TECHNICAL REVIEW BOARD ANNUAL REPORT 2012-13

DEPARTMENT OF
STATE DEVELOPMENT
BUSINESS AND
INNOVATION

State Government
Victoria

Executive Summary

The Technical Review Board (TRB) was constituted in 2009 following the Warden's Inquiry into the collapse of the North East Batter at Yallourn Mine. A primary function of the TRB is to provide independent advice to assist the Minister for Energy and Resources, the Department of State Development, Business and Innovation and industry to better manage ground control associated with mining in Victoria, in order to mitigate the risks this presents to public safety, environment, public infrastructure and security of power supply.

This annual report covers the activities of the TRB during the second year of its second term, being September 2012 to August 2013. The Board met formally on nine occasions during this period, consisting of eight Board Meetings and a meeting with corporate management of the Latrobe Valley brown coal mines. Additionally, Board members individually and collectively had involvement in a range of activities associated with the TRB's Terms of Reference. These included:

1. Assessment of the two remaining Latrobe Valley stability reviews commissioned by the Department and the formulation of associated advice to the Department on the four stability reviews commissioned in total.
2. Maintaining a watching brief on the remediation of the Morwell Main Drain.
3. Assessment of a suite of reports and provision of advice to the Department in relation to the repair of the Morwell River Diversion.
4. Meetings with the CEOs and mine managers of Latrobe Valley power companies to discuss issues of mine stability and, in particular, the importance of robust, risk based, Ground Control Management Plans.
5. Several visits to the Latrobe Valley mines to meet with site management and to be briefed on current issues and developments affecting stability.
6. A visit to the Geotechnical and Hydrogeological Engineering Research Group (GHERG) at Monash University Gippsland Campus to see and discuss activities related to the Latrobe Valley mine operations.
7. A successful approach to the Victorian Group of the Australian Geomechanics Society (AGS), a technical group which is sponsored by Engineers Australia (EA) and the Australasian Institute of Mining and Metallurgy (AusIMM), to set up a Latrobe Valley Geomechanics Group.
8. The commencement of educational initiatives through GHERG, with courses appropriate to the development of a greater understanding of stability issues at the mines in general accordance with TRB recommendations.
9. Engagement with one mine in developing a new Ground Control Management Plan that the TRB is optimistic will serve as a benchmark for the brown coal sector.
10. Input into developing a guideline for managing geotechnical risk in Victorian brown coal mines arising out of a need identified by the TRB in its first term.
11. Other mines and quarries, including review of stability issues at Alcoa Anglesea coal mine.

The TRB had previously identified seven 'at risk' batters, including two which subsequently failed and one which underwent substantial movement prior to remedial stabilisation. The four stability reviews have identified one new potentially 'at risk' batter. The TRB uses the term 'risk' in a manner consistent with International Standard *ISO 31000:2009 Risk Management – Principles and Guidelines,* to which Australia subscribes. As such, risk is a combined measure of the probability of an event occurring and the consequences should it occur. The geotechnical reviews have brought a focus to all the 'at risk' batters, resulting in mitigation actions and increased levels of monitoring and control. Since all the batters identified as being at risk exhibit signs of movement, they need to be monitored carefully. However, in three cases, the risk rating is more a reflection of the consequences of failure. These consequences are a legacy of the mining method that results in all conveyors at a mine being located on the same batter.

In its previous annual report, the TRB identified a number of technical issues that needed to be addressed and expressed the view that stakeholder culture had to change in regard to managing ground control in a risk management framework if further incidents of major instability are to be avoided. A number of initiatives were also identified for going forward.

It is pleasing to report that in the 2012-13 reporting period, there has been meaningful progress in addressing the technical issues and in advancing the initiatives identified in the 2011-12 TRB Annual Report. Technical progress has been particularly evident in regards to water management, monitoring and data processing. A changing culture at mine site level regarding stability is evident from the generally positive responses from the individual mines to the review reports; organisational changes at two of the mines; a renewed interest and support for education and research; and an improved level of constructive and collaborative engagement and dialogue between all stakeholders on geotechnical matters.

GHERG continued to develop its research and education programs throughout the period. There has been a research focus on developing a better understanding of the coal and interseam geotechnical and hydrogeological properties that govern batter stability and the risks of surface water ingress into the coal. Education initiatives include a series of three half day workshops. The first of the workshops was delivered in the reporting period, with the remaining workshops programmed for later in the year.

The status of stability at the Anglesea brown coal mine also continued to be monitored by the TRB. Areas of previous concern to the Board have been stabilised but further investigations are required to develop a proper understanding of ground behaviour at the site.

During the reporting period, the TRB also turned its mind to the stability of water impoundment structures in close proximity to the perimeter of mine sites, identified as a focus area during the first term of the TRB. Some of these structures have experienced movement since construction and may be exposed to similar ground movements to that of batters, with failure of a water impoundment structure potentially having similar consequences for public safety, infrastructure, environment and security of power supply as that of a batter instability. The TRB has no reason for immediate concern that remediation measures undertaken to date have not been effective but, given the history behind these measures, it considers that their effectiveness warrants confirmation. The Department has been alerted to this and the matters have received attention in the more recent stability reviews commissioned by it.

The TRB remains of the opinion that the original measures proposed for the rehabilitation of the Latrobe Valley mines fall well short of what could reasonably be considered as adequate for achieving long term safe and stable batters from a ground control perspective. Experience is now revealing that rehabilitation is a far more complex matter than envisaged when rehabilitation plans were developed as part of the work plans for the mines. Progress is being made in addressing these shortcomings.

Reflection on the history of events leading up to the mine instabilities in the brown coal sector; the manner in which these incidents were managed and mitigated; the findings of high level geotechnical reviews; and exposure to the approval processes, has led the TRB to conclude that there are significant uncertainties and gaps in the management of stability in the Latrobe Valley mines that relate to the interacting elements of knowledge and competency, risk management, and regulation.

There is an emerging appreciation amongst all stakeholders of the gaps and uncertainties in knowledge, competency and risk management, but there is still some way to go. Research and education are fundamental to addressing these matters and, therefore, are focal points of the TRB in its new term, which commenced in September 2013.

The history of recent instabilities in the Latrobe Valley mines and the events leading up to them cause the TRB to be of the strong view that designs for critical mine infrastructure need to be subject to robust, independent, third party review. The Board will continue to advocate that this should be an integral part of risk management embedded in each mine's Ground Control Management Plan.

The TRB will be focusing during its new term on regulatory aspects relating to mine stability, with a view to providing advice on improving efficiency and effectiveness. The current legislative requirement for mines to provide stability reports to the regulator on a six monthly basis, for example, appears to be particularly onerous for the mines and to stretch the Department's resources to undertake a meaningful review of the information and to respond to it in a timely manner. The TRB will be considering whether the development of effective Ground Control Management Plans could enable this process to be streamlined and made more effective by enabling mine owners to report on a 'by exception' basis.

In summary, the TRB is encouraged by the signs of a cultural change in how mine stability is being managed in the Latrobe Valley. Research and education initiatives are a priority to support this change and to foster greater engagement and collaboration amongst all stakeholders. It is timely for stakeholders to give consideration to whether the current administrative processes and their resourcing are the most appropriate for mines that are already large and complex by world standards and continuing to become more so.

Introduction

The Technical Review Board (TRB) was constituted in 2009 after the collapse of the North East Batter at Yallourn Mine and the subsequent Warden's Inquiry, which identified a number of areas where improvements in the mining industry could be made. It was established as an Advisory Panel under Sections 54A, 54C, 54D and 54E of the Mineral Resources (Sustainable Development) Act 1990 for the purpose of providing independent advice to the Minister for Energy and Resources and the Department of State Development, Business and Innovation (the Department) on mine and quarry stability issues with respect to reducing risks within the mining industry. The Terms of Reference applicable to the current reporting period focussed the TRB's activities specifically on risks to the environment, to public safety, to infrastructure and to continuity of coal supply.

Terms of Reference

The Terms of Reference (TOR) for the TRB have a wide scope, calling for advice to be provided to the Minister and the Department in four general areas, namely:

1. Strategy
2. Stability Assessments
3. Work plans
4. Other activities, including education, research and interaction with industry

The TOR were framed with the overall aim of improving the geotechnical and hydrogeological performance and knowledge within the Victorian mining industry.

> *"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.*
>
> *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 related 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."

Board Members

The Board comprises four members.

Emeritus Professor Jim Galvin – Board Chairman

Professor Galvin has extensive international experience in mining and geotechnical engineering, risk management and OH&S. His career encompasses working in and managing underground mines, leading and directing research bodies, headship of the School of Mining Engineering at UNSW, and consulting. Current and recent appointments include member (part-time) of the NSW Planning Assessment Commission; independent member of the Health, Safety, Environment and Community (HSEC) Advisory Committees to the Boards of BHP Billiton and Solid Energy New Zealand; chair of the Federal Government Australia/China Joint Safety Taskforce to Improve Safety in Coal Mining, and of the Continuing Professional Development Committee of the Mine Managers Association of Australia. Professor Galvin has been a member of the TRB since its inception in 2009 and Chairman of the Board since 2011.

Professor Ian Johnston – Board Member

Golder Associates Chair of Geotechnical Engineering
Department of Infrastructure Engineering
University of Melbourne

Professor Johnston graduated from the University of Southampton, UK with a bachelor's degree in civil engineering and a PhD in geotechnical engineering. After a few years in practice in the UK, USA and Europe, he joined Monash University in 1975. He became Dean of Engineering at Victoria University in 1993 and five years later moved to Coffey Geotechnics where he was a Senior Principal. In 2009, he accepted the Golder Chair of Geotechnical Engineering at the University of Melbourne. He has over 40 years' experience in geotechnical engineering, both as an academic and as a consultant for major projects in Australia and overseas. His interests cover a wide range of topics and he is particularly well known for his work on soft and weak rock and the engineering problems associated with the stability of this material in civil and mining engineering.

Professor Rae Mackay – Board Member

Geotechnical and Hydrogeological Engineering
Director of the Geotechnical and Hydrogeological Engineering Research Group
Monash University, Gippsland Campus.

Professor Mackay holds a degree in civil engineering from Imperial College, London University and a PhD in Hydrogeology from the University of Newcastle upon Tyne. Prior to moving to Australia in 2011, he was an advisor to the UK nuclear waste management programme and Professor of Hydrogeology and Head of the Hydrogeology Research Group at Birmingham University, UK, where he worked on a diverse range of subjects including arid zone hydrogeology, sustainable urban water resources, geothermal energy exploitation and nuclear waste disposal. His current research role is directed at understanding risks and impacts associated with the ongoing development and eventual long-term rehabilitation of the brown coal mines in the Latrobe Valley, with his primary interests being in understanding subsurface flow and transport processes and developing predictive models for engineering and environmental applications. Professor Mackay is also a member of the Clean Coal Victoria Advisory Group.

Mr Alan Moon – Board Member (from 2012)

Alan Moon is an engineering geologist with over 40 years' experience in ground investigations for civil and mining projects in a wide variety of geological environments in Australia and overseas. He has a bachelor's degree in geology from Imperial College, London, and a master's degree for research in slope stability and soil mechanics from the University of Tasmania, and has held part time teaching positions at several universities. From 1997 to 2013, he was a Senior Principal with Coffey Geotechnics, providing specialist and review inputs to projects in Australia and overseas. In 2013, he joined Water Plan Consulting Pty Ltd. Mr Moon has specialist expertise in soil and rock slope stability and risk assessment and management, with most of his current work being as a geotechnical specialist on technical review panels associated with dams.

The Situation as at September 2012

At the time of preparing the 2011-12 TRB Annual Report, the Morwell River Diversion failure was in the early stages of investigation and remediation, and discussions were ongoing regarding the remediation of the Morwell Main Drain as one of a number of actions related to the Hazelwood Northern Batters instability event that impacted the Princes Highway. Two of four reviews of the stability of the Latrobe Valley brown coal mines commissioned by the Department to provide the evidence base for its work remained to be completed for TRB review and advice.

In its annual report to 31st August 2012, the TRB concluded that there had been virtually no advancement for many years in the Victorian brown coal industry's understanding of the characteristics, mechanisms, and movements of slopes and the consequences of these movements for public safety, surrounding infrastructure, continuity of power supply and the environment. The report went on to identify a number of technical areas that appeared not to have experienced continuity and ongoing development at all mines. It also expressed the view that stakeholder culture needed to change with respect to managing ground control in a risk management framework if further incidents of major instability were to be avoided.

The TRB concluded that the situation with regard to mine stability had reached a serious state. The mines are complex structures that are large by world standards and continue to become larger and deeper. History demonstrates that managing mine stability and risks associated with instability to an acceptable standard requires high level, ongoing assessment, investigation, design, implementation and reassessment on both mine specific and regional scales.

Given the nature of the legacies and the complexity of the issues, the TRB advised that it will take some time to develop, implement and refine effective solutions. Towards the end of the 2011-12 reporting period, the TRB elevated its concerns to the highest levels within industry and government and formulated a range of initiatives for addressing the issues in going forward. The six principal initiatives related to:

1. Geotechnical studies
2. Contingency planning
3. Monitoring, data processing and reporting
4. Rehabilitation
5. Future research and education directions for the Geotechnical and Hydrogeological Engineering Research Group (GHERG)
6. Changing stakeholder culture

2012-13 Activities and Status

A summary list of key TRB activities during the year is presented in Table 1. The Board met formally on nine occasions, with all Board members attending each meeting. Eight of the meetings were Board meetings and the ninth was with the corporate management of the Latrobe Valley brown coal mines. A range of tasks was completed out of session.

TABLE 1: SUMMARY LIST OF KEY TRB ACTIVITIES SEPTEMBER 2012 TO AUGUST 2013

DATE		WHO	KEY ACTIVITIES
2012	17 – 20 September	All Board	Board Meeting • Hazelwood, Yallourn and GHERG site visits • Meeting with Loy Yang
	30 October – 2 November	All Board	Board Meeting • Loy Yang site visit • Meeting with GDF Suez
	4 – 6 December	All Board	Board Meeting • Letter report to Minister O'Brien regarding developments subsequent to TRB 2011-2012 Annual Report.

DATE		WHO	KEY ACTIVITIES
2013	5 – 7 February	All Board	Board Meeting • DPI Mine Stability Workplan workshop (including geotechnical study program)
	14 February	Professor Johnston	• Site visit Loy Yang for discussion on DINSAR radar interferometry
	15 February	Professor MacKay	• Site visit Yallourn for discussion on DINSAR radar interferometry.
	3 April	All Board	• TRB Recommendations Re: PSM Hazelwood Mine Stability Report, PSM1632-140R
	23-25 April	All Board	Board Meeting • Presentation by PSM on draft Loy Yang stability report • Frame recommendations re Hazelwood Northern Batters
	10 May	All Board	• Meeting with industry – LV mine CEO's and Mine Managers • Hazelwood Northern Batter Movement Report discussion with GDF Suez.
	20 May	Professor Galvin and Professor MacKay	• Hazelwood and Loy Yang Site visit
	21-23 May	All Board	Board Meeting • Meeting with Minister Kotsiras
	30 May	All Board	• Letter report to Minister Kotsiras regarding developments subsequent to TRB 2011-2012 Annual Report
	16 – 17 July	All Board	Board Meeting • Presentation on Anglesea batter stability • Meeting with WorkSafe
	19 July	All Board	• TRB Recommendations re: PSM Loy Yang Stability Report, PSM 1632-160R.
	21 August	Professors Ian Johnston and Rae Mackay	• TRB members attending DSDBI lessons learned workshop on Yallourn MRD Failure Technical Investigation
	27 – 28 August	All Board	Board Meeting • Status of TRB review • Strategic planning • Annual report preparation

Given the nature of the issues that it faced at the beginning of the reporting period, the TRB was brought up to its full complement of four members by the appointment of a second geotechnical specialist. Mr Alan Moon is an engineering geologist with specialist expertise in slope stability and risk assessment.

During the current reporting period, the remaining two mine stability reviews commissioned by the Department were submitted to the TRB for assessment and for the provision of advice and recommendations to the Minister. These reports were the Hazelwood Mine Stability Report and the Loy Yang Mine Stability Report. The Hazelwood Northern Batter Report, which had been the subject of a TRB review during the previous reporting period, also underwent significant revision and was submitted for additional TRB review. These and the Yallourn stability report reaffirmed the technical areas identified in the 2011-2012 TRB Annual Report as in need of improvement.

It is pleasing to report that in the 2012-13 reporting period, there has been meaningful progress in addressing technical issues and advancing initiatives identified in the 2011-12 TRB Annual Report. Technical progress has been particularly evident with regard to water management, monitoring and data processing. A changing culture at mine site level regarding stability is evident from the generally positive responses from the individual mines to the review reports; organisational changes at two of the mines; a renewed interest and support for education and research; and an improved level of constructive and collaborative engagement and dialogue between all stakeholders on geotechnical matters.

Specific TRB related activities to support cultural change include:

- Meetings with Latrobe Valley CEOs and mine managers to discuss issues of stability and, in particular, the importance of robust, risk based, Ground Control Management Plans that incorporate up-to-date geological and geotechnical models and hazard maps.
- Several visits to the Latrobe Valley mines to meet with personnel and to be briefed on current issues and developments affecting stability.
- A visit to GHERG at Monash University Gippsland Campus to see and discuss activities related to the Latrobe Valley mine operations.
- An approach to the Victorian Group of the Australian Geomechanics Society (AGS), a technical group which is sponsored by the Engineers Australia (EA) and the Australasian Institute of Mining and Metallurgy (AusIMM), to set up a Latrobe Valley Geomechanics Group. Whilst details are still to be formulated, the Latrobe Valley Geomechanics Group would provide a platform for individuals and groups to share their geotechnical experiences and generally encourage communal ownership of the issues. This experience would be developed by a local organising committee supported financially by the AGS and representing at least the mines, GHERG and any other interested party, with technical meetings every two or three months.
- The commencement of educational initiatives through GHERG, with courses appropriate to the development of a greater understanding of stability issues at the mines in general accordance with TRB recommendations. To date, GHERG has presented two full day workshops on geotechnical methods and monitoring and a half day workshop on probabilistic risk analysis, with two further workshops planned to the end of the year. There was good attendance from the relevant mine personnel, with very positive feedback. GHERG has also presented its research program through a half day seminar.
- Engagement with one mine in developing a Ground Control Management Plan that the TRB is optimistic will serve as a benchmark for the brown coal sector.
- Input into developing guidance material for managing geotechnical risk in Victorian brown coal mines. This need was identified by the TRB in its first term. Funding to support the initiative was allocated by the Victorian government in the 2013 budget, which is expected to be completed in 2014. The TRB advocated that industry lead this initiative as another cultural change strategy to develop industry's knowledge base and foster ownership and sharing of the outcomes. The Board will input into the document on an as-required basis.

The TRB has previously identified seven 'at risk' batters, including two which subsequently failed and one which underwent substantial movement prior to remedial stabilisation. The four stability reviews have identified one new 'at risk' batter. The TRB uses the term 'risk' in a manner consistent with International Standard *ISO 31000:2009 Risk Management – Principles and Guidelines,* to which Australia subscribes. As such, risk is a combined measure of the probability of an event occurring and the consequences should it occur. The geotechnical reviews have brought a focus to all the 'at risk' batters, resulting in mitigation actions and increased levels of monitoring and control. Since all the batters identified as being at risk exhibit signs of movement, they need to be monitored carefully. However, in three cases, the risk rating is more a reflection of the consequences of failure. These consequences are a legacy of the mining method that results in all conveyors at a mine being located on the same batter.

A watching brief has been maintained on the remediation of the Morwell Main Drain (MMD). The TRB was also consulted extensively in regards to the causes of the failure of the Morwell River Diversion (MRD), the repair program, and the implications of the failure for the long term stability of sections of the diversion further upstream and for the mining of the Maryvale field.

The repair of the MRD continued throughout the reporting period. Given the priority of this work, the TRB took a decision to minimise the mine owner being distracted from the task by the Board's activities. In the interim, a number of reports have been submitted to the Board for preliminary review and the TRB has provided advice to the Department on the more urgent or critical aspects. However, it is clear that the matter is complex and the TRB will not formulate a concluded position and advice until a complete suite of studies into failure causes and their implications for future stability of the structure has been completed. The timing of activities means that the repair will be completed prior to final advice to the Minister from the Board.

The status of stability at the Anglesea brown coal mine also continued to be monitored by the TRB. Areas of previous concern to the Board have been addressed by the mine but further investigations are required to develop a proper understanding of ground behaviour at the site. Towards the end of the reporting period, the Department also sought the TRB's advice regarding the management of stability and safety in a new section of the mine. This work is ongoing.

During the reporting period, the TRB turned its mind to the stability of water impoundment structures in close proximity to the perimeter of mine sites, identified as a focus area during the first term of the TRB. Some of these structures have experienced movement since construction and may be exposed to similar ground movements to that of batters. Failure of a water impoundment structure potentially has similar consequences for public safety, infrastructure, environment and security of power supply as that of a batter instability. The TRB has no reason for immediate concern that remediation measures undertaken to date have not been effective but, given the history behind these measures, it considers that their effectiveness warrants confirmation. The Department has been alerted to this and the matters have received attention in the more recent stability reviews commissioned by it.

The TRB remains of the opinion that the original measures proposed for the rehabilitation of the Latrobe Valley mines fall well short of what could reasonably be considered as adequate for achieving long term safe and stable batters from a ground control perspective. Experience is now revealing that rehabilitation is a far more complex matter than envisaged when rehabilitation plans were developed as part of the work plans for the mines. Progress is being made in addressing these shortcomings.

GHERG

GHERG has continued to develop both its research and education programs over the year, although a proposition and resulting decision by Monash University to transfer its operations at the Gippsland Campus to Ballarat University to create a new university, Federation University Australia, caused some disruption to progress.

Five key elements for GHERG's research and education program were identified in the TRB 2011-12 Annual Report, namely:

- Establish equivalence relationships between standard factor of safety results from slope stability assessment and the risk of failure of the slope determined using probabilistic risk assessment techniques.
- Seek new monitoring evaluation strategies that can provide better trigger points for use by the mines for assessing the risks from slope movements.
- Evaluate the requirements for the number and type of underpinning data for application of probabilistic risk assessment methods to slope stability analysis.
- Deliver a training workshop series on the use of probabilistic risk assessment methods for slope stability analysis and the interpretation of the results.
- Commence a review of the geotechnical parameters used in assessing batter stability at the mines with particular reference to the equipment used, the testing procedures followed and the interpretation of the results obtained.

Under research elements 2, 3, and 5, GHERG's activities have focussed on developing better understanding of the coal and interseam geotechnical and hydrogeological properties that govern batter stability and the risks of surface water ingress into the coal. New results for coal consolidation and coal strength properties have been generated, as well as new results for interseam shear strength based around improved material test methods using direct shear, triaxial and ring shear equipment. GHERG's investigations of material properties also include examining the tensile response of the overburden and the chemical and temperature controlled creep in brown coal, both areas previously neglected, but now considered important for long term slope stability. GHERG was pleased to receive on long-term loan from the University of Melbourne, a large shear box to increase its capacity for developing improved geotechnical testing methods.

Rehabilitation issues are also being addressed through new research supported by one of the mines on ash disposal into the mine void and soils development for rehabilitation using wastewater, mine and power station wastes. Hydrogeological research has concentrated on quantifying recharge processes and their relationship to aquifer depressurisation due to mining.

Under education elements 1 and 4, GHERG developed a series of three half day workshops on reliability analysis and probabilistic risk assessment, supported by comparative analysis of factor of safety and reliability indices for the same problems. The first of the workshops was delivered in the reporting period, with the remaining workshops programmed for later in the year.

Going Forward

Reflection on the history of events leading up to the mine instabilities in the brown coal sector; the manner in which these incidents were managed and mitigated; the findings of high level geotechnical reviews; and exposure to the approval processes, has led the TRB to conclude that there are significant uncertainties and gaps in the management of stability in the Latrobe Valley mines that relate to the interacting elements of knowledge and competency, risk management, and regulation.

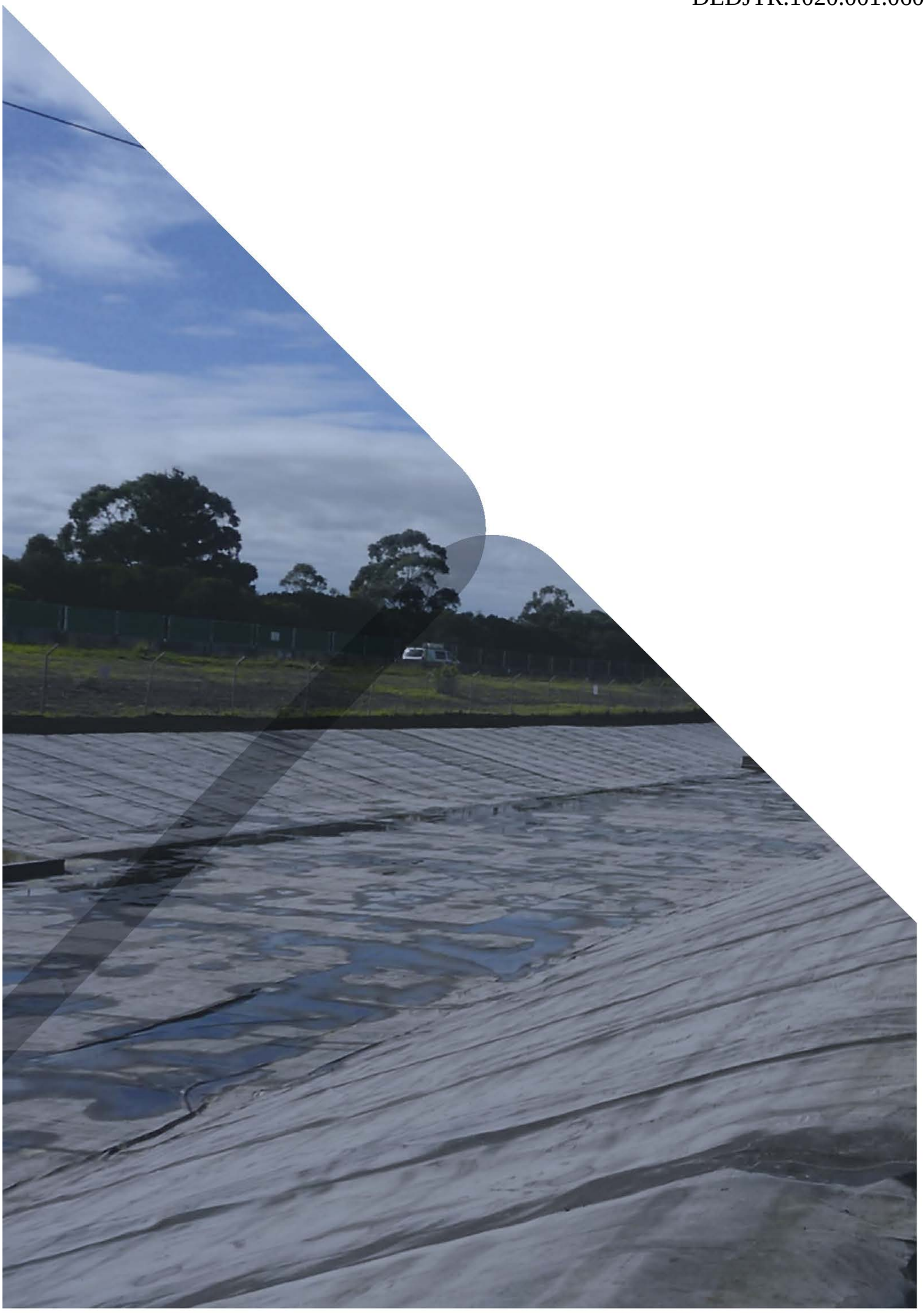
There is an emerging appreciation amongst all stakeholders of the gaps and uncertainties in knowledge, competency and risk management, but there is still some way to go. Research and education are fundamental to addressing these matters and, therefore, are focal points of the TRB in its new term, which commenced in September 2013. The development of the Guideline on Ground Control Management Practices in Latrobe Valley Brown Coal Mines is expected to make a significant contribution to improving knowledge, understanding and competency. The TRB is also planning to assist the Department in the planning, facilitation and presentation of a Latrobe Valley specific conference in 2014.

The history of recent instabilities in the Latrobe Valley mines and the events leading up to them cause the TRB to be of the strong view that designs for critical mine infrastructure need to be subjected to robust, independent, third party review. The Board will continue to advocate that this should be an integral part of risk management embedded in each mine's Ground Control Management Plan.

The TRB will be focusing during its new term on regulatory aspects relating to mine stability, with a view to providing advice on improving efficiency and effectiveness. The current legislative requirement for mines to provide stability reports to the regulator on a six monthly basis, for example, appears to be particularly onerous for the mines and to stretch the Department's resources to undertake a meaningful review of the information and to respond to it in a timely manner. The TRB will be considering whether the development of effective Ground Control Management Plans could enable this process to be streamlined and made more effective by enabling mine owners to report on a 'by exception' basis.

Concluding Remarks

The TRB is encouraged by the signs of a cultural change in how mine stability is being managed in the Latrobe Valley. Research and education initiatives are a priority to support this change and to foster greater engagement and collaboration amongst all stakeholders. It is timely for stakeholders to give consideration to whether the current administrative processes and their resourcing are the most appropriate for mines that are already large and complex by world standards and continuing to become more so.



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