environment victoria

Hazelwood Mine Fire Inquiry
PO Box 24
Flinders Lane VIC 8009

24 August 2015

Dear Board of Inquiry,

RE: Submission on mine rehabilitation

Thank you for the opportunity to make a submission to the Hazelwood Mine Fire Inquiry on mine rehabilitation.

Environment Victoria is one of Australia's leading independent environment groups. With over 40 member groups and tens of thousands of individual supporters, we've been representing Victorian communities on environmental matters for over 40 years.

Comments on mine rehabilitation

Our full submission to the Inquiry covering Terms of Reference 8, 9 and 10 accompanies this letter.

The key points covered in our submission are:

- Rehabilitation bonds for the Latrobe Valley coal mines are inadequate and need to be urgently increased to match the full cost of rehabilitation works, to protect the public from the unacceptable financial risk that we currently bear and to create an appropriate incentive for full rehabilitation to take place.
- The current approach to mine rehabilitation in Victoria fails to establish clear criteria by which to measure the success of rehabilitation works, making it difficult to enforce and reducing the ability to hold mine operators accountable to the high standards expected by the community.
- Decisions about long term rehabilitation options must involve the Latrobe Valley community as the critical stakeholder. The community will be there long after mining companies have moved on, and the future economic success of the Latrobe Valley relies on developing a more diverse local economy. Beneficial future land uses of the mines is an enormous opportunity, and is a key part of the Latrobe Valley's future prosperity.

We encourage the Inquiry to make clear recommendations to address these and other issues as detailed in our submission.

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1 Improving the rehabilitation bond system

1.1 Existing rehabilitation bonds need to be increased

The rehabilitation bonds that are currently in place for the Latrobe Valley coal mines are inadequate to meet rehabilitation costs. The state government holds a bond of just $15 million for each mine.

Numerous pieces of evidence support this assertion:

- The first Hazelwood Inquiry heard evidence from Kylie White, Executive Director, Earth Resources Regulation Branch of the Department of Economic Development, Jobs, Transport and Resources, who agreed that the bonds were too low.[1] The Department has since commenced an internal review into the quantum of rehabilitation bonds.
- The first Hazelwood Inquiry also heard evidence from the Hazelwood Asset Manager George Graham that GDF Suez has budgeted over $80 million for rehabilitation of the site.[1]
- The Australian Energy Market Operator, who manage the National Electricity Market, provide estimates for rehabilitation costs faced by each electricity generator. These figures, provided on a cost per MW basis, indicate that rehabilitation costs at each Latrobe Valley mine will exceed $100 million.[2]
- The State Government has made it clear that the purpose of the bond is to cover the full amount of the rehabilitation liability. It is not, as some argue, comparable to a rental bond paid by a tenant to a landlord, which is designed to reflect only a portion of the cost of repairing possible damage. The Department of Economic Development, Jobs, Transport and Resources ('the Department' or DEDJTR) has published a document that sets out how bonds are to be determined.[3] Relevant sections from this document include:

> "A rehabilitation bond … must be provided … to ensure that rehabilitation can be undertaken by the department should the operator be unable to meet their rehabilitation obligations."
>
> "The amount of the bond is calculated to address in full the rehabilitation liability based on the works specified in the approved work plan."
>
> "For periodic bond reviews, the bond is calculated on the existing rehabilitation liability at the time of the review."
>
> "For both the initial and periodic bond reviews, the rehabilitation liability is calculated on achieving the final rehabilitated landform as specified in the rehabilitation plan."

Further, the Department has advanced an argument for setting bonds that are higher than the cost to the mine operator of rehabilitation works. If a mine operator defaults on their rehabilitation obligations, section 83 of the *Mineral Resources (Sustainable Development) Act* ('the MRSD Act')

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[1] Hazelwood Mine Fire Inquiry Report, p.190.
[2] http://www.aemo.com.au/Electricity/Planning/Related-Information/~/media/Files/Other/planning/2014%20Assumptions/Fuel_and_Technology_Cost_Review_Data_ACIL_Allen.ashx. See tab "Existing Generators", column AG.
[3] DEDJTR, *Establishment and Management of Rehabilitation Bonds for the Mining and Extractive Industries*. Online ISBN: 978-1-74199-757-6.

provides the Minister with the power to carry out rehabilitation works through a third party. Carrying out the works through a third party would inevitably be more expensive than if the work were to be done by the existing operator – the Department and contractor would need to bring in their own equipment and staff, rather than using what was already in place. For this reason, the Department notes that bonds could actually be set *higher* than the cost of rehabilitation that the mine operator would face, and should reflect the costs that the State would face if forced to do the rehabilitation work themselves.[4]

On this basis, it is clear that (1) the likely cost of rehabilitating each mine will be much higher than the currently held $15 million bonds, and (2) the bonds should at least match the full cost of anticipated rehabilitation works.

There is a clear public benefit in matching the bonds to existing liabilities: if the bonds remain lower than the rehabilitation liability, it is the public who bears the risk of a mine operator defaulting on their responsibilities.[5] Across three very large mines in the Latrobe Valley, this risk to the public purse could exceed $500 million – a significant amount by any measure, and not a risk that should be dismissed lightly.

The Closure Plan for Alcoa's Anglesea mine and power station[6] recognises the importance of mine operators being aware of the costs of closure that might be incurred in the event of an unplanned closure. Nine coal-fired power stations have closed across Australia in the past three years (or had closure dates announced). More closures are expected to occur, either due to climate policies to reduce greenhouse gas pollution or purely due to falling profitability and corporate decisions.

Power station	State	Capacity (MW)	Closure
Redbank	NSW	150	2014
Wallerawang	NSW	1,000	2014
Munmorah	NSW	1,400	2014
EnergyBrix	VIC	162	2014
Anglesea	VIC	150	2015
Collinsville	QLD	190	2013
Northern	SA	530	Pre-2018
Playford B	SA	240	Pre-2018
Callide A	QLD	90	Mothballed
		3,912 MW	

There is a real possibility that one or two of the Latrobe Valley power stations (and associated mines) could close within the next 5-10 years. Unless rehabilitation bonds are increased, there is a material risk of enormous rehabilitation liabilities falling on the public purse. Mine operators will assert that they are good corporate citizens and would never default on these obligations, but the State can't rely on such unenforceable promises.

[4] DEDJTR, *Establishment and Management of Rehabilitation Bonds for the Mining and Extractive Industries*, section 4.3.
[5] While the Minister can attempt to recover costs under s.83(4) of the MRSD Act, there is no guarantee that these costs could in practice be recovered. This process also puts the onus on the state, rather than on the mine operator.
[6] Obtained under Freedom of Information. Available here, from page 39:
http://environmentvictoria.org.au/sites/default/files/Alcoa%20-%20Land%20%26%20Closure%20Plans.pdf

1.2 Mechanisms to ensure the public doesn't bear the risk

Recognising that rehabilitation bond needs to be increased, there are a number of mechanisms that could be implemented to increase bonds to ensure the public does not bear the risk of default.

Within the MRSD Act, the Minister already has the power to require mine operators to assess their rehabilitation liability (s.79A) and to require an additional bond (s.80(4)). The current 'interim' bonds were set in the 1990s but have not been revised since being set, despite significant expansion of each mine since then.

Environment Victoria's report from October 2014, *Preventing the Preventable*, outlines two possible approaches to increasing the bonds.[7] One approach is for the Minister to require an additional bond to bring the total bond amount to a level that matches the rehabilitation liability. Recognising that a single, very large, lump sum payment to the State could present difficulties for generators, a second option is to introduce a mechanism that would allow the effective bond amount held by government to grow steadily over a period of a few years.

This mechanism could be connected to an increase in the royalty rate for brown coal. The additional money received by the Government could be put into a dedicated mine-specific fund. The royalty rate increase could be set such that the fund grows to match the rehabilitation liability over a period of five to ten years. The longer it takes for the fund to accumulate, the longer the public bears the risk of abandoned rehabilitation liabilities. More details on this option are explored in section 8.2 of our *Preventing the Preventable* report, attached as Appendix A to this submission.

1.3 How bonds are held

It is also important to consider how rehabilitation bonds are held by government. Currently, bonds are only accepted as bank guarantees. As rehabilitation bonds increase, banks might become less inclined to provide surety to such large liabilities, especially in light of current trends in energy markets and the potential for unplanned closure of coal generation. Companies typically keep rehabilitation costs on their balance sheets as contingent or future liabilities, but relying on company accounting measures provides no certainty that rehabilitation works will be funded.

One alternative that could be considered is for the government to hold the bonds as cash bonds (i.e. money in a Government bank account), rather than bank guarantees. These accounts would create a steady stream of interest that could be used to fund new initiatives in the Latrobe Valley, such as regional economic diversification programs or health programs.

1.4 Alternatives to bond systems are less effective

Different approaches to ensuring rehabilitation is competed are in place in Western Australia and the USA, but neither presents a viable alternative to rehabilitation bonds.

The US has a system of "self-bonding", which relies on each company putting aside an appropriate amount for its rehabilitation works. Such a system provides no guarantees, and exposes taxpayers in the US to billions of dollars in rehabilitation liabilities. It relies on government regulators having a

[7] Environment Victoria, Preventing the Preventable: Policy options for accelerating coal mine rehabilitation and creating jobs in the Latrobe Valley (October 2014). http://environmentvictoria.org.au/learn/category/campaign-focus/safe-climate/mine-rehabilitation#report

better understanding of corporate accounts than the companies themselves – the potential failing in such a system is clear to see.[8]

Western Australia recently shifted to a consolidated Mine Rehabilitation Fund. All mine operators make an annual contribution to the fund, and the fund can be drawn on if a mine operator defaults on their obligations. The motivation behind the WA model was to reduce the need for junior miners to post a large bond upfront, which reduced cash-flow at a critical moment for companies trying to get mining operations off the ground. This is not at issue in Victoria, where the key challenge is how to ensure the enormous existing liabilities are not inflicted on the public purse. For each of the coal mines in the Latrobe Valley, the access to flexible capital is no longer needed to ease the commencement of operations, and the scale of the liability has expanded dramatically since the bonds were originally set.

The WA model requires miners to pay around just 1% of their total estimated liability into the fund each year, meaning the fund grows very slowly. The scheme creates a tragedy-of-the-commons situation where there's no clear incentive for any individual company to meet its rehabilitation obligations. The recent unexpected closure of a diamond mine in WA, after the owner went into administration, means the industry-wide fund will likely be drawn upon for that rehabilitation task. Recognising the risk of companies defaulting, the WA government has had to tighten its regulations, which included allowing bonds to exist alongside the communal fund.[9] This is unnecessary duplication: a bond scheme alone will work well in Victoria, provided the bonds are set at an appropriate level.

2 Rehabilitation must achieve clear criteria for success

One weakness of the regulatory regime that currently governs mine rehabilitation in Victoria is the lack of emphasis on criteria for success.

Mine operators are currently held to account by their work plans, which typically only specify that certain rehabilitation activities will be carried out. Work plans, and some rehabilitation plans, appear to make no mention of *the outcomes that are to be achieved*.

This shifts the risk from the mine operator to the public: if it transpires that the activities as proposed or as performed do not yield a satisfactory result, the operator can stand behind the work plan and say that they've met their obligations. Without clear criteria for success that mine operators are required to meet, there is no effective accountability nor is there a clear way in which regulators can enforce standards.

Appendix B to Environment Victoria's submission to the first Hazelwood Inquiry was a report by Tim Anderson from NRA Environmental Consulting, who specialises in mine rehabilitation and other environmental management assessments. In that report, criteria for success were identified as a key missing component of GDF Suez's work plan:

> "The specific agreed rehabilitation outcomes for each disturbance area appear absent or ill-defined."

[8] http://ieefa.org/ample-evidence-in-at-least-12-states-that-coal-companies-are-in-no-position-to-meet-their-cleanup-commitments/
[9] https://au.news.yahoo.com/thewest/wa/a/28659451/fund-may-foot-ellendale-bill/

> "Success criteria for final rehabilitation appear not to be defined. Without well-defined and measurable success criteria, it is not possible to validate the achievement of agreed outcomes through monitoring."

The NRA report also alludes to the fact that, absent clear success criteria, it is difficult to determine the costs that might be involved in 'successful' rehabilitation. This report is attached to this submission, also as Appendix B.

The Rehabilitation and Closure Plans for Alcoa's Anglesea site refer explicitly to the need for 'completion criteria', though Alcoa had not actually developed these criteria. Alcoa notes that meeting success criteria cannot be a one-off check – they propose a check 18 months after completion of works, but also state that their responsibility for the site only ends when land stability and the presence of an enduring ecosystem *can be demonstrated*.

These are similar to the factors the Department considers in whether to return a bond to a mine operator. DEDJTR's document on rehabilitation bonds says the Department will undertake:

> "an assessment of the rehabilitation to verify the land is safe and stable, non-polluting and the revegetation cover is likely to be self-sustaining… Sustainability may need to be demonstrated over several seasons under the normal range of conditions for the region."[10]

These concepts should be developed into clear criteria for success for rehabilitation and embedded in the work plans and rehabilitation plans of each mine in the Latrobe Valley (and indeed of other non-coal mines across the state).

Possible success criteria could include:

- No on-going detrimental effect on the water-table – the presence of an unremediated pit could be affecting the water table in surrounding areas and causing destabilisation of land
- A stable landform
- No on-going pollution of groundwater
- No on-going effect on biodiversity
- The fire risk of the rehabilitated site should be no greater than that of the surrounding area

The NSW Department of Industry has published a code of practice for rehabilitation of exploration works. While obviously exploration works are vastly less significant than the scale of the Latrobe Valley mines, the code of practice includes a list of possible rehabilitation objectives and completion criteria that would still be relevant to Victoria's coal mines.[11]

It is also important for the local community to be closely involved in any decisions about what success criteria should be applied. Local residents are the people who will live with the legacy of the former mines, therefore their priorities and expectations must be central to setting outcomes.

The agreed-upon criteria should be made publicly available, so the community can have confidence that an acceptable standard of rehabilitation will be required. Further, since full site remediation will

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[10] DEDJTR, *Establishment and Management of Rehabilitation Bonds for the Mining and Extractive Industries*, section 9.

[11] NSW Department of Industry, *Exploration Code of Practice: Rehabilitation* (2015). See Appendix 2. www.resourcesandenergy.nsw.gov.au/__data/assets/pdf_file/0008/565955/Exploration-Code-of-Practice-Rehabilitation.pdf

cover more than just rehabilitation of the mine pits, each mine operator should be required to complete and publish a detailed closure plan comparable to the Alcoa Anglesea Site Closure Plan.

3 Rehabilitation options

The mines in the Latrobe Valley will inevitably close. Mine operators will have a final choice as to whether they retain the land in the long-term or whether the rehabilitated site is transferred to other private or public ownership. Either way, the site needs to be rehabilitated to meet criteria such as those outlined in Section 2 above.

Current rehabilitation plans for all three mines involve some re-shaping of steep mine batters to make the slopes more gentle, with the void below ultimately being flooded over time. With projections for climate change in Victoria suggesting the state will become much drier, it will be important for these plans to at least consider how a drying climate might affect the rate at which voids are filled with water. The current plans also raise questions over how the sites will be managed while water levels are below the level to which the land is rehabilitated.

3.1 Short and medium terms options for rehabilitation

Short and medium term rehabilitation works should focus on achieving two objectives:

1) Reducing the risk of mine fires, and
2) Contributing to the work required for final rehabilitation.

Expert evidence at the first Hazelwood Inquiry provided unanimous agreement on the benefits of progressive rehabilitation as a fire prevention measure.

Because of the costs associate with rehabilitation work, it makes sense for the ‘double-handling’ to be minimised: progressive rehabilitation works conducted for fire-prevention reasons should, ideally, be as consistent as possible with the final rehabilitation plan.

Short and medium term rehabilitation options, therefore, should be informed by final rehabilitation plans, which should in turn be informed by possible future land uses.

3.2 Long term rehabilitation options should be governed by criteria for success

The mines in the Latrobe Valley already occupy a large proportion of the total area of the region. This situation will only be exacerbated as the mines continue to grow over the 11 to 22 years remaining on each mining licence.

For this reason, the future of the sites post-mining is a very important issue – especially for the local community, who will continue living in the region long after mining companies have moved on.

The question of future land use should be addressed after criteria for success are established – the criteria that are agreed upon by all stake-holders sets the scope for types of final landform and land use that could be achieved.

3.3 Considerations for possible future land uses

The scope of possible final landforms is somewhat limited by the lack of overburden, compared to the depth of the coal seams. There is simply not enough earth for the holes to be filled in. But it is not clear that the best outcome for the Latrobe Valley community is to be left with three very large holes, filled with water, that do no more than sit idle.

There are many ideas in the community about how the sites could be used: a pumped-hydro-electricity facility at Hazelwood, using the pondage as an upper reservoir; filling a pit with solar panels; creating wetlands; building a racetrack… The list is limited only by people's imaginations. This type of thinking should be encouraged – the Latrobe Valley's future economic success relies on it developing a more diverse local economy.

While it may not be the role of this Inquiry to pick winners from a list of possible future land uses, it will be important for the Inquiry to ensure that final rehabilitation plans are at least consistent with a range of future uses. These uses might be exclusively natural: restoring native vegetation and habitat around a healthy freshwater lake. Or the future use might include a much higher level of human activity, including on-going employment in whatever replaces the mines and power stations.

Each mine has its own specific situation and challenges with respect to rehabilitation. One mine might be more suited to one type of land use than another mine.

A reasonable starting point is that each site (which includes the power stations, overburden dumps and other areas – not just the mine pit itself) should be left so that it matches the surrounding areas. It could, however, be less expensive (and preferable from a community perspective) for a mine operator to work towards a specific future use that fits with community wishes.

For this reason, there should be a clear public discussion about what the community wants from future land uses, while remaining consistent with the universal criteria for success that need to be established. If there is a well-articulated future land use that all stake-holders, including the mine operator, have agreed on, there will need to be additional land-use-specific criteria, to ensure that the intended land use is achieved.

4 Conclusion

Rehabilitation of the Latrobe Valley coal mines will be a challenging process, but if it is not done well the community will be left with an unacceptably scarred landscape that diminishes the region's potential.

The first challenge is to ensure that mine operators are held to account financially for delivering their rehabilitation obligations. To do this, the State government needs to raise rehabilitation bonds to a level that at least matches the costs that will be faced by mine operators in performing the final rehabilitation works.

These works must be governed not by actions or processes but by outcomes. Clear criteria by which the success of rehabilitation can be measured are urgently needed. These criteria should be developed in close consultation with the community, disclosed publicly, and explicitly incorporated into each mine's work plan and rehabilitation plan. Mine operators must show that their rehabilitation works meet the criteria over a period of years before rehabilitation bonds should be

relinquished by the government. Public disclosure of full rehabilitation and closure plans is also important.

Short and medium term rehabilitation should focus on reducing the risk of fire in each mine while also making progress towards agreed-upon future land uses. Long term rehabilitation options should be strongly influenced by the future land uses that the local community would like in their region, as they are the ones who will live with the legacy of coal mining.

APPENDIX A

Preventing the Preventable report

By

Environment Victoria

Environment Victoria Policy Report
2014

October 2014

PREVENTING THE PREVENTABLE

Policy Options for Accelerating Coal Mine Rehabilitation and Creating Jobs in the Latrobe Valley

environment victoria

EXECUTIVE SUMMARY

The 2014 Hazelwood mine fire was one of the worst environmental and public health disasters in Victoria's history. The fire had serious social, environmental and economic implications. The total financial cost of the fire was estimated by the Hazelwood Mine Fire Inquiry to be over $100 million. The Inquiry found the fire was entirely preventable, and heard evidence that mine rehabilitation is the most effective way of preventing coal mine fires.

Progressive rehabilitation of coal mines protects communities from the risk of catastrophic mine fires while also reducing the community health impacts of mining operations.

Unrehabilitated mines also represent a significant financial risk to Victorian taxpayers should mine operators fail to fulfil their rehabilitation responsibilities, leaving the state government to bear the cost of making the site safe.

Works involved in mine rehabilitation across the Latrobe Valley would create around 450 long-lasting skilled and unskilled jobs, providing a billion-dollar economic stimulus to a region in need of a more diverse economy.

The carrying out of rehabilitation works by mine operators is already a condition of all coal mining licenses, but these works are not happening with sufficient urgency. These delays leave the community exposed to fire and health risks and the broader public exposed to the on-going financial and environmental risks.

Existing rehabilitation bonds for all Victorian coal mines are too low to provide sufficient incentive for mine operators to fulfil their obligations, and the Victorian Government has exerted no regulatory pressure to accelerate rehabilitation.

In this report, we identify the three steps required to address this issue:

1. Determining the scale of the rehabilitation task
2. Accelerating rehabilitation of worked-out coal faces to reduce fire and health risks
3. Ensure rehabilitation bonds match the rehabilitation liability to reduce the public financial risk

To a large extent, the legislative and regulatory powers to achieve these already exist. Two key policy solutions include:

1. Increasing rehabilitation bonds to appropriate levels. These bonds should be received as cash bonds (currently they are bank guarantees), with the government using the interest payments on the bonds to support regional development and transition initiatives in the Latrobe Valley and the wider Gippsland region.
2. Raise the rate of coal royalties, with the additional royalties from each mine being put into separate funds. These funds can then be drawn on by mine operators to recoup money spent on progressive rehabilitation works.

Full details on these policy proposals can be found within the report.

Environment Victoria is seeking both a clear commitment to accelerate rehabilitation efforts and the views of all candidates standing at the 2014 State election in the seat of Morwell on the policy measures recommended within this report.

1. Overview of the Hazelwood mine fire and the benefits of mine rehabilitation

The fire in the Hazelwood coal mine in early 2014 covered the town of Morwell and the surrounding area in toxic coal ash for 45 days. It cost the Victorian Government over $32 million to bring the fire under control (not taking into account the volunteer labour of the CFA), and the overall cost of fire to the Government, the community and to mine operator GDF Suez has been estimated at over $100 million.[1] The additional cost to the long-term health of the community will, tragically, not be known for many years to come.

The only sections of Hazelwood's northern batters that did not burn during the mine fire are those that had been rehabilitated between 2008 and 2012.[2] This was a powerful demonstration of the role that mine rehabilitation can play in protecting communities from dangerous mine fires.

The benefits of rehabilitation extend beyond reducing the risk of fire. There are significant co-benefits to the mining community, through job creation and the reduction of toxic coal dust, and to the wider public and government, through a reduced financial risk to the public purse in the event of mine operators failing to complete their rehabilitation obligations.

Unfortunately, the Hazelwood Mine Fire Inquiry made no recommendations on mine rehabilitation despite hearing extensive evidence of its benefits.

However, there is still an onus on the state government to act in the public interest and deliver improvements to mine rehabilitation policy to ensure mining communities are protected and that they are receiving the benefits of accelerated rehabilitation.

2. What is mine rehabilitation?

At its simplest, mine rehabilitation is the process of repairing the damage caused by mining activity. This can involve simply making the site safe and stable, but global best-practice strives to create a landscape that can support future uses of the land – whether that is returning it to an agricultural landscape or identifying new beneficial uses.[3]

At a practical level, coal mine rehabilitation typically involves flattening the steep sides of the mine, covering exposed coal with soil and clay and re-vegetating the area with trees and grasses.

Community consultation is a key aspect of rehabilitation. As they are the most likely future users of the land, it is essential that the community be involved in decisions about how the land is rehabilitated and for what final purpose.

3. How is rehabilitation regulated currently in Victoria?

Rehabilitation of Victorian coal mines (and other mines) is primarily regulated by Part 7 of the Mineral Resources (Sustainable Development) Act 1990 ("the MRSD Act"), in conjunction with the conditions of each operator's mining licence.

Key sections of the MRSD Act include:

- Mine rehabilitation needs to be carried out in accordance with the conditions of the mining licence (s78(2))
- Mine operators need an approved rehabilitation plan (ss78(1) and 79)
- The Minister can require mine operators to assess their rehabilitation liability (s79A)

- A rehabilitation bond is required (s80(1)) and the Minister may require an additional bond if the existing one is deemed insufficient (s80(4))

- If the mine operator refuses to carry out rehabilitation works, the Minister may engage others to carry out the works ss83(1)-(3) and then recover costs later s83(4)

Coal mines in Victoria are required by their mining licences to have a plan for "final rehabilitation" (i.e. once the mine is no longer operational), as well as to conduct "progressive rehabilitation" while the mine is still active. In addition to the work specified in the rehabilitation plans, further work must be carried out if the operator is directed to do so by the Department or a Mines Inspector.

Neither the legislation nor the associated regulations set any more specific timelines for when rehabilitation should happen. It is left to mine operators to propose timelines in their Rehabilitation Plans (which form part of the broader Work Plan), which are then approved by Government regulators.

Unlike the other two major mines in the Latrobe Valley, the operators of the Yallourn mine are required by their mining licence to publicly report on the annual progress of their rehabilitation work.[4] Because public confidence in rehabilitation is critical, this requirement for public reporting should be extended to all other coal mines in Victoria.

Mine operators are also required to lodge a "rehabilitation bond" with the Government. This bond serves as an incentive for mine operators to carry out progressive rehabilitation, and to provide financial security that the public will not bear the cost of an abandoned unrehabilitated site. If the site is not ultimately left adequately rehabilitated post-mining, the bond is forfeited by the mine operator and kept by the Government.

Rehabilitation bonds for each of the three Latrobe Valley mines were set in the 1990s at "interim" amounts of $15 million. The bond amounts have not been revised since being set, despite significant expansion of the mines, and a commensurate increase in the total rehabilitation liability, over the past 20 years.

1 Report of the Hazelwood Mine Fire Inquiry, p.222

2 Report of the Hazelwood Mine Fire Inquiry, p.188

3 Australian Government Department of Industry, Tourism and Resources, "Mine rehabilitation: Leading practice sustainable development program for the mining industry," 2006, p.2.

4 Mining Licence 5003, Schedule of Conditions, cl 18(3), registered 25 January 2002.

4. The benefits of coal mine rehabilitation

A recent survey conducted by the CSIRO on attitudes to mining amongst the Australian public, including mining communities, found strong agreement that mine rehabilitation is important.[5] In addition to ultimately returning a mine to safe, stable and usable landform, mine rehabilitation confers many benefits on both the local mining community and the broader public.

4.1 Fire prevention

For coal mine fires, as with most undesirable outcomes, prevention is better than cure. During the public hearings of the Hazelwood Mine Fire Inquiry, experts agreed that the most effective way of preventing mine fires is to properly rehabilitate the area.

Professor David Cliff said during his evidence that rehabilitation is "the only way of ensuring that such events cannot occur"[6] and that "if the coal can't be exposed to air, it can't burn; it's as simple as that."[7]

GDF Suez's Technical Services Manager indicated that the best solution for fire prevention is rehabilitation, combined with a fire sprinkler system in areas that can't be rehabilitated.[8]

Fire expert Roderic Incoll said in his report to the Hazelwood Inquiry that:

> *"Anything less that 100% spray coverage availability during hot dry windy conditions, or full earth covering of the Northern Batters is inviting a recurrence of the incident with similar outcomes. For this reason, the situation must be permanently remedied."*[9]

As a fire prevention measure, rehabilitation has important benefits over alternatives such as water sprays. Once completed, rehabilitation does not rely on decisions by people to activate it, nor does it rely on the supply of electricity or water which may fail at crucial moments.

A CSIRO and Bushfire Cooperative Research Centre report into future bushfire danger in south-eastern Australia shows that the number of days with a Fire Danger Index of 50+ is set to increase by as much as 70% by 2050, with more than 40 days per year.[10] Measures taken now to reduce the risks of future fires in the Latrobe Valley mines should be a community safety priority.

4.2 Job creation and broader economic benefits

Mine rehabilitation is a labour-intensive process, meaning there is great potential for a wide range of skilled and unskilled long-term jobs to be created. With the vast scale of the three Latrobe Valley mines, full rehabilitation of the open cuts could provide decades of employment.

The US Department of Interior's Office of Surface Mining Reclamation and Enforcement has a comprehensive program for dealing with abandoned mine land. The Office estimated that approximately $USD 370 million ($AUD 411 million) spent on mine rehabilitation in 2010 created over 8500 jobs in that year alone.[11] The broader additional economic activity flowing from this work amounted to $USD 1.06 billion.[12]

Extrapolating these employment figures to the Victorian rehabilitation task requires an approximation of the likely cost of rehabilitating the three large coal mines in the Latrobe Valley. During the Hazelwood inquiry, GDF Suez gave evidence that they have budgeted $81 million for their final rehabilitation works.[13] It is not clear whether this is intended to include rehabilitation of the mine and the power station or just the mine. It should also be noted that this $81 million for Hazelwood involves only partial rehabilitation of the land, with the majority of the pit to be flooded and converted over decades into a lake. For this reason, and because

5 K Moffatt, A Zhang, N Boughen, "Australian attutides toward mining: Citizen survey – 2014 results", CSIRO (2014), p6. EP 146276

6 Hazelwood Mine Fire Inquiry, Transcript of Evidence, Day 13, p.2110.

7 Hazelwood Mine Fire Inquiry, Transcript of Evidence, Day 13, p.2111.

8 Hazelwood Mine Fire Inquiry, Transcript of Evidence, Day 13, pp.1981 & 2021.

9 Report of the Hazelwood Mine Fire Inquiry, p202.

10 CSIRO/Bushfire CRC and Australian Bureau of Meteorology, "Climate change impacts on fire-weather in south-east Australia", pp.5 & 26.

Table 1: Job creation & wider economic benefits of mine rehabilitation

	USA†	Latrobe Valley low-cost case ‡	Latrobe Valley medium-cost case ‡	Latrobe Valley high-cost case ‡
Expenditure * millions of AUD	$411m	$243m	$421m	$600m
Total job years created	8578	5076	8789	12523
Jobs per year Over 20 years	429	254	439	626
Economic benefit Billions of AUD	$1.18b	$0.70b	$1.21b	$1.72b

* Using an exchange rate of $0.90 † Actual expenditure and job creation ‡ Projected expenditure and job creation

mining companies regularly downplay their likely rehabilitation costs, we will treat $81m as a low-cost case. Across three mines of comparable size, that equates to a minimum of $243 million.

Figures used by the Queensland Government estimate the cost of reshaping and capping high risk material (such as coal) at $136,000/hectare.[14] This cost does not include the cost of accessing any externally sourced topsoil or other materials, nor does it include revegetation works. For a pit roughly 1000 hectares in size, this leads to an estimate of $136 million. Additional works to rehabilitate other areas around the mine pit, such as overburden dumps, and to complete revegetation works could lead to estimates around $200 million per mine, or $600 million across the Latrobe Valley. We will treat this as the high-cost case. A medium-cost case is taken as the mid-point between high and low – total expenditure of $421 million.

Table 1 shows how this level of expenditure could affect the economy of the Latrobe Valley.

Assuming comparable levels of job creation per dollar as observed in the USA and spreading the work over a twenty year period, this equates in the medium-cost case to 439 direct jobs that last for two decades with total economic impact in the region of $1.21 billion. The high-cost case shows the potential for over 600 jobs and $1.7 billion in economic impact.

Exact rehabilitation requirements can vary vastly from site to site, but this analysis confirms that rehabilitation of the Latrobe Valley mines is likely to create significant employment in the local area. As part of supporting a just transition for workers in the Latrobe Valley, as many as possible of these jobs should be reserved for local residents, rather than contractors from elsewhere.

The types of jobs that are typically involved directly in coal mine rehabilitation include:

- Environmental and technical managers
- Engineers
- Geologists
- Biologists
- Technicians
- Surveyors
- Heavy equipment operators
- General labourers.[15]

11 US Department of Interior, Economic Contributions, 21 June 2011, p.26.

12 US Department of Interior, Economic Contributions, 21 June 2011, p.26.

13 Report of the Hazelwood Mine Fire Inquiry, p190.

14 Rehabilitation Cost Calculator, Queensland Government. Available here: http://www.business.qld.gov.au/business/running/environment/licences-permits/financial-assurance-rehabilitation/financial-assurance-security-deposit

15 Office of Surface Mining Reclamation and Enforcement, "Annual Report 2010-11: Reclaiming Oversight, Reclaiming Communities"

4.3 Improved health for communities

There has been little quantification in Victoria of the health consequences of living next to coal mines and power stations, but a 1996 study by the Victorian Department of Health revealed that the Latrobe Valley had worse health outcomes than other parts of the state.[16]

Latrobe Valley coal mines currently have large surface areas of exposed coal. This exposed coal is responsible for the high levels of fine particulate matter that emanates from coal mines. National Pollutant Inventory data shows that coal mining and coal power stations are the two largest point source contributors to PM2.5 pollution in Victoria.[17]

Speeding up rehabilitation efforts will reduce the total surface area of exposed coal, therefore reducing the toxic fine particulate matter that affects residents in the towns of the Latrobe Valley. The National Pollutant Inventory notes that, for these particulates, "there is no threshold at which health effects do not occur."[18]

In the US, the Office of Surface Mining Reclamation and Enforcement have estimated that 80,000 hectares of unrehabilitated mine land is creating $USD 3.9 billion in health and safety problems.[19] An extrapolation of these figures, across the approximately 3000 hectares of deep open cut mines in the Latrobe Valley, equates to health and safety impacts of almost $150 million. The state government bears many of these costs through increased hospital bills and reduced economic activity.

4.4 Avoids public exposure to financial liability

In addition to missing out on the economic and health benefits listed above, a failure to accelerate progressive rehabilitation could expose the public to significant financial liability if a mining company does not deliver on its rehabilitation obligations.

Rehabilitation bonds, lodged by the company with the Government, are intended to cover the likely costs of full rehabilitation,[20] but existing bonds are likely to be an order of magnitude too low.[21] As noted above, rehabilitation of the Hazelwood mine could cost between $80-200 million, yet the bond is only $15 million. This creates little incentive for the mine operator to conduct progressive rehabilitation.

Financially, it could make more sense for the company to sacrifice its bond and abandon the mine without carrying out rehabilitation works. This leaves the community and state government with a potentially massive financial burden of cleaning up the site to ensure it is safe and able to contribute to the future prosperity of the community.

While the legislation allows for the state government to try to recover any costs it incurs in carrying out rehabilitation (s80(4)), in practice it will be very difficult. The risk of recovery is shifted to the state government, who must bring legal action to find company assets in the jurisdiction that can be claimed against.

The only guarantee for the state to avoid public expense is to ensure that rehabilitation bonds match the assessed rehabilitation liability for each mine.

5. Is rehabilitation happening now?

During the Hazelwood Mine Fire Inquiry, it was revealed that GDF Suez proposes to undertake only very limited progressive rehabilitation at the Hazelwood mine between now and 2028[22] – just four years before the scheduled closure of the mine and power station in 2032. This is unacceptably slow and provides no comfort to a community that is rightly concerned about whether future fires or health impacts will be avoided.

In the past five years, only around five hectares of land has been rehabilitated per year at Hazelwood,[23] although GDF Suez has committed to rehabilitating an additional 20 hectares of the northern batters as a response to the fire.[24] 20 hectares represents only about 2% of the total area of the open cut.

16 Report of the Hazelwood Mine Fire Inquiry, p250-251.

17 Business Spectator, "New data reveals coal's health pollutant risk", 3 June 2014. Available here: http://www.businessspectator.com.au/news/2014/6/3/science-environment/new-data-reveals-coals-health-pollutant-risk. Note that in the National Pollutant Inventory for PM2.5, there is no disaggregation of the relative contributions of coal mining and coal burning in Victoria. It is only provided as a combined total of each mine and its associated power station.

18 National Pollutant Inventory, Fact Sheet for Particulate Matter (PM10 and PM2.5). Available here: http://www.npi.gov.au/resource/particulate-matter-pm10-and-pm25

19 US Department of Interior, Economic Contributions, 21 June 2011, p.26.

In Loy Yang's only publicly available work plan, targets for annual rehabilitation are only for 3-5 hectares of the mine per year.[25]

At Yallourn mine, 70 hectares were rehabilitated in 2012, but the majority of this was overburden dumps rather than exposed coal faces.[26]

To the extent that rehabilitation has taken place at the Latrobe Valley open cuts, it has largely been outside the mine pits themselves, with the exception of the Yallourn Town Field. This fails to address the fire risk, the health risk and the financial risk to the public. The limited scope of the rehabilitation means the vast majority of jobs in rehabilitation have not yet been created.

Further, the longer rehabilitation of exposed coal faces is delayed, the greater the risk that it will not happen at all.

As noted by mine rehabilitation experts at Environmental Earth Sciences, "in the mining industry, there is a need for a stronger focus on closure during the years when the mine is most profitable"[27] – that is, while the power station is still operating and generating revenue.

6. Why is extensive rehabilitation not taking place?

Only small amounts of rehabilitation work are happening, for two main reasons:

1. The rehabilitation bonds are too low, so mine operators have little incentive to meet their rehabilitation obligations ahead of closure; and
2. The Government is exerting no regulatory pressure to accelerate rehabilitation, primarily because it has not fully accounted for the costs of delayed rehabilitation.

20 "Establishment and management of rehabilitation bonds for the mining and extractive industries", Department of State Development, Business and Innovation (2014). Available here: http://www.energyandresources.vic.gov.au/earth-resources/licensing-and-approvals/minerals/guidelines-and-codes-of-practice/exploration-and-rehabilitation-of-mineral-exploration-sites

21 Report of the Hazelwood Mine Fire Inquiry, p190.

22 Report of the Hazelwood Mine Fire Inquiry, p186.

23 Report of the Hazelwood Mine Fire Inquiry, p189. The majority of rehabilitation work that has been completed has been the "easy wins" of flat areas outside the mine's pit (see page 188).

24 Report of the Hazelwood Mine Fire Inquiry, p228.

25 Loy Yang Power Ltd, "Mining Licence Application – Work Plan Submission, Part 2: Rehabilitation Plan". Victorian Government Gazette, 8 May 1997, No s53, p35.

26 EnergyAustralia Yallourn, "Social and Environmental Performance Summary 2012".

27 Environmental Earth Sciences, "Mine Closure and Waste: Responsibilities and Liabilities", Discussion Paper, September 2012, Philip Mulvey, Alan Baker and Peter Scott, p.6.

7. What does the Government need to do?

Mine fire risk and rehabilitation has become a pressing public policy issue.

Environment Victoria is seeking a commitment from all parties and candidates contesting the 2014 State Election to release a policy that will:

1. Determine the scale of the rehabilitation task
2. Act to urgently accelerate rehabilitation of exposed coal faces in worked-out areas of all coal mines in the state, creating hundreds of long term jobs and reducing risks to the community;
3. Ensure adequate provisions are in place to guarantee Victorian taxpayers are not burdened by uncompleted rehabilitation works.

8. Policy solutions for accelerating coal mine rehabilitation

There are a number of mechanisms by which the Victorian Government can address this situation.

The Mining Licences for each mine allow the Inspector of Mines or the Department to direct mine operators to carry out any rehabilitation work that the Inspector or Department thinks is necessary. This can be over and above the operator's commitments in their rehabilitation plans.

The Victorian Government could consider (through the Department or Inspector of Mines) directing coal mine operators to complete the rehabilitation of all worked-out coal faces in the next five years, starting in the next 12 months with areas within 2 km of residential areas.

While this approach could be relied on in specific circumstances, more sophisticated policy options are available.

8.1 Increasing the rehabilitation bond to create an appropriate incentive

The Department of State Development, Business & Innovation are explicit in stating that the purpose of the rehabilitation bond is to cover the full rehabilitation liability for a given mine. To create an appropriate incentive for mine operators to meet their rehabilitation obligations, these bonds need to be increased to reflect the actual likely costs of full rehabilitation.

The Minister has the power under s.79A of the MRSD Act to ask operators to estimate their rehabilitation liability. This request should be made immediately. Simultaneously, DSDBI needs to fast-track its review of bond calculation methodology, and then conduct its own assessment of likely mine rehabilitation costs. Both the private and public assessments must be accompanied by an independent mine auditor's report verifying the accuracy of each assessment. This process should be completed within 12 months.

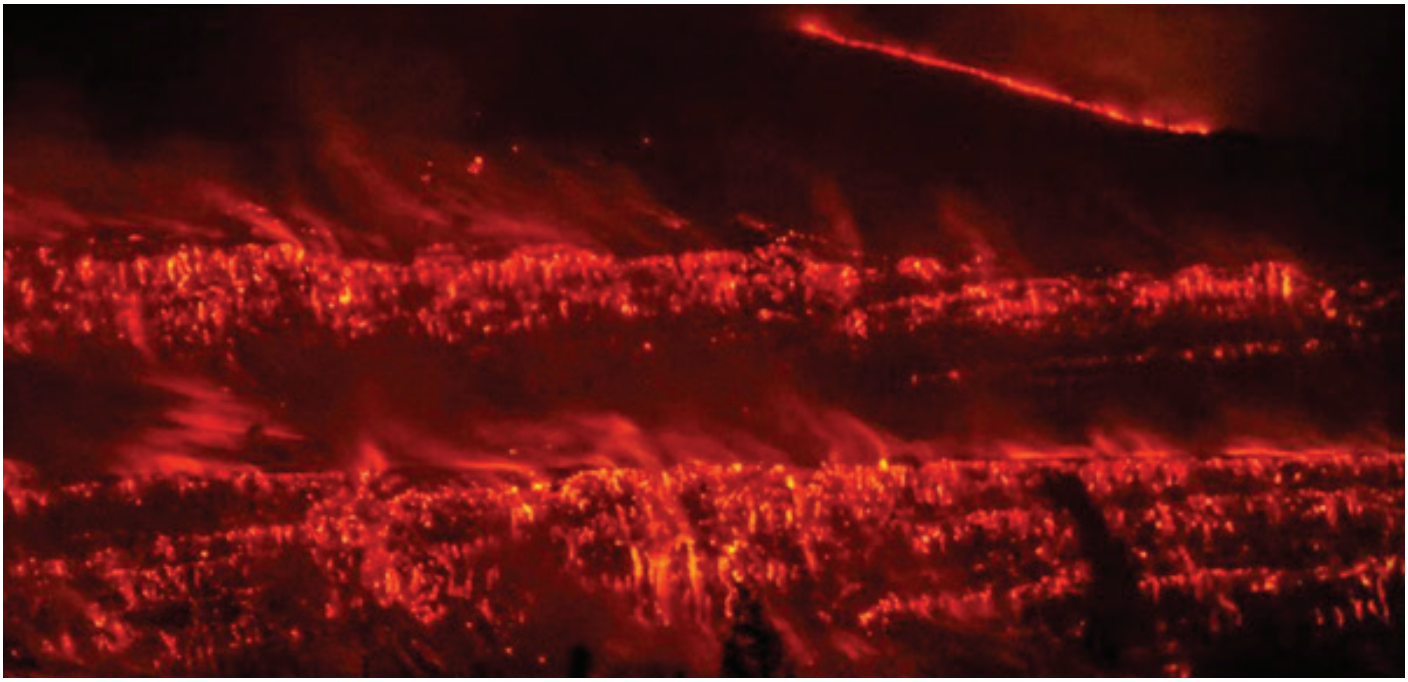
Upon completion of this process, additional bonds should be required of each mine operator (as permitted under s.80(4) of the MRSD Act) to bring the total amount held by the Government up to the level of the assessed liability. For example, if the calculated liability is $150 million and the current bond is $15 million, an additional bond of $135 million should be lodged immediately.

The additional bonds should be required as cash bonds, not as bank guarantees as currently used.

This means the Government would hold the cash amount of the bonds. The interest on these amounts should be used to drive regional development and economic transition programs in the Latrobe Valley and the wider Gippsland region.

Bonds should be reviewed every five years. This ensures that, as rehabilitation progresses, there is eventually an opportunity for bonds to be lowered and returned to the operator as the remaining liability declines.

➔ **ACTION ASSOCIATED WITH THIS APPROACH:** Review the rehabilitation bonds of



existing coal mines, and require additional cash bonds to be lodged to cover the full rehabilitation liability of each mine. Interest received by the Government on these bonds is to be used to support economic diversification of the Latrobe Valley.

8.2 Create a mine-specific rehabilitation fund based on increased coal royalties

Royalties currently received by the Victorian Government for extracted coal is relatively low by comparison to other Australian states. Evidence given by the Department at the Hazelwood Inquiry indicated that the Government receives $50-60 million annually in combined royalties from the three Latrobe Valley mines.[28] Exact royalty rates are based on the energy content of the coal, but equate to approximately $1 per tonne.

We propose a mechanism by which each mine has its royalty rate increased. The additional money raised from this new royalty should be put into a dedicated, mine-specific rehabilitation fund. If rehabilitation works are completed in a given year, the operator can apply to recover the costs of that rehabilitation work from the fund. If no rehabilitation works are completed, the fund continues to accumulate with the additional royalties.

For example, if the fund for one mine receives $7 million per year in additional royalties, and the operator completes $5 million worth of rehabilitation, the operator can apply to recover $5 million from the $7 million that is in the fund. If the work is not completed, the full amount of the additional royalty remains held by the government as a kind of bond.

Each mine's fund, if not drawn upon, would continue to grow until it reaches the estimated remaining rehabilitation liability. Beyond that amount, the additional royalties should be diverted towards regional development and economic diversification programs in the Latrobe Valley. For example, if the total cost of a mine's rehabilitation is estimated to be $100 million, once the additional royalties have boosted the fund to that amount, the money would then go to benefit the region in other ways.

If works are carried out, the fire, health and financial risks are all reduced. If the works are not carried out and the fund is allowed to grow, the public financial risk is reduced, but the community remains exposed to the fire and health risks. In that situation, to ensure the fire and health risks are also mitigated, the Government could periodically use its power to compel mine operators to carry out specific rehabilitation projects (as noted above).

Alternatively, to create an incentive for mine operators to actually carry out rehabilitation works (thus reducing the fire and health risks to communities), the rate of additional royalties could be reviewed on regular 5-yearly cycles. If rehabilitation works have not been conducted, the royalty rate could increase further. If rehabilitation works have been conducted, the additional royalty rate could decrease, acknowledging the efforts the operator has made to reduce risks to the public.

We propose that the initial increased royalty rate be

28 Hazelwood Mine Fire Inquiry, Transcript of Evidence, Day 11, p.1585.

set so that ten years of accumulation would result in a fund commensurate in size with a revised rehabilitation liability.

For example, if a mine's current bond is $15 million and its calculated rehabilitation liability is $100 million, the rate of additional royalties should be set to accumulate the outstanding $85 million within ten years – an additional $8.5 million per year. For a mine extracting 20 million tonnes per year (roughly equivalent to $20 million in existing royalties to Government), this would correspond to a 42.5% increase in royalties.

It should be emphasised that the amount of additional royalties is effectively recoverable by the mine operator if they choose to carry out rehabilitation works that they are legally required to perform.

➔ **ACTION ASSOCIATED WITH THIS APPROACH:** Increase the royalties from brown coal to rates that would accumulate to match a revised bond within 10 years. Establish separate funds to receive the royalties from each individual mine and establish a methodology for auditing rehabilitation works and for returning paid royalties to the mine operators after the completion of works. The Department should also develop criteria for assessing success of any rehabilitation works, to be reviewed at five-yearly intervals. Methodology should also be determined for adjusting the additional royalty rate on the basis of the extent and success of rehabilitation works.

9. Additional initiatives to boost community confidence

The following measures would provide further assurances to local communities that rehabilitation is being progressively implemented to an appropriate standard:

- Mining licences for all coal mines should be amended to require clear annual public reporting of rehabilitation works.
- The remit of the existing Technical Review Board should be expanded to include general mine rehabilitation, rather than limiting it to rehabilitation that deals with mine stability.
- Each mine operator should publicly disclose the amount it has budgeted for progressive and final rehabilitation works, to give the community confidence that the work will take place.
- Over the next five years, each mine operator should engage in in-depth community engagement to discuss possible future land uses of the mines, to allow final rehabilitation plans to reflect community aspirations for the future of the area.

10. Conclusion

Since the Hazelwood mine fire, it has been clear that there can be no more “business as usual” in how coal mining is regulated in Victoria. The risks are simply too great.

Accelerating mine rehabilitation has the the potential to address the fire, health and financial risks associated with the state’s brown coal mines, creating a significant local economic stimulus, in the form of hundreds of long-lasting and diverse jobs.

With both mine safety and employment opportunities emerging as key issues in the key seat of Morwell at the 2014 Victorian election, strong policies on mine rehabilitation represent a win-win opportunity.

Within the context of the existing regulatory and legislative framework, we have identified two practical, effective and flexible policy solutions that will reduce the risks of coal mining and create hundreds of jobs while providing new streams of support to the community of the Latrobe Valley.

We encourage all parties and candidates contesting the 2014 State Election to take this opportunity.

environment victoria

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APPENDIX B

Rehabilitation issues at the Hazelwood Mine

By

Tim Anderson
NRA Environmental Consultants

NRA Reference: HazelwoodMine_Rehab_L01

7 May 2014

Environment Victoria
PO Box 12575 A'Beckett Street
MELBOURNE VIC 8006

Attention: Dr Nicholas Aberle

Dear Nick

RE: Hazelwood Mine – Mine Rehabilitation Related

NRA Environmental Consultants (NRA) was requested by Environment Victoria (EnvVic) to provide comment on mine rehabilitation related matters concerning the Hazelwood Mine with reference to documents provided by EnvVic. It is our understanding that the information NRA provides will be used to inform a submission to be prepared by EnvVic and, as relevant, will be included as an attachment to their submission.

NRA is an independent environmental consultancy, based in offices in Townsville and Cairns. We assist our clients to fulfil their environmental management obligations and have a reputation for providing credible, independent advice. We service projects in Australia, Papua New Guinea and South East Asia. An innovator in the arena of environmental services, NRA provides environmental management and planning services at policy, strategic and operational levels. The company was established in 1984 and continues to set the standard for high quality, independent and professional services.

The information in this report is for the exclusive use of Environment Victoria, the only intended beneficiary of our work. NRA cannot be held liable for third party reliance on this document. This disclaimer brings the limitations of the investigations to the attention of the reader. The information herein could be different if the information upon which it is based is determined to be inaccurate or incomplete. The results of work carried out by others may have been used in the preparation of this report. These results have been used in good faith, and we are not responsible for their accuracy. The information herein is a professionally accurate account of the site conditions at the time of investigations; it is prepared in the context of inherent limitations associated with any investigation of this type. NRA's opinions in this document are subject to modification if additional information is obtained through further investigation, observations or analysis. They relate solely and exclusively to environmental management matters, and are based on the technical and practical experience of environmental practitioners. They are not presented as legal advice, nor do they represent decisions from the regulatory agencies charged with the administration of the relevant Acts. Any advice, opinions or recommendations contained in this document should be read and relied upon only in the context of the document as a whole and are considered current as of the date of this document.

NRA undertook a desk-based review of information provided by EnvVic *ie*:

1. Victoria Government Gazette, No S 104, Thursday 12 September 1996. Pages 1 to 96. Hereafter referred to as **Document 1**.
2. *Work Plan Variation Mining Licence 5004 Phase 2 of the West Field Development of Hazelwood Mine* (dated April 2009). This Work Plan was presented under an Explanatory Note prepared by the *Department of State Development Business and Innovation* (which reported that the Work Plan was released by the Department on 13 March 2014). Hereafter referred to as **Document 2**.

The review focused exclusively on the information presented by EnvVic as listed above. The review focused on land systems and did not address surface and/or groundwater aspects. A site visit was not undertaken, no review of specific technical data was undertaken, and specific review of the regulatory mechanisms (past and current) for the environmental management of the mining sector in Victoria was not undertaken. Each of these tasks would be required should further characterisation of mine rehabilitation aspects beyond that provided in this report be required.

The review was undertaken by Tim Anderson. He holds a Bachelor of Agricultural Science (Hons) degree majoring in the Land Resources stream, and a Master of Agricultural Science degree (research on soil physical, chemical and biological properties in stockpiles) awarded by the University of Queensland. Tim has practised in the management of land and water resources since graduating in 1984. He has over 25 years' experience working as a qualified scientist. He has a solid technical background and considerable regulatory experience, and has worked extensively on environmental management in the resources and infrastructure sector. Tim has regulatory experience gained while working in the Queensland Department of Mines, and post-graduate qualifications relevant to mine rehabilitation and extensive industry experience. Tim was Principal Environmental Advisor to Thiess for several coal mining related projects from 1996 to 2006 and Kagara Ltd's Queensland projects from 2001 to present. He has provided expert services to mining houses, Indigenous land holders, pastoral companies, and the Queensland State Government. He is a Certified Lead Auditor (Environmental) (No. 13704), a Certified Professional in Erosion and Sediment Control (CPESC Certificate No. 2723), a Certified Environmental Practitioner (CEnvP Certificate No. 002) and a past member of the Federal Ministerial Great Barrier Reef Consultative Committee (2005-2007).

Comments

Background to Mine Rehabilitation

Rehabilitation can be defined as the return of a disturbed site to a form, productivity level and environmental condition that conforms to an agreed land use that may not necessarily be the original use (adapted from Bell 1996).

The nature of disturbance, resulting landform and growing medium associated with some mining activities, the complexity of ecosystems, and relatively limited experience within environmental science disciplines mean that re-instatement to pre-disturbance condition and/or matching the condition of surrounding land, is not realistic for the vast majority of mining projects.

The technical approach to rehabilitation is straightforward; broadly, the rehabilitation work required is a function of:

- the characteristics of each land area (pre- and post-disturbance), and
- the desired rehabilitation outcome for each land area.

Specific rehabilitation tasks will be followed by:

- the monitoring of performance against nominated performance expectations
- necessary corrective actions
- ultimate validation of performance.

Planning and design are critical to achieving successful outcomes. Rehabilitation (planning, design and implementation) is directly dependent on the mine plan and schedule; for example, the evaluation of materials types, quantities and rates of production.

The ultimate test of rehabilitation success is the attainment of an agreed land use target (*eg* for conservation use or primary production), and the resilience of the rehabilitated landscape (*ie* its ability to resist degradation and retain function). A judgement of successful rehabilitation must be based on documented evidence.

Progress towards attaining the rehabilitation objectives should be assessed by the measurement of rehabilitation indicators. When developing rehabilitation completion criteria based on agricultural land use, prior land use and suitability and surrounding land uses should be considered. Time periods required to demonstrate success will vary depending on the land use but 5 years is considered realistic as agricultural systems, by their nature, are managed systems (*ie* they will receive regular inputs, such as fertilisers, cultivation and ongoing management). When developing rehabilitation completion criteria based on the establishment of native vegetation or ecosystems, the types of habitats or vegetation communities that will be established will be nominated. The appropriate attributes which must be manipulated and managed during the development period will vary for each situation, with a 15 year monitoring and validation timeframe considered appropriate to provide a justified level of confidence of success.

Experience in Queensland (and more widely in Australia and abroad) reveals that there are no simple solutions to achieving demonstrated, successful, on-the-ground rehabilitation performance. Haymont (2012) reported that for some parts of Australia, there are very significant areas of mining disturbance that clearly cannot be relinquished. Successful rehabilitation outcomes for mining related activities are scarce and it is clear that the task is plagued by complexity.

Hazelwood

Document 1

It is understood that **Document 1** is superseded by **Document 2** for a variety of matters concerning mine rehabilitation. It is not known (and cannot be determined by NRA without additional work) what, if any, components of **Document 1**, with the exception of the mining licence, remain current from a regulatory perspective.

The Mining Licence NO 5004 presented in **Document 1** is understood to remain current. The licence records the mine lease area of 2725ha[1] and specifies a rehabilitation bond of $15M. In terms of mine rehabilitation specifications, the licence defers to subordinate documents (approved Work Plan (incorporating a Rehabilitation Plan)). The following provides a brief commentary on each of the remaining documents contained in **Document 1**.

1. The *Morwell Mine Rehabilitation Concept Plan* (December 1994) stated "*the aim of the Rehabilitation Master Plan is to provide an overall vision for the ultimate rehabilitation of all disturbed land at Morwell Mine in compliance with policy requirements."*

   The Concept Plan referred to the *5-Year Rolling Implementation Plans* which were intended to provide the scheduling of ongoing rehabilitation to a five year projection. These were to be revised annually or as required. These plans were to contain sufficient detail to enable field works to be carried out to achieve the ultimate concept of the Rehabilitation Master Plan [sic].

[1] **Document 2** reports an increase in the mine lease area through the amalgamation of four new mining licences into Mining Licence NO 5004.

It included under the *Final Land Use* aspect:

- *"identification of potential future land use opportunities based on the return of the land to its pre-mined capability for agricultural and silvicultural uses.*
- *built-in flexibility of the plan to adapt to changing conditions."*.

It included under the *Ecological Management* aspect:

- *"Objectives for the re-establishment of a sustainable ecological regime for the area.*
- *Indication of conservation areas."*.

It included under the *Critical Decision Points* aspect:

- *"A list of key decisions and timing which have a significant effect on rehabilitation.*".

Further reporting that "*Point H (Critical Decision Points) will be formulated when key decisions are required. At this stage, key decisions on the long term future of the mine are yet to be made*.".

It is considered that *Morwell Mine Rehabilitation Concept Plan* presented a reasonable approach at the conceptual level, although the undertakings to return land to '*pre-mined capability for agricultural and silvicultural uses*' are considered not appropriate (as such an outcome may not be possible to achieve).

2. The *Land Capability Analysis Hazelwood Power Corporation Mine and Environs* (dated May 1995) notes that "*disturbed land forms have little in common with the pre-disturbed condition"* and that "*the final land uses may or may not reflect pre-disturbance conditions"*. This logic, which is considered appropriate, is not consistent with the earlier *Morwell Mine Rehabilitation Concept Plan.*

   The report presents recommended land uses for disturbance areas together with limitations. The land ratings undertaken were reported as '*broad level analysis'*. For some disturbance areas, a specific use or combination of uses is nominated, though not for all disturbance areas. No specifications are provided for grazing capacity, which is an important attribute. It is noted that a limitation of dispersive clays exist noting that "*disturbed 'soil' is often a mixture of a number of soil horizons including heavy clays and coal from overburden to considerable depths*". Landforms having these properties would be expected to be potentially difficult to manage from a rehabilitation perspective.

3. The *Hazelwood Power Corporation (HPC) 5 Year Rolling Mine Rehabilitation Plans Summer – Autumn 1996* in isolation does not provide sufficient information for implementation purposes. The drawings provided are in part illegible. The rehabilitation works proposed appear to primarily, though not exclusively, involve revegetation. Specifications that define important attributes for rehabilitation planning and implementation are not apparent. These include, though are not limited to, depth of soil respreading, seeding rates and planting densities. In terms of practicalities of rehabilitation planning and implementation, beyond the apparent absence of key specifications (*eg* depth of soil respreading), there is no apparent materials balance related information; for example, volumes of soil required for respreading and haul distance related information; neither does there appear to be specific information on the bulk earthworks effort (the need for reshaping is stated and the drawings indicate the work area and possibly the final landform). Information that provides the necessary detail may be available in other documents that have not been provided to NRA.

4. The *Hazelwood Power Corporation Mining Licence Application Work Plan Submission 1 June 1995.* It is understood that the Work Plan is not intended to present specific detail necessary to implement rehabilitation, with this information to be documented in other documents (refer above).

The Work Plan includes statements concerning rehabilitation, some as follows:

- *"Hazelwood Power Corporation has made a strong commitment to rehabilitate land disturbed by mining operations in accordance with community expectations."*
- *"The Mine has a long standing policy to ensure that all land disturbed by mining is stabilised and landscaped to blend into or complement natural features."*
- *"The areas surrounding the Mine will ultimately be used for grazing, conservation, active and passive recreation, wetlands habitat and forestry."*
- *"Progressive rehabilitation of the Mine overburden batters and external overburden dumps occurs each summer as operations move clear of the area."*
- *"A Rehabilitation Concept Master Plan has been produced for the Mine. Its purpose is to provide an overall vision for the ultimate rehabilitation of all land disturbed by mining activities."*
- *"A 5-Year Rolling Implementation Plan has been prepared for the Mine. Its purpose is to schedule ongoing rehabilitation to a five year projection and is revised annually or as required."*
- *"Revegetation, in keeping with the Rehabilitation Concept Master Plan, is aimed at returning the land disturbed by mining to its pre-mining state. That is, forest cleared last century to open woodland for agriculture."*
- *"Former wetland areas, drained to allow mining development, have been able to be reinstated and developed (as advised by consultants) into viable eco-systems."*
- *"Each year's rehabilitation project work is audited and reported against financial and quantitative performance targets to management and the Rehabilitation Consultative Group."*

As stated previously, statements "*returning the land disturbed by mining to its pre-mining state"* are not considered appropriate.

The Work Plan reports that certain areas (wetland areas) had been reinstated and developed into viable ecosystems; though, neither success criteria nor data was presented or referenced in the Work Plan to support the statement.

Document 2

It is understood that **Document 2** is a variation to the Work Plan. It is not known if this is the sole variation to the Work Plan. As stated above, it is not known (and cannot be determined by NRA without additional work) what, if any, components of **Document 1**, with the exception of the mining licence, remain current from a regulatory perspective.

Document 2 refers to a rehabilitation plan that is updated every five years ("*IPRH has progressively rehabilitated the Hazelwood Mine overburden batters and external overburden dumps under a plan that is updated every five years. The mine closure and rehabilitation concept for Phase 2 will be integrated with rehabilitation plans for the entire mine.").* The periodicity of updates to the rehabilitation plan discussed in **Document 2** differs from that applicable to the '5 Year Rolling Plan' discussed in **Document 1** (*ie* every 5 years *cf* annually).

In terms of rehabilitation, **Document 2** states "*The mine closure and rehabilitation concept for Phase 2 will be integrated with rehabilitation plans for the entire mine.*". As stated previously, it is not known, nor is it made clear in **Document 2**, to what extent the information in **Document 2** replaces that presented in **Document 1** concerning the specifics of rehabilitation (*ie* 'Concept Plan' and 'Rolling 5 Year Plan').

Apart from the obvious implications, the following points are made to bring to attention some of the challenges associated with the apparent lack of integration observed between **Document 1** and **Document 2**; together with items of relevance to rehabilitation.

1. The rehabilitation goals and objectives listed in **Document 2** introduce differences to the relevant statements made in **Document 1**.

   "The strategic rehabilitation and mine closure goal for the ultimate completion of the Hazelwood Mine, including West Field, is to:

   Provide a technically feasible, safe, stable and sustainable landscape that reflects the aspirations of stakeholders within the practical constraints of rehabilitation for the mine.

   This goal requires the following objectives to be met:

   - *A safe and stable self-supporting structure.*
   - *To maximise the opportunities for establishment of a self-sustaining ecosystem.*
   - *To minimise the use of natural resources.*
   - *To minimise the cost of recovery of resources.".*

2. As stated above the periodicity of updates to the rehabilitation plan discussed in **Document 2** differs from that applicable to the '5 Year Rolling Plan' discussed in **Document 1** (*ie* every 5 years *cf* annually).

3. **Document 2** reports for Phase 1 and Phase 2 mining areas – "*The topsoil analysis indicates that much of the topsoil is of poor quality and structure and unsuited to storage. ……Stockpiling of topsoil to date has proven to effectively destroy the topsoil. Further investigations are being considered to try and effectively stockpile topsoil for later use, until this can be successfully undertaken there is no value in stockpiling.".* The implication being that where the soil is not suitable, an alternate suitable growing medium will need to be provided where rehabilitation involves a revegetation component.

4. With reference to rehabilitation material/ecosystem function, **Document 2** states *"Material mined comprises approximately 20% overburden (less than 7% of which is topsoil) and 80% coal. As the area of exposed coal batters exceeds the area from which topsoil is removed, final rehabilitation will require revegetation with coal and overburden-tolerant species and will result in a modified ecosystem.".* Further reporting states:

   - "*Revegetation options are constrained by a shortage of topsoil."*
   - "*The IPRH site-specific species planting guide may be augmented by vegetation trials to identify vegetation that is either coal/overburden tolerant or adaptable to inundation. Such trials will not commence before completion of the RRR project revegetation works program (nominally 2011) to balance resource demands.*"
   - *"IPRH will undertake further investigations to continue the process of optimising outcomes for mine closure and rehabilitation, including:……*
     - *Establish trial plots to determine the ratio of coal to overburden required to achieve optimal revegetation treatments (i.e., moisture content, nutrient level, organic matter, fertiliser application and stability).*
     - *Establish controlled test plots to determine the indigenous species most responsive to the planned revegetation treatment.*
     - *Assess planting techniques to determine which ones achieve optimal coverage of tree species, particularly those species that regenerate following fire.".*

5. **Document 2** reports limitations to progressive rehabilitation and presents a 'base case' for mine closure stating that it is unreasonable to prejudge community aspirations that may prevail at the time of closure.

6. There appears to be no specific information provided in **Document 2** for:
   - Material balance (volumes of material required *eg* cover material if required (it appears that some of the overburden material is dispersive and without specific information to the contrary, it is reasonable to suggest that a cover layer may be required for specific problematic areas); growing media; material availability and haulage distance). This information is necessary to plan and implement rehabilitation (as well as estimate costs and time periods).
   - Depth of soil replacement (or in the absence of soil, an alternate suitable growing medium). The detail provided is considered to be conceptual and without specific evidence of efficacy, is considered unproven, for example, "*Overburden faces from above the completed coal benches will be pushed down to create final shape. This same overburden will be placed over the coal batters in sufficient quantities to allow plant growth to achieve long term stability.*".

7. **Document 2**, Appendix A - *International Power Hazelwood Code of Practice Revegetation Guide 2004* states:
   - *"International Power Hazelwood and its predecessor the former SECV have been establishing indigenous trees, shrubs and grasses on overburden dumps and other grossly disturbed sites for more than a decade. Through trial and error, and more recently, monitoring of these plantings, a broad range of indigenous plants that are reliable for planting on disturbed areas, including those without topsoil, have been identified.*
   - *However, each disturbed area requires detailed assessment prior to plant selection. The soils, aspect, elevation, slope, drainage and other conditions must be taken into account when compiling plant lists for revegetation. While plantings on grossly disturbed sites have produced successful results, there is still much to learn, and failures of recalcitrant species can and do occur. Long-term survivability is of utmost importance. It is suggested that each new disturbed landform is assessed and compared to other similar sites where plantings have proven successful."*

   This information highlights the need for work to determine vegetation species to be incorporated into the species mix for specific disturbance areas.

   The Guide provides no specific information on species mix (it does provide a species list divided into groupings), rates of application, planting densities and/or fertiliser regime, success criteria and monitoring methods to validate performance. It does provide information on seed collection periods.

8. **Document 2**, Appendix B - *IPRH Rehabilitation Progress Report 2008* states:
   - "*The requirements for Final Rehabilitation are as follows:*
     - *The post-mining landscape is safe and stable.*
     - *The quality of surrounding water resources is protected.*
     - *The post-mining land use is sustainable and agreeable to both the local community and Government.*
     - *Success criteria are agreed to by stakeholders, monitored and reported."*.

     It appears that success criteria have not been nominated. These may be nominated in other documents not made available to NRA.
   - "*A total of approximately 625 ha of disturbed land has been rehabilitated to date*.".

     No information is provided to demonstrate the success or otherwise of this rehabilitation; though the report states "*The rehabilitation works are reported progressively to the Victorian Government Regulators and the public through the IPRH Environmental Review Committee (ERC) which meets quarterly. There is also a short annual (mid-year) report to DPI*".

- The report refers to reports presented in **Document 1** (*ie* the Concept Plan), the inference being that the Concept Plan remains current. With reference to some areas of rehabilitation work on Eastern Overburden Dump, the report states "*The cleared site will then require considerable re-working to repair erosion scars and to stabilise the batters. The area will have to be topsoiled, sown to pasture grass and revegetated with native trees.*". The implication being the longevity of rehabilitation works is uncertain, and should soil resources be limited (as appears to be the case based on statements made in **Document 2**) then alternate suitable growing medium will be required.
- There is no documentation provided to support statements that infer and/or allude to successful rehabilitation such as :

  "*The west side of the dump facing the main Morwell-Hazelwood road has also been landscaped using flatter batters, covered with topsoil and sown to pasture crop. Clumps of Upperstorey trees were planted and fencing installed. However, the site was subsequently overdumped and most of the previously rehabilitated land features, including trees, were disturbed. The site has since been revegetated again and is recovering well.*".

In conclusion and based on the documents provided (noting that other documents not available to NRA may exist and may provide additional relevant information), the following points are provided:

1. The specific agreed rehabilitation outcomes for each disturbance area appear absent or ill-defined. Specifications that NRA considers to be guiding information critical to rehabilitation change from document to document.
2. Success criteria for final rehabilitation appear not to be defined (*IPRH Mine Rehabilitation Progress Report 2008* which is presented as Appendix B in **Document 1** notes that agreed success criteria is a requirement for final rehabilitation). Without well-defined and measurable success criteria, it is not possible to validate the achievement of agreed outcomes through monitoring.
3. There appears to be insufficient information to quantify the disturbance areas. Refinement of disturbance areas based on disturbance type appears deficient.
4. The information necessary to plan, provide cost estimates, schedule and implement rehabilitation is insufficient and arguably absent. There is uncertainty in the documents as to the most successful methods for rehabilitation at this site.
5. Based on the information provided, it is not possible to provide an estimate for the rehabilitation costs without severe qualifications that would make the estimate potentially meaningless.
6. It is noted that the lease area in 1996 was 2725 ha which increased by an area (not known to NRA) at a later date. Of the lease area it appears reasonable to estimate the area disturbed by mining to be in the order of no less than 1000 ha. The disturbance types include areas (some overburden piles) that appear to have problematic physical properties. Further soil resources appear to be a limiting factor in terms of the rehabilitation program. The preceding points (1, 2, 3, 4 and 5) restrict the cost estimation of rehabilitation works for the site. Further, NRA has no information on specific assessment and calculations undertaken to determine the $15M security bond reported in **Document 1**. **Attachment 1** presents an extract from the spreadsheet issued by the Queensland Government relevant to calculating rehabilitation costs in Queensland. Although site-specific information should always apply, the information in the spreadsheet is of relevance in terms of the components of rehabilitation and the order of magnitude of costs. NRA's opinion, noting the obvious limitations stated above and assuming that the minimal rehabilitation target was to have vegetative cover (other than weeds) that has no anthropogenic use and effectively reverts to bushland with receiving waters not significantly impacted, is that a significantly greater amount of money would be required for the Victoria Government to undertake rehabilitation works at the Hazelwood Mine than allowed for by $15M.

Please contact the undersigned should there be any points of clarification required.

Yours sincerely

NRA Environmental Consultants

Tim Anderson
Principal Scientist

Enc: Attachment 1 - Extract from Rehabilitation Cost Calculator in use in Queensland (sourced 7 May 2014 from http://www.business.qld.gov.au/business/running/environment/licences-permits/ financial-assurance-rehabilitation/financial-assurance-security-deposit).

References

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