Mine Closure 2011 — A.B. Fourie, M. Tibbett and A. Beersing (eds)

doi:10.36487/ACG_rep/1152_115_Springer

Five years to the end – planning the closure of Rio Tinto's Blair Athol coal mine

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Abstract

Mining of the Blair Athol coal measures is coming to an end. Since coal was discovered in 1864, 15 underground and four open cut mining operations have mined what was once a four coal seam measure with a 30 metre thick main seam.

Current large scale export operations started in 1983 and since then over 240 million tonnes of coal have been mined. Originally scheduled to cease operations in 2010, Rio Tinto has been actively planning for closure since the early 2000s. Changes to mining rates and resource definition over the last ten years have seen closure extended from 2010 to 2016. The closure planning process has been an important part of site management.

Blair Athol mine's closure vision is:

> to minimise adverse impacts on the natural environment and to leave a legacy of enduring community benefit.

To facilitate the implementation of this vision in 2011, Rio Tinto will develop a +/-15% cost engineered decommissioning plan for Blair Athol. Similar to a feasibility study for a new mine, the decommissioning plan will cover all aspects of closing a mine. It will build on the strategies and management programmes contained in the site mine closure plan.

This paper examines how the Rio Tinto's mine closure planning process has been implemented at Blair Athol mine, integration of the vision and closure objectives into the day to day management of the operation, community relations and the process of developing a decommissioning plan that will be used to close the mine in little over five years from now.

1 Introduction

Blair Athol mine is located in the north western corner of Queensland's Bowen Basin, 1,000 km northwest of Brisbane. Developed in the early 1980s, Blair Athol was the largest export thermal coal mine in Queensland in its day, producing up to 13 million tonnes of low ash and low sulphur thermal coal for the export market. The mine was unique with its relatively shallow (30–50 m to top of coal), 30 m thick seam main seam. Mining of the Blair Athol deposit stretches back over 150 years, however large scale production only began in 1984. Over 250 million tonnes of coal have been mined from the site over the last 27, years which is around 70 million tonnes more than originally planned during the development of the mine. In 2010 the last of the main thick seam was mined out resulting in a reduction to mining rates to one third of peak production with the remaining economic resources made up of deeper, thinner, lower quality coal scheduled to be depleted by 2016.

Considerations of post closure landscapes and land use were included in original (1970s) mine planning documents, however actual planning for Blair Athol's closure dates back into the late 1990s, when closure was forecast to occur between 2005 and 2010. Since 2005, Blair Athol has had a much stronger closure planning process based on the Rio Tinto closure standard.

Many factors have seen the date for closing the mine change over the years – global down turns, off site port and rail constraints, rise in coal prices and subsequent increase to the economic resource have all contributed to extension in the mine life. Throughout these changes, closure planning has been an essential part of the site planning process.

The development of detailed closure plans under the Rio Tinto closure standard has resulted in the development of a vision for closure, establishment of objectives, targets and action/further works programmes. Importantly the vision for closure

> *"to minimise adverse impacts on the natural environment and to leave a legacy of enduring community benefit"*

has become an important outcome for the site and part of the values used by the broader leadership team as part of the management of the site.

2 Rio Tinto closure planning process

Rio Tinto's closure standard was first released in 2004. It applies to all Rio Tinto operations across the globe and has to be included in exploration and feasibility study processes. Based on sustainable development principles the process requires operations to investigate both on site and off site risks associated with environmental, social and economic aspects of closing the operation. The documented outcome of the closure planning processes is the site mine closure plan (MCP); however, Rio Tinto's expectations is the plan is a living document that is updated regularly and is reviewed every five years.

The sections of the mine closure plan reflect the closure planning process. The Rio Tinto closure standard requires that the MCP is structured in accordance with the following four key elements:

- Knowledge base:
  - A synopsis of the current knowledge about the mining operation, its impacts on the environment, social and economic aspects. The information in the knowledge base is used as the background for decisions relating to closure.
- Closure strategy:
  - Evaluation of the closure concepts based on risk. From these concepts preferred closure options are established and a vision for the closure is developed.
- Closure management plan:
  - Building on the closure strategy, this section details how the preferred closure options will be implemented. This section includes risk analysis of the options, consultation processes, the post closure management and calculation of cost estimates relating to closure.
- Decommissioning plan:
  - Similar in detail to a feasibility study for a new project, it is required under the closure standard for all projects at five years from closure. It will include detailed engineering and design work required for the physical closure to proceed, and describes the implementation programme for the preferred closure strategy.

Blair Athol completed the first Rio Tinto closure standard compliant mine closure plan in 2005, updated in 2007 and 2010. In 2011, the site staff is undertaking the development of a detailed decommissioning plan, a +/-15% cost engineered study as the next step in the application of the closure planning process.

3 Application of the closure planning process at Blair Athol mine

3.1 Site description

Blair Athol mine is an open cut, dragline operation, which is situated on 3,000 ha of land, 22 km from the nearest township Clermont, which is the base for the predominantly residential workforce. The mine site is bounded on three sides by State Forest (forestry reserve tenure) and only has one adjacent neighbour. The coal deposit is lencular basin (bowl shaped, with shallow thin edges and deeper thick central section) containing four coal seams and the deposit has discrete edges within the mining lease. Over the life of the operation about 2,000 ha of the total area will be disturbed by either mining or infrastructure areas. At the

end of 2010, 560 ha of mining disturbance had been rehabilitated. Rehabilitation has primarily focused on returning land back to natural vegetation made up of similar species to pre mining vegetation communities.

The operation has an excavator / truck fleet, overburden and coal dozer fleet as well as substantial ancillary fleet including scrapers, graders, water carts and other specialist gear.

At its peak Blair Athol had about 320 employees and full time contractors. Currently after downsizing with the reduction in mining rates to 3mtpa, there are now only 160 employees and full time contractors running the operation. The workforce remains predominately residential, based in Clermont; however, the competitive demand for mine workers and professionals has seen the development of commute based employees over the last five years, with employees commuting from as far away as Brisbane, Rockhampton and Townsville.

As part of the development of the mine in the 1980s, there was a requirement for an infrastructure package to assist in the development of local communities. Through this process the Clermont township received sporting facilities, a caravan park, large water supply dam, high voltage power supply, 300 houses for employees and an ongoing financial support to local government. The mine has also supported the community through donations, sponsorship and development fund aimed to assist community based organisations improve the skills/training, liveability and progress of the community.

From 1982, when construction started, to 2008, Blair Athol mine was the only mining operation to support the Clermont township; however, in 2007 Rio Tinto announced the development of the Wolfang Coal Deposit to the north east of Clermont, which saw the development of the Clermont Mine, which started mining coal in early 2010. This was a sister operation to Blair Athol, and utilised the same coal handling and railing infrastructure. The development of the new operation has brought additional vigour to the Clermont township, which has seen an increased demand for housing, accommodation, brought new families and opportunities to the region.

3.2 Closure planning activities to date

3.2.1 The early days

Closure planning started in its current form in 2004; however, considerations about closure were included in the initial planning documents for the mining operation back in the 1970s. Concept of final land use based on native vegetation communities were part of the initial vision for the operation with all construction disturbances rehabilitated in the early years to native habitats. After 25 years, many of these areas are difficult to distinguish from the surrounding remnant vegetation and are largely considered to be successful. As the mine progressed to its original life of mine estimate in the early 2000s, planning for closure was focused on developing an improved estimate of closure costs for the physical rehabilitation of the disturbance. It wasn't until the current closure planning process commenced in 2004 that the broader sustainable development considerations were added into the fold. In 2005–06 it was the first time that social impact assessment and risks about the impacts of closure of the Clermont township economy and social processes were undertaken, it was also the first time that the concept of a positive legacy was for employees, community, Rio Tinto and landholders included in the process.

3.2.2 2005 and 2006

The 2005 closure plan was based around a life of mine plan that scheduled for cessation of mining in late 2010. From this plan a comprehensive list of further works was established, which built on the known deficiencies in information about impacts. Work commenced immediately on completing the programme to aid in future plan iterations. The plan was reviewed by a corporate Rio Tinto mine closure steering group with a range of recommendations and additional works proposed which was feedback to the site for inclusion future revisions. One of the recommendations was the need for a dedicated onsite resource to coordinate and manage the closure planning process as the mine headed towards closure in 2010.

By August 2006, a closure planning professional had started with the task of reviewing and implementing the mine closure, and then the life of mine plan had included additional coal resource due to a change in economics and the life of mine extended out to 2012.

3.2.3 2007-decommissioning plan development

Under the Rio Tinto closure standard a detailed decommissioning plan is required to be developed five years from closure, and with the end of mining now scheduled for 2012, planning for the decommissioning plan development commenced in 2007. It was the first time a proper schedule for delivery of closure would be developed.

In preparation for the start of the decommissioning plan development in mid 2007, the 2005 plan underwent a substantial review through late 2006 and into early 2007. The most significant change that had to be captured was the initial consideration of the impacts of the development of the Clermont mine. In 2005, the Clermont mine was yet to complete the feasibility process and had not received all government approvals, so it was largely kept out of the closure planning process. However, in early 2007, the decision to progress the new mine had been made and due to the shared infrastructure, additional level of planning was required. The new mine would be operating for 15–20 years after the closure of Blair Athol, so the closure planning now had to reflect the new operating requirements.

In May 2007, the decommissioning plan development commenced. Building a decommissioning plan was not something that had been previously undertaken by Rio Tinto Coal Australia (Blair Athol's management group), and the decision was made to base the process on model used for project management of feasibility studies for new mines and expansions. The difficulty was that unlike a feasibility study which is built from the outcomes of a pre-feasibility study, the mine closure plan was more like an order of magnitude study. There were plenty of gaps in the knowledge, and a level of unknown that made initial decisions about the direction of the study difficult to make. A pre-plan development definition study was undertaken for three months as a rapid assessment of current state, desired state, and critical options selection. From this a schedule and budget for the development of a decommissioning plan and associated studies was created. In 2007 the completion of the decommission plan was scheduled to take about 12 months at a cost of AU$5 million.

In September 2007, the updated Life of Mine plan was released for Blair Athol and saw closure extended out to 2015. This was based on a positive outlook for coal sales and the inclusion of additional coal resource from the deeper, low quality seam. The plan also took into consideration the requirements for joint railing of coal from both Blair Athol and Clermont mines. Based on this new life of mine information, the decommissioning plan development was suspended; however, several study components continued in order to assist with further mine closure plan developments. The life of mine extended by a further year to 2016 in 2009.

With the end date extending out, the pressure on closure planning dropped away and significant plan updates were held over until the next major update in 2010. However, in the period from 2007 to 2010, there was substantial work completed around several key risks including contaminated land, rehabilitation success, spontaneous combustion control and acid rock drainage.

3.2.4 2010 and onwards

In 2010, the Clermont mine, which was now operational, and Blair Athol mine were merged into a single operation with a common management team and support services group. This further changed the requirements for closure planning and in the second half of 2010, the first major update of the closure plan since 2007 was initiated.

A complete review of the closure risk register, desired outcomes, objectives, targets and the knowledge base was undertaken. The closure management programmes were updated to reflect changes in knowledge, risks and legal requirements. The document was completely rewritten and updated to reflect the changes that had occurred since 2007.

The update took over ten months to complete and was reviewed by Rio Tinto corporate closure steering committee in mid 2011. The 2010 plan update is also the basis for the next decommissioning plan development which will be completed in 2011.

Development of the decommissioning plan in 2011 is based on the project methodologies established back in the 2007 study and is likely to take at least eight months to complete. The project schedule for decommissioning will extend from current day out to the planned surrender of the mining tenements, some

20 years away and includes further decommissioning plan execution study development to commence one year from the planned cessation of mining. Based on the variability of the end date of mining, the key attribute of the decommissioning plan will be designed so that it could be implemented in one, three, five or ten years from now.

4 Summary of key closure risks and preferred options

The identification of risks and development of controls is a fundamental building block for the mine closure planning process. The determination of risks came through a working group analysis of the knowledge base and through community consultation. The significant risks identified for Blair Athol at closure include:

- Community health and safety associated with aspects of the final landform.
- Final drainage strategies associated with surface water management.
- Landform rehabilitation including re-vegetation success and minimisation of spontaneous combustion.
- Meeting surrender/relinquishment requirements.
- Out of plan cost.
- Retention of skilled workforce to undertake mine closure activities.
- Socio-economic impacts associated with loss of employment, property values, availability of housing in Clermont, and the impacts on the local economy.

The risks were grouped into themes/ aspects and an analysis of options was undertaken to identify the most appropriate controls. These controls became the preferred closure options and were then used to develop the closure management plan. Table 1 details the high level outcomes of the options analysis. For each of these preferred closure options objectives, performance targets and management programmes have been developed to provide detail on how the options will be implemented and the risks addressed.

Table 1 Summary of preferred closure options

Aspect	Preferred Closure Option
Final land use	Native vegetation with additional beneficial land uses (to be defined and agreed in consultation with Traditional Owners, the community and government).
Overburden rehabilitation	Owner team with contractor assistance undertaking rehabilitation activities, maximum progressive rehabilitation, dragline and dozer fleet utilised for bulk reshaping, reshaping works are constrained to eastern drainage system, maximum spoil angle of 15% will be used with a spoil peak angle of 8% to give a resultant undulating surface, highwalls and endwalls recontoured to 15%.
Water systems	Permanent diversion of all flows around the mining void with retention of West Dam for Clermont Mine operations. Upgrade to existing diversion system will be required for surrender of licences.
Infrastructure	Infrastructure required for Clermont mining operations to be maintained, however in all other areas maximum salvage and disposal through tender, removal of all buildings and structures from site and benign waste and contaminated soil disposed on site.
Community programmes	Community programmes as determined through consultation, the Clermont Community Consultative Committee, the Preferred Future Strategy Committee, transitional programmes, and the channelling of Community and Aboriginal Community Development Fund programmes to long term sustainable solutions for the future of Clermont.
Employee programmes	Ongoing employee consultation and communication, redundancy packages, Employee Assistance Programmes, retention packages, inter-company placements.

5 Mine closure planning, positive legacy and the mining operation

One of the most important outcomes from the closure planning process at Blair Athol has been the cultural change that has occurred. The consideration of what will be the "legacy?" has made its way into every day processes on site and a value used by the leadership team in making decision. The desire to leave a positive legacy has driven both employee and community engagement programmes over the last five years and has been influential in decisions about progressive rehabilitation and infrastructure development. A quote from the Blair Athol general manager during a closure steering committee meeting –

> *"Closure is more than tree, seeds, trucks and buildings, it's much bigger, it is also employees, communities and about sustainable futures."*

Here are two case studies of current activities at Blair Athol that have been borne out of the desire for a positive legacy and are leading to more sustainable mine closure outcomes.

5.1 Case study – my future plan process (employee engagement)

In 2010, Blair Athol reduced its production rate from 10 to 3 mtpa. This change would result in the need to reduce the workforce. Holding a positive legacy as a value and desired outcome, the My Future Plan programme was established 12–18 months ahead of the planned ramp down. Its purpose was to give every employee a choice about their future on site and to provide the site with information so that a process of matching up employee desires with site requirements. Employees were asked to nominate if they would like a redundancy, be re-trained, continue working in their current role or change employment to another Rio Tinto operation. There were multiple opportunities for employees to make or change their choice based on up to date information.

The hallmark of the My Future Plan process was that employees were directly engaged through their immediate leader. Information about their options was provided on a regular basis through their leader and by the broader site management. Leaders were given special coaching in how to hold My Future Plan discussions and dealing with difficult or emotionally charge situations. Regular leadership briefing sessions were held to ensure at a common message was being communicated across site.

During this process all employees were given access to funds for re-training and re-skilling, financial planning services and personal counselling services. For some employees the decision to move on or stay was a difficult one, as many had been working at the mine for most of their life, and may result in the need to move from the township in order to find further employment. These services were available to employees regardless of their future plan choices and were an import part of the process to ensure a positive legacy from the down sizing process.

Another important aspect to the process was engagement with families and the broader community. Information sessions were held in town to enable families to talk directly with the mine. Community engagement included keeping schools, churches and other community support groups informed of the progress, so that they can also provide support to the families through this period of change.

The outcome of the process was that through the careful planning and engagement, the majority of people were able to receive their first future choice and the site did not have to make any mandatory reductions in employee numbers, which is a positive outcome from a pre closure process based. The My Future Plan process will continue to be utilised as an employee engagement process through until final closure of the site. The model of direct engagement between leaders and employees, with up to date information for employees, their families and the broader community will be an important part of the closure process and ensuring a positive legacy for employees and the community when the mine finally closes.

5.2 Case study – Clermont region preferred futures strategy (community engagement)

During the development of the mine closure plan in 2005, a social impact assessment was conducted to determine the likely outcomes of the closure of Blair Athol mine on the Clermont township and community. Rio Tinto saw this as a significant risk to the desired outcomes of the Blair Athol mine and the ability to deliver on the closure vision. Through consultation with the community and the local government, it was

identified that a strategy to develop Clermont into a resilient and sustainable community was required to offset the impacts of the closure of the Blair Athol mine.

Through 2007 and 2008, a working group was formed to work with the community to identify what the community wanted for the town in the years to come. Rio Tinto through the Clermont Region Community Development Fund resourced the study along with the former Belyando Shire Council (now Isaac Regional Council) to build governance structure and the development of a report that provided over 170 recommendations about how the community as a whole could be change, modified or assisted to become more resilient and self determining.

In 2009, the Strategy was released and an implementation group was established, made up of community members, council and mine management. The implementation group will work through the recommendations with funding from the council, the mine and other sources.

To date outcomes of the strategy are two key initiatives:

1. Development of an Urban Design Master Plan for the revitalisation of the Clermont Township – with the purpose of making Clermont a more desirable place to live and encourage population growth.
2. A feasibility study into a Bio Industries development for the Clermont Region – with the potential of utilising the Blair Athol mine site post closure, particularly looking at bio-diesel production.

6 Conclusion

Planning for closure of Blair Athol mine started over 30 years ago; however, through the implementation of the Rio Tinto closure standard over the last ten years, more detailed and sustainable closure outcomes have been identified. It has become evident that closure has to be treated as a process rather than an event and that engagement of the community, employees and leaders are required to ensure that positive outcomes from the closure of the mine are achieved.

With planned closure looming in 2016, there is an increasing need to expand the focus on mine closure planning and the development of a decommissioning plan in 2011 will be significant next step in the process. The decommissioning plan will be really the "who" and "how" of closing the mine, which is an evolution from the current plans which are really the "what" and "why".

The mine closure vision and the concept of a positive legacy both on and off site have become an integral part of the way Blair Athol works over the last five years and has set a solid platform for a sustainable future of the both the operation, its legacy and the Clermont township.