stability and related geotechnical and hydrogeological issues, including participation in site visits, presentations and dialogue, particularly with respect to communicating findings of reviews with relevant stakeholders.
- In conjunction with the Department, interact directly with Monash University in relation to the Research and Development program on brown coal geotechnical and hydrogeological issues.