

Mine Rehabilitation and Closure Cost

A Hidden Business Risk



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SUMMARY

The accuracy of mine closure and rehabilitation liabilities can have a material impact on the valuation of a mining company. Closing the current generation of very large open pit operations across various commodities will certainly be in the order of hundreds of millions and in many cases be in excess of a billion dollars for a single asset. The cumulative impact of closure obligations on a corporate balance sheet should not be underestimated.

Currently, it is our view the accuracy of closure provisions are not adequately scrutinized in annual reports and neither are the risks associated with mine closure. Given the order of magnitude of the costs of closure and the associated technical, financial, reputational and regulatory risks, closure costs deserve far more scrutiny.

This report uses a series of contemporary case studies to illustrate that mining companies appear to consistently underestimate the cost of mine closure. Equally the whole issue of closure risk is not dealt with in any depth in any annual or sustainability reports.

This lack of accuracy and transparency can erode balance sheets over time depending on the particular company's assets, their timeframe to closure and the cost of satisfying increasingly stringent closure regulatory requirements and changing public expectations.

In summary we found:

Oz Minerals: Significant underestimation of the cost of rehabilitating the waste rock dumps and tailings storage facilities by between \$A100m-200m;

MMG: MMG inherited a closure provision of approximately \$A169m in 2008 when it purchased the majority of Oz Minerals' assets which escalated to \$US805m in 2015;

ERA Ranger Mine: A constant revision of the cost of rehabilitating the Ranger Uranium Mine from \$A1m in 2004 to \$A600m+ in 2016;

Rio Tinto Blair Athol Mine: The Government financial assurance calculated by Rio Tinto and held for the closure and rehabilitation of Blair Athol stands at \$A79.7m. However applying the default values in the QLD Governments Financial Assurance calculator and adjusting other costs accordingly, generates a rehabilitation cost closer to \$A160m.

The Latrobe Valley coal mines: Following the Hazelwood Inquiry into the Morwell coal mine fire, the Victorian Government raised the financial assurance for the Yallourn, Hazelwood and Loy Yang brown coal mines from a collective \$A41m to \$A254m.

INTRODUCTION

Investors and financial analysts should take greater interest in and demand greater transparency in regards to mine closure liabilities because the way closure costs and risks are represented on corporate balance sheets masks a potentially material business risk.

In spite of a strong business case to invest in mine closure planning early in the project cycle to minimise total cost by maximizing progressive rehabilitation throughout the operations life, mining companies continue to prioritise short-term cash flow over long-term risk management. Until recently, the pervasive view within the industry and amongst investors has been that poor closure and rehabilitation is a long-term issue with only minimal risk.

This situation is changing rapidly.

Increasing public awareness, driven in part by a number of NGO campaigns, of the industry's poor track record, weak regulation and the growing burden on the tax payer of more than 50,000 abandoned mines across Australia is bringing the issue of mine rehabilitation onto the political radar. The controversy surrounding the Queensland Nickel Refinery, the closure of the equally controversial Ranger Uranium Mine and the Century Zinc Mine in Queensland and the first closure of "mega" coal mines in NSW (Anglo American's Drayton) and Queensland (Rio Tinto's Blair Athol) is impacting regulatory behavior and law makers are paying more attention.

The ongoing debate regarding the adequacy of financial assurances and the historical acceptance of discounts for a firm's now questionable financial state will inevitably focus attention on the accuracy of provisions and how mining companies account for their closure cost liabilities. This issue would be crystalised if State governments moved to end the use of care and maintenance provisions as an alternative to implementing a formal closure plan.

Already we have seen Queensland take measures to ensure cleanup costs will be paid if not by the company, but by related persons such as directors, in the form of the Chain of Responsibility 2016 amendments to the Environmental Protection Act. In Victoria, the fallout from the Hazelwood Inquiry resulted a massive relative increase on brown coal mine bonds.

The industry has consistently run the line that mining is a temporary land use and that "previously mined land is available for future economic activity, conservation or community use."¹

However, the legacy of 50,000 abandoned mines across Australia, significant numbers of mines in perpetual care and maintenance due to failed rehabilitation and the failure of the industry to deliver the relinquishment of mines following successful rehabilitation outcomes is exposing the sector to increased public and political scrutiny. This will eventually undermine the industry's social licence, increase cost and inhibit their ability to grow.

Up until now, closure and rehabilitation costs have rarely been on the investor radar. This will need to change as the risk profile and exposure of the industry to the issue increases. Over 2016 the issue has become more visible.

Rio Tinto's attempt in 2013 to sell the closed Blair Athol mine to Linc Energy was blocked by the regulator on the grounds that Linc did not have

the financial or technical capacity to deliver the required rehabilitation outcomes.² The subsequent proposed sale of Blair Athol to TerraCom in July 2016 for A\$1 is expected to raise similar regulatory concerns.³

A second relevant example relates to BHP's Nickel West assets. It is time investors took note.

As reported in the Australian Financial Review in May 2014:

"Environmental liabilities of up to \$2 billion attached to BHP Billiton's Nickel West operations in Western Australia are proving to be a major hurdle as the mining giant attempts to offload the struggling project.

BHP owns and operates the third-largest nickel business in the world but it is a commodity it considers non-core, and is keen to exit. Deutsche Bank analyst Paul Young says environmental liabilities on Nickel West could deter a foreign buyer:

'If you are a foreign company wanting to invest in Australia and all of a sudden you are taking on a liability which could put your corporate governance and reputation at risk, then why would you take that on. You just wouldn't do that.'

Figures on BHP's environmental liabilities for the operations are not publicly available but UBS estimates the exposure at between \$1 billion and \$2 billion. It would include closures, rehabilitation and future site monitoring plans for the key mines, smelter and refinery sites."⁴

ENHANCED TRANSPARENCY: What Investors Need to Know

In order to better understand mine closure and rehabilitation risks, investors and shareholders should request the following information from mining firms:

1. Timeframe to closure for each asset;
2. Total estimated cost of closure for each asset both in terms of the present closure obligation (unplanned closure) and total projected cost (at the end of the mine's life – before and after discounting for time values);
3. The mine closure risk assessment for each asset;
4. The rehabilitation bonds and financial assurance held as an offset;
5. Investment to date in progressive rehabilitation – the current disturbed land to rehabilitation ratio for each mine site; and,
6. Commodity price forecasts against mine closure timeframes.

Mine Closure and Rehabilitation Risks

Mine closure and rehabilitation is a key business risk because:

Undervaluation of closure costs can impact the balance sheet

A “sleeper” contingent liability impacts the valuation of the company particularly those mining companies with low cash flow and a narrow asset base. Significant closure liabilities can impact available cash reserves and shareholder distributions. Should companies need to significantly adjust their closure provisions, the risk profile, credit ratings and share prices could be negatively impacted.

Mine closure is expensive

Large open cut mines can cost hundreds of millions - and some cases - over a billion dollars to close. Currently, the Ranger Uranium Mine and Century Mine (zinc) are the two largest mine closures to date. These two mines will cost in the vicinity of \$750m to \$1bn to close once complete, and the outcomes in regards to residual risks and perpetual liabilities the parent companies – Rio Tinto and MMG respectively - are at this stage unknown.

The timing and magnitude of mine closures has the potential to impact balance sheets

Perhaps the most serious risk is to cash flow. If a company’s portfolio is dominated by aging or short life assets then there is a risk that closure costs will start mounting as assets close in

relatively quick succession and impact free cash flow. This may be exacerbated by the current sustained downturn in commodity prices which will bring closure forward.

Rehabilitation performance as a risk to future growth

Maintaining a social licence and securing access to land increasingly requires companies to demonstrate successful rehabilitation outcomes as a key performance indicator particularly as the next generation of large and “mega” open cut mines become exhausted or are shut for other reasons. Failure to demonstrate successful rehabilitation is likely to lead to approval delays and in the worst case total loss of future development opportunities.

Mine closure is high risk from a technical standpoint

Mine closure is complex and the technical challenges are starkly different to those experienced building and operating a mine. The Mary Kathleen Uranium Mine was rehabilitated and relinquished in 1986 winning an award for technical excellence at the time. The waste encapsulation dump has subsequently failed with the liability and associated costs now residing with the Queensland Government.

The relinquishment of these large liabilities cannot be assumed

The ability of mining companies to fully relinquish these liabilities remains doubtful as State Governments are increasing reluctant to approve divestments and take on the residual liability risks. This means Australian mining companies are likely to accrue a large portfolio of multi-decade liabilities over time as the current generation of very large coal, base metal and iron ore mines start to close.

Reputational/Brand risk

Mine rehabilitation issues are increasingly visible. As NGO campaigns begin to bite and public awareness in regards to historical mine legacies and the industry's performance increases, the failure of mining companies to meet changing public expectations will erode corporate reputations. This situation is exacerbated by the "rhetorical-reality gap" between the industry's historical commitments to sustainable land use and attempts to position mining as a temporary land use that delivers positive legacies and its actual track record. This reputational damage can impact a broad range of stakeholders including Government, communities and civil society at local, national and global levels as well as employees, contractors, suppliers and customers. The financial impact of the damage to reputation is notoriously difficult to quantify. Nonetheless, it can represent a significant risk if new development opportunities are lost to competitors or regulation is increased as a result of a poor mine rehabilitation track record.

Closing mines is not core business for mining companies in Australia

Mining companies reduced their environmental and closure capacity post mining boom and have not retained the prerequisite skills and experience in-house. Australian mining companies have no consistent experience closing, rehabilitating and relinquishing large scale open cut mines in Australia. Mine closure is not generally seen as core business and is not, therefore, part of the corporate "DNA". It is generally seen as a marginal, long-term environmental risk.

The industry's historical track record is poor

The Australian landscape is littered with over 50,000 abandoned mines. While the majority of these are small, in Queensland alone there are 120 to 130 medium sized abandoned mine sites most likely to have infrastructure, such as tailings dams and 317 giant, very large, large or medium sized abandoned mines.⁵ Historically, public awareness of the abandoned mines legacy has been poor. However, environmental NGOs are beginning to focus on the abandoned mines issue resulting in greater public awareness which is forcing regulators to react to protect the public interest. The fallout from the Hazelwood inquiry in Victoria and the passing of the Chain of Responsibility amendments to Queensland's Environmental Protection Act in April 2016 are testaments to this fact. This trend is set to continue as the public pressure to reform mine rehabilitation regulation grows.

Case Study 1 - Oz Minerals

Oz Minerals owns a single operating asset, a large copper and gold operation at Prominent Hill in outback South Australia. This operation consists of a single large open pit which is approximately 500m deep, 1.2 km wide and 1.4km long⁶ and two underground operations. The open cut will end production in 2018.

It appears that there will be no requirement to backfill the pit, meaning the largest cost will be the closure, rehabilitation and management of the tailings storage facility and the waste rock dumps. Collectively known as the Integrated Waste Landform (IWL) this contaminated waste storage facility covers 888.2 hectares.⁷

According to the 2015 Annual Report, Oz Minerals has a total mine rehabilitation and closure provision of \$A30.9m. This modest sum increased from 2014 by 50% or \$A10.7 million due to "revisions in mine rehabilitation cost estimates and changes in the estimated timing of rehabilitation activities at Prominent Hill and initial recognition of a provision for Carrapateena".⁸

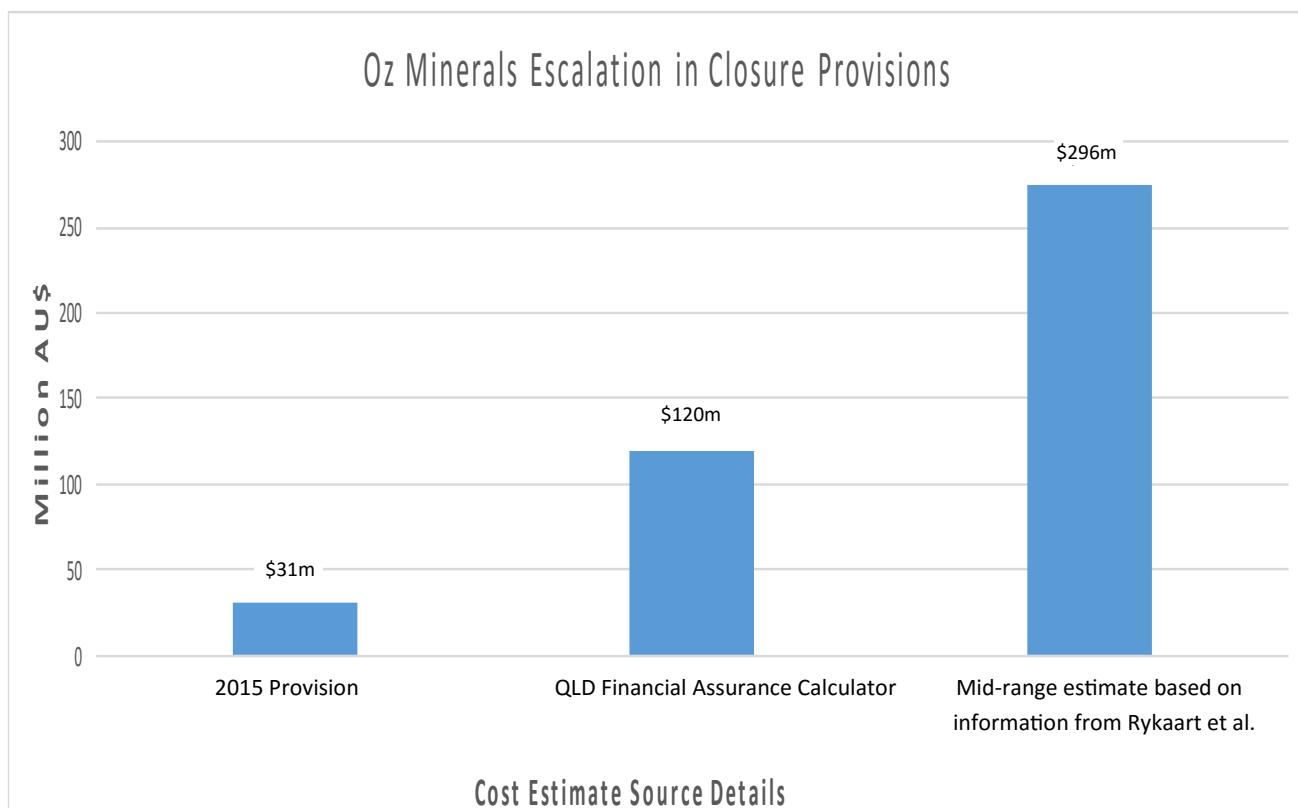
The focus of closure planning will be the IWL, which will be the most significant closure feature within the landscape and the largest area of disturbance requiring rehabilitation. According to Oz Minerals, cover trials will be established to determine the most appropriate method for covering the potentially acid forming (PAF) encapsulation sections (e.g., store and release covers or water shedding covers) of the IWL, and the IWL in general.

Oz Minerals anticipates that establishing a full and functional vegetative cover on the entire surface of the IWL will be "extremely difficult, if not impossible", to achieve, given the site conditions. Rock armouring (i.e., placement of a protective rock layer over the angle of repose slopes and top surfaces) is therefore considered the most appropriate mechanism to meet the IWL rehabilitation objectives and is proposed as the 'base case' for rehabilitation of the IWL.⁹

Case Study 1 - Oz Minerals

A 2006 study by Rykaart, Hockley, Noel and Paul¹⁰ surveyed the cost of covers across 16 countries including Australia. In regards to covers designed to adequately manage mine waste by reducing infiltration, they found that a simple, single layer cover can cost up to \$US100,000 per hectare whereas complex multi-layer covers can cost up to \$US500,000 per hectare. Adjusted for inflation and the exchange rate, this data suggests Oz Minerals has underestimated the cost of cover installation significantly. Based on an mid-range cost of \$US250,000 at an exchange rate of \$.75 AUD/US, then the cost of covering the IWL (assuming 888 hectares is approximately \$A296m). Basing the cover cost on a more conservative estimate, the TSF cover default per hectare cost of \$A136,000 (used in the Queensland Government's financial assurance calculator), the cover cost for the IWL comes in at \$A120m.

Given these costs do not include dealing with the water management in the pit void in perpetuity, the underground operations or the dismantling and rehabilitation of the processing plant, the maintenance facilities, administration, ROM pad, village, airstrip and other costs, Oz Mineral's closure provision is \$A30.9m, which appears to significantly underestimate the closure liability. The impact of a more realistic closure cost estimate on the value of the company maybe material even relative to its current equity capitalisation of A\$1.8bn.¹¹ A substantial review and revision appears warranted.



Case Study 2 - MMG

MMG was formed following the acquisition of the majority of Oz Minerals' assets in 2009 for a reported \$US1.386bn.¹²

This included the Century, Golden Grove, Rosebery and Sepon mines; the Dugald River and Izok Corridor development projects and a range of exploration tenements. MMG did not purchase the Prominent Hill Copper/Gold mine and the Martabe Gold Project.

Since the purchase of the Oz Minerals assets, MMG has purchased the Kinsevere copper mine in the Democratic Republic of the Congo and the Las Bambas copper project in Peru.

At the time of the MMG purchase as documented in the Oz Minerals 2008 Annual Report, the aggregated (current and non-current) mine rehabilitation, restoration and dismantling provision stood at \$A169.1m.¹³ Our understanding is that neither the Prominent Hill Copper/Gold Project and the Martabe Gold Project were included in the provision making this figure an accurate reflection of the provisions inherited by MMG at the time of purchase.

In the 2015 MMG Annual report, the total aggregated mine rehabilitation, restoration and dismantling provision stood at \$US805m¹⁴, a five-fold increase in seven years on the OZ Minerals provision.

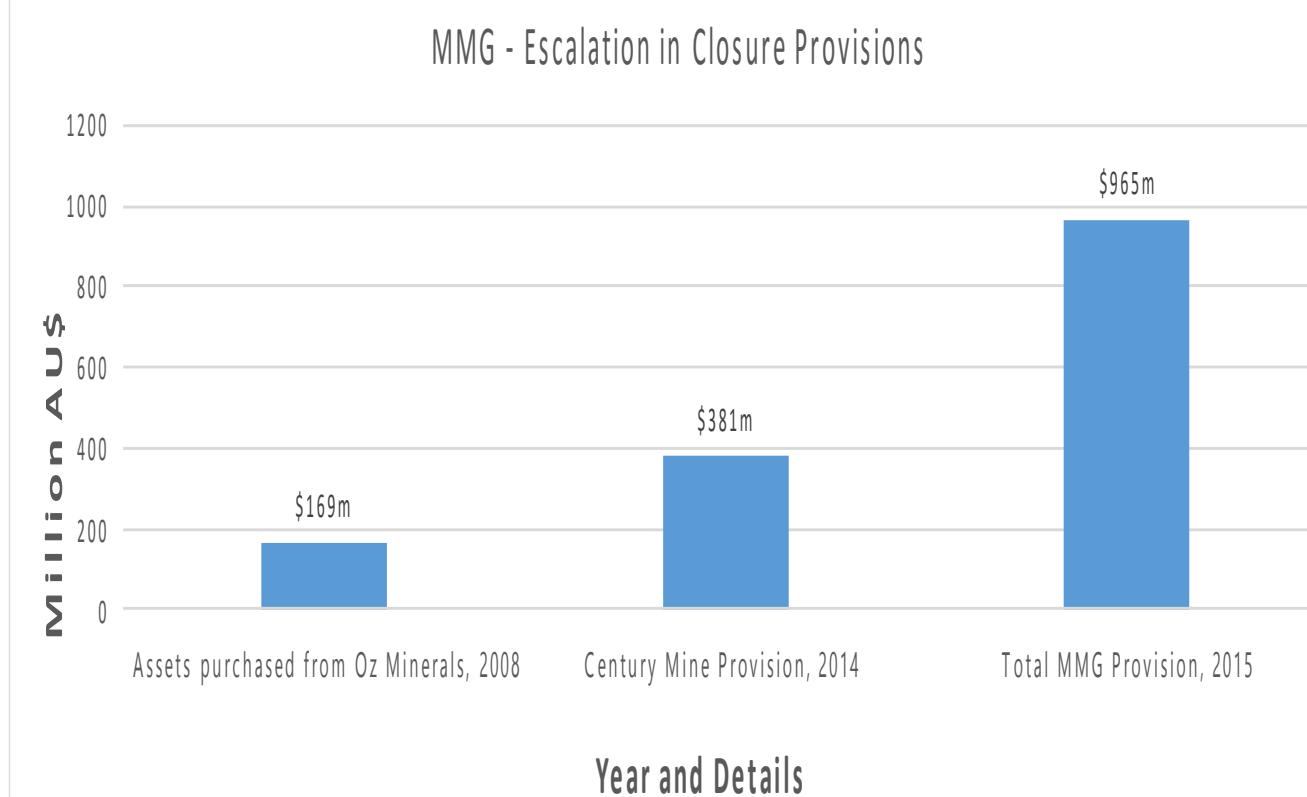
The Las Bambas copper project is included in the 2015 MMG provision by virtue of a \$A30.7m adjustment in 2014.¹⁵ It is not possible to disaggregate the provision number, but the size of the Kinsevere operation will not in and of itself explain the fivefold increase in the provision.

The single biggest contribution to the increase in the provision is the closure of the Century Zinc Mine in north-west Queensland. In the 2015 Annual Report, the company acknowledges that the provision for Century was increased by a considerable of US\$146.3million¹⁶ at the end of 2014. According to a Reuters report, "MMG has provisioned an amount of US\$378.1 million to allow for the closure of Century, an increase of US\$146.3 million from the 2013 level. MMG expects to spend US\$39.8 million in 2015 on the rehabilitation of land as part of the site's plan for closure. It is expected that progressive rehabilitation of the area will take place over approximately 40 years."¹⁷

The MMG case study illustrates two points. Firstly, mine rehabilitation provisions can be unreliable and, secondly, closing mines is an expensive business.

The publicly quoted closure cost figure of \$US378m for Century dwarfs the total Oz Minerals provision at the time of MMG's acquisition (\$A169.1m), suggesting Oz Minerals underestimated the scope of the closure task.

It would appear that similar under-reporting of closure liabilities continues at MMG. The total disturbed area for the Las Bambas Project as reported in MMG's 2015 Sustainability Report stands at 4,588ha¹⁸ yet the provision for Las Bambas stands at \$30.7m in 2014.¹⁹



Best practice closure cost estimation includes a contingency line item that is designed to reflect the level of uncertainty depending on the stage of the operations life cycle and time frame to closure – see table below. The inclusion of contingency in the cost estimate is designed to limit “shocks” in regards to the adjustment of provisions.

In regards to MMG Century, we suggest that the accounting practices employed by both Oz Minerals and MMG failed to include an adequate

contingency. If inadequate contingencies have been applied to other MMG assets, then further adjustments may be needed in the future. Of particular relevance is MMG’s Sepon operation in Laos which has a large footprint, and significant waste management issues and associated risks and is due to close in 2020.²⁰ Similarly MMG’s Rosebery mine in Tasmania is due to close in 2023. MMG’s closure costs are stacking up.

Closure Plan level	Accuracy	Expected Contingency Range
High level conceptual only 10 years + from closure	+/-30% to +/-40%	25%-40%
Designs and costings to a Pre-Feasibility level 3 to 10 years from closure	+/- 20% to +/- 30%	15%-25%
Detailed closure plan <3 years from closure	+/-10% to +/-15%	10%-15%

In regards to the overall cost of closing Century, given the magnitude of the task, the \$US378m figure would appear to be low based on a comparison with the likes of the Ranger mine. The low figure for Century may be a result of discounting even though the mine has ceased production and is in active closure. The un-discounted Present Closure Obligation number for the Century Mine calculation may be a more accurate reflection of the ultimate cost of closure.

The Century example raises questions regarding the accuracy of the provisions for MMG’s other assets and illustrates (along with the Oz Minerals and ERA examples – see below) that mining companies underestimate the real cost of closure because the complexity, risks and costs of mine closure is poorly understood.

MMG has never closed a mine before and is only now discovering the reality of closing a large open pit base metals mine. Government imposed closure obligations and completion criteria are legally binding and the process of satisfying these statutory obligation has forced MMG to revise the cost of the Century closure upwards. It is entirely plausible to expect that the cost will rise further given the relinquishment process is ill-defined in Queensland.

The impact of any upward revision of closure costs for Century, Sepon and MMG’s other operations on its balance sheet is unknown.

Case Study 3 - ERA Ranger Uranium Mine

Tracking internal reports and media statements of various companies illustrates that closure cost estimations are consistently underestimated in the early stages of a projects life, only to escalate as the company's closure cost estimations become more detailed as closure looms.

ERA's Ranger Uranium Mine is a case in point. The huge increase in the rehabilitation provision between 2004 and 2005 is inadequately explained in ERA's 2005 annual report. This illustrates a serious lack of transparency in the reporting on the company's provisioning process.

This consistent under-estimation illustrates that in the vast majority of cases "best practice" closure cost accounting is not applied as this would mitigate against the repeated, significant revision of the closure cost estimate.

This case study chronicles the escalation of Ranger's closure costs between 2004 and 2016:

- ◊ 2004: The Annual report cites total rehabilitation provisions of **A\$1m**, down from **A\$2.7m** in 2003²¹.
- ◊ 2005: The 2005 annual report books a massive increase in the overall provision from A\$1m in 2004 to **A\$186m** in 2005²². The \$166m 2004 figure cited in the 2005 Annual Report does not align in any way

with the same line item in the 2004 Annual Report of A\$1m. Note (16 (m)) on pages 44 and 45 of the 2005 document does nothing to explain this retrospective adjustment to downgrade retained profits after the event to build the provision.

◊ 2008: "ERA is required to provide financial security to ensure that the country can be remediated in the event the company or its operations are closed in an unexpected manner. At 31 December, 2008 security of **A\$149 million**²³ was held by the Commonwealth Government in respect of the Ranger Project Area." The 2008 Annual Report cites total non-current and current provisions of **A\$197m**²⁴ illustrating not only a substantial increase in the provision since 2004 but also the gap between what is held by the Government and the actual amount Director's reported as required for rehabilitation.

◊ 2012: **ERA adds A\$251m to Ranger closure plan:** "The CEO of uranium miner Energy Resources of Australia, Rob Atkinson, told shareholders that the company had increased the provision for the closure of its Ranger mine, in the Northern Territory, **from A\$314m to A\$565m**, following a desktop review."²⁵

Case Study 3 - ERA Ranger Uranium Mine

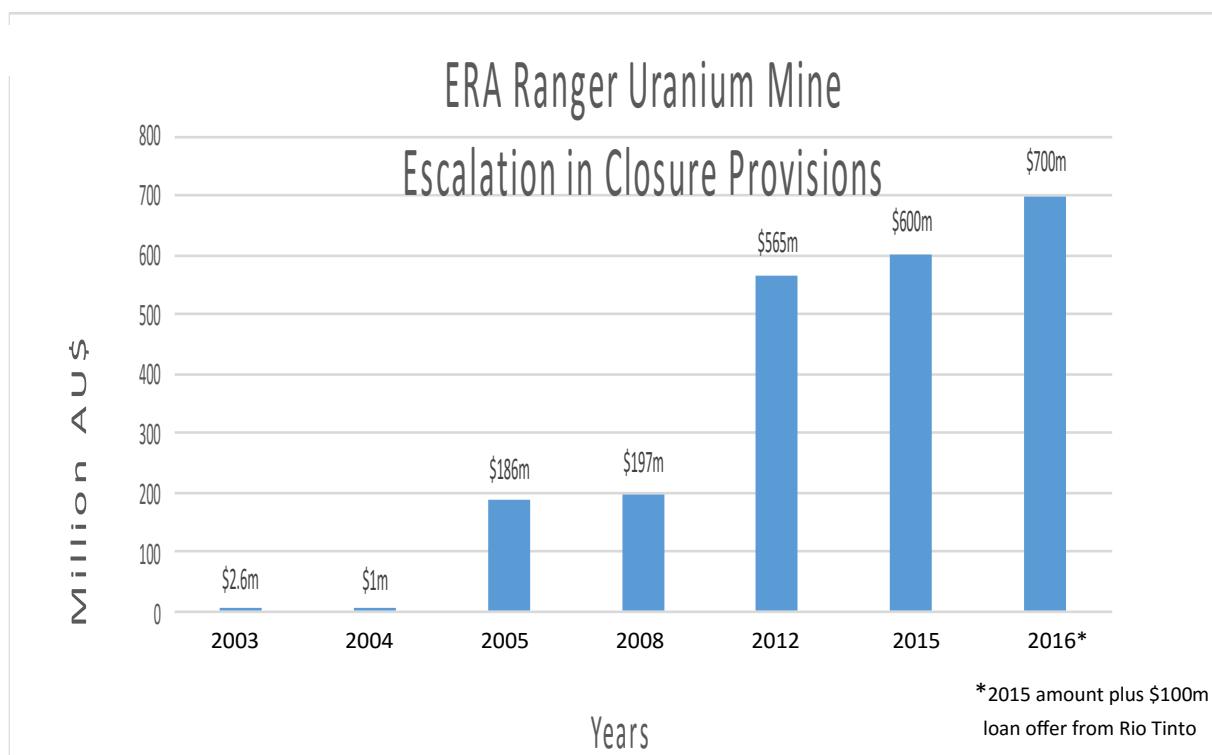
- ◊ December 2014: Importantly, given current low uranium prices persist, it looks like that support will be needed. ERA is presently sitting on \$293m in cash and has \$66.8m invested in the Ranger rehabilitation trust. ERA's most recent annual report puts the future rehab liability at **\$512m and its potential unfunded liability at \$445m.** The equity market's very obvious, and quite expensive, shock at this confirmation of Rio's Ranger ambivalence is something of a surprise given that *AFR Weekend* reported the real and imminent potential for just this outcome back in early April.²⁶
- ◊ June 2015: Rio Tinto could also be compelled to step in to ensure that in the event that Ranger's life is not extended beyond the current treatment of stockpiles, ERA will be able to meet its rehabilitation costs of more than **\$600m.**²⁷
- ◊ April 2016: Rio Tinto, the major shareholder of the mine operator Energy Resources of Australia (ERA), has made a **\$100m loan offer** to cover any shortfall in rehabilitation funding.²⁸

Share market reaction to ERA's financial issues:

ERA's share price collapsed 75% from \$1.30 to \$0.35 in the space of a week in 3QCY2015 – reflecting the culmination of the failure of a two year exploration and new Ranger 3 Deeps development proposal that proved to be uneconomic with sustained low uranium prices²⁹ and in the face of Traditional Owner resistance.³⁰ Having had a market equity capitalisation of close to A\$2bn five years ago, ERA at just \$180m is now priced more as an option value (possible value if the uranium price were to unexpectedly recover).

There is a real risk that the company has a possible negative net worth post the "unexpected" outcome of Fukushima in 2011 which saw the share price of \$3.40 more than halve over 2011 and then the rapid escalation of mine closure costs and multi-hundred million dollar write downs in FY2014 and FY2015 relating to the failure of the new mine development program.

Case Study 3 - ERA Ranger Uranium Mine



The true cost of closing the Ranger mine remains unknown but would appear to be tracking toward the \$700m mark, with ERA having spent \$392m on rehabilitation and water treatment facilities at the Ranger and Jabiluka sites from 2012 through to 2016 already.³¹ Returning the site to what is effectively its pre-mining condition as required by the closure criteria is unprecedented for a uranium mine operating in a high rainfall tropical environment.

With respect to rehabilitation at Ranger, the Environmental Requirements (ERs) state that:

- ◊ *"The company must rehabilitate the Ranger Project Area to establish an environment similar to the adjacent areas of Kakadu National Park such that, in the opinion of the Minister with the advice of the Supervising Scientist, the rehabilitated area could be incorporated into the Kakadu National Park."*

The ERs go on to specify the major objectives of rehabilitation at Ranger as follows:

- ◊ *"Revegetation of the disturbed sites of the Ranger Project Area using local native plant species similar in density and abundance to those existing in adjacent areas of Kakadu National Park, to form*

an ecosystem the long term viability of which would not require a maintenance regime significantly different from that appropriate to adjacent areas of the park;

◊ *stable radiological conditions on areas impacted by mining so that, the health risk to members of the public, including Traditional Owners, is as low as reasonably achievable; members of the public do not receive a radiation dose which exceeds applicable limits recommended by the most recently published and relevant Australian standards, codes of practice, and guidelines; and there is a minimum of restrictions on the use of the area;*

◊ *erosion characteristics which, as far as can reasonably be achieved, do not vary significantly from those of comparable landforms in surrounding undisturbed areas."³²*

It is entirely reasonable to assume, given the high risk involved in mine closure due to the myriad of "unknowns", that the cost of closure will rise over time and the site may never be relinquished saddling Rio Tinto with an on-going liability.

Case Study 4 - Blair Athol Mine

The purpose of this analysis is to challenge the accuracy of Rio Tinto's government held financial assurance for the Blair Athol Mine which ceased production in November 2012.

Since closing, the site remains in care and maintenance. Rio attempted to offload its closure obligations by selling the site to the now bankrupt Linc Energy for \$1 in 2013. The sale fell through. In July 2016 Rio Tinto announced another potential sale to an ASX listed minnow, TerraCom Ltd, again for A\$1, plus full cash backing of the A\$80m rehab provision requirement.³³

Currently the individual closure costs for Rio Tinto assets is not publically available. However the financial assurance does give some indication of the cost but as noted by the Queensland Auditor General in his 2014 inquiry into the resources sector;

*"The financial assurance held by the state has historically been insufficient to cover the estimated rehabilitation costs...." and... "The amount of financial assurance requested is not always the amount calculated as necessary for rehabilitation meaning sites remain with insufficient financial assurance."*³⁴

This analysis below is not exhaustive. It simply applies the default costs in the Queensland Government's financial assurance calculator for key mine closure and rehabilitation features and land forms at Blair Athol. This includes the waste rock dumps, the final pit voids and the tailings storage facilities (historically the most expensive aspects of mine closure) and compares it to the Rio Tinto figure in their 2015/17 Plan of Operations which was derived from its own, internal and confidential calculator.

The analysis was based on the following disturbed areas and Rio Tinto's cost calculations contained in the current Blair Athol Plan of Operations;³⁵

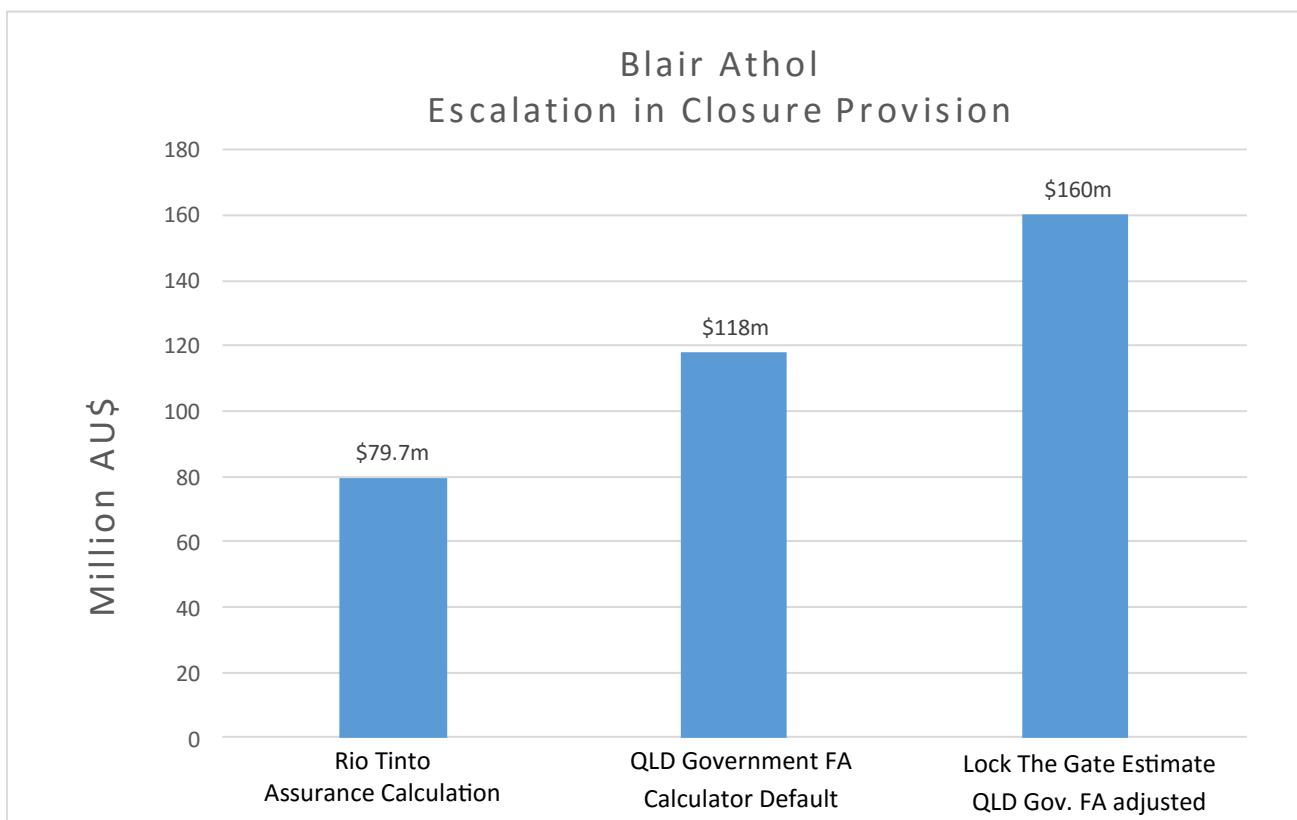
Domain in Plan of Operations	Hectares	Plan of Operations Total Cost
Infrastructure		\$7,090,956.25
Tailings	32	\$3,277,440.0
Waste Rock Dumps/ROM	20.6	\$47,283,803.75
Water	N/A	\$11,650,429.10
Pits	N/A	\$0
Other		\$0
Project Management	10%	\$6,930,262.91
Maintenance and monitoring	5%	\$3,465,131.46
Total		\$79,698,023.47

The Queensland Government's Financial Assurance calculator assumes a standard default of \$136,000 per hectare for over burden and waste dump rehabilitation that includes acid forming materials which are confirmed to be an issue at Blair Athol mine.

This figure only covers "reshaping, capping / sealing of high risk material presenting environmental difficulties (ARD / AMD / PAF [acidic and heavy metal materials], carbonaceous, saline material etc)".³⁶ This amount does not cover activities such as structural works, ripping, seeding, fertilising, care and maintenance and amelioration of failed rehabilitation or mitigation of eroding or unstable landforms nor does it address, blasting, trimming, high wall treatment or buttressing of pit voids and a range of other activities.

The Departmental Guidance does not specify the basis for the default values. Given they can be used by proponents who have not yet commissioned detailed studies, for the purpose of calculating their financial assurance we are assuming they represent, in the Government's view, a fair valuation of the tasks and activities.

Applying the \$136,000 default figure from the government calculator to the combined area of deferred rehabilitation and the waste rock dumps gives a total of more than \$102m. There is a solid justification for applying the larger default as the 2015/17 Plan of Operations and the 2011 Closure Plan confirms that high ARD material is present citing that potentially high acid waste material will be stored in the Ramp 2 tailings storage facility.



The total of \$102m does not include the other major rehabilitation cost, the \$11m allocated for water management. Managing watercourse and drainage reconstruction is complex, high risk and notoriously expensive. As noted in the FA calculator, rock armouring can cost \$60,000 per hectare and structures around creek entry points \$100,000 each. The FA calculator does not have a default per hectare cost for water management. However if we assume the same but conservative margin of error and apply it to Blair Athol's estimate for water management we would suggest a 40% increase in this allocation to approximately \$16m.

Using the Government's FA calculator as a framework, this brings the total conservative estimation for Blair Athol's rehabilitation works covering areas of deferred rehabilitation (729.2ha), the waste rock dumps (20.6ha), drains (51.7), dams (34.7) and total of 836.2ha to approximately \$118m. If the other line items are added as stated in the 2015/17 Plan of Operation, then the total FA for the 2015/17 Plan of Operations should be a conservative \$138m.

Remembering that this correction does not include an analysis of other "domains" or a significant number of other activities and does not include any contingency it is arguably not unreasonable to assume that the financial assurance for Blair Athol Mine should be doubled to \$160m.

From discussions with industry closure professions, the size and nature of the task at Blair Athol is more likely to cost around the amended figure rather than the current \$80m held as financial assurance. Opinions vary between \$160m and \$300m depending on the assumed final landform. The amended financial assurance figure is of course contestable, but the reality is there is no transparency in either the Queensland financial assurance system or the methodology used by Rio Tinto.

It should also be noted that Rio Tinto's present closure obligation number and its total projected cost as calculated using its own internal closure cost estimation standards will not reflect the financial assurance. This ambiguity and lack of transparency needs to be corrected if the market is to have access to a more realistic closure cost estimation.

Case Study 5 - The Hazelwood Inquiry

The Hazelwood mine fire that began on 9th February 2014 was the largest and longest burning mine fire that has occurred in the Latrobe Valley to date.

The fire was caused by embers spotting into the Hazelwood mine from bushfires burning in close proximity to the mine. The mine fire burned for 45 days. The fire sent smoke and ash over the town of Morwell and surrounding areas for much of that time.

On 11 March 2014, a day after the fire was declared under control, Dr Denis Napthine MP, Premier of Victoria, announced an independent inquiry into the Hazelwood mine fire.

The Hazelwood enquiry also addressed the question of long-term environmental impacts of brown coal mining including mine closure and rehabilitation. As a result the State Government enforced new bond requirements on the brown coal industry.

As a result of bond levels being historically inadequate which exposes the Victorian taxpayer

to the eventuate cost of rehabilitation, the Victorian Government required the owners of the Latrobe Valley's big three coal mines to increase their bonds to reflect the true cost of closure based on the operators own estimates. This translated into the following additional costs:

- ◊ The bond for AGL, which owns Loy Yang, will have to increase their bond from \$15m to \$112m by January 2017;
- ◊ The bond for Energy Australia, which owns the Yallourn mine, will rise from \$11.4m to \$68.5m; and
- ◊ The bond for Hazelwood's owners will go from \$15m to \$73.4m.³⁷

This represents a more than five-fold increase in the total from \$41.4m to \$254m.

Victorian Premier Daniel Andrews declared:

"We've had companies for too long that have been allowed to put aside just a fraction of what it costs to keep their mines safe and what it costs to return those mine sites to the community, to whom they fundamentally belong, at the end of useful life."³⁸

The government also agreed to develop a region-wide strategy for the rehabilitation of the coal mines and to reform state mining laws. It will also establish an independent commissioner to oversee mine rehabilitation and carry out an inquiry to determine the exact costs of cleaning up the mines once they close.

As with Queensland and NSW Government imposed financial assurance and bond arrangements have historically underestimated the true cost of mine closure and rehabilitation. The Victorian decision in the face of public outrage imposed a significant additional cost on the mines. Perhaps more importantly it raised the profile of mine rehabilitation and the failure of the regulators to adequately protect the public interest.



CONCLUSION

Closure provisions can have material impacts on corporate balance sheets. The case studies above illustrate that mining companies appear to consistently underestimate the real cost of mine closure and progressive rehabilitation is little more than a PR talking point. Provisioning for closure should deliver a robust cost estimate that reflects the discounted cost of mine rehabilitation based on the operational life of mine plan.

*"Closedown and restoration costs are provided for in the accounting period when the obligation arising from the related disturbance occurs, whether this occurs during the mine development or during the production phase, based on the net present value of estimated future costs. The costs are estimated on the basis of a closure model. The cost estimates are calculated annually during the life of the operation to reflect known developments, and are subject to regular reviews."*³⁹

Should best practice accounting methods be applied, there is little excuse for the escalation in costs (ERA/MMG) or the apparent failure to adequately estimate the quantum of the closure task (Oz Minerals).

Analysts and investors need to apply greater diligence in regards to closure cost estimation and provisioning, particularly as to the use of aggressive non disclosed discount rates and the consistent pattern of deferral ("care & maintenance") so as to benefit from time value of money.

While it may suit management to underestimate the provisions in the short-term, sooner or later the reality will catch up with the balance sheets as mines reach the end of their life.

The practice of on-selling near exhausted assets to juniors is not a sustainable closure strategy as the political optics change (Rio Tinto Blair Athol). Increased public scrutiny is delivering political interventions as we have seen in Victoria (Hazelwood Inquiry and the subsequent fivefold increase in rehabilitation bonds required in April 2016), NSW (commencing in July 2016 a new audit of Financial Assurance)⁴⁰ and Queensland (Chain of Responsibility Act (2016)).

Investors and analysts should take note.

The situation is changing rapidly and in certain cases the under estimation of closure costs could significantly erode or even destroy financially leveraged or undercapitalized corporate balance sheets as the closure "chickens come home to roost".

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