A global view of integrated closure and legacy planning

Mine Closure 2013, Eden Project, Cornwall

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A changing business climate

• The business climate is changing
  − Climate change driving public awareness
  − Economic development and population pressure
  − Shifts in regulation

• Sustainable development – an overplayed card

• But the concept of sustainable development is driving a more holistic and longer term perspective of our operations and their role in social and economic development

• Focus on mine closure is shifting
  − From biophysical aspects (demolition of plant, pollution remediation, land rehabilitation, human resources)
  − To encompassing broader issues such as the social consequences of closure on communities
  − Joining the dots to drive for more sustainable outcomes

Effective mine closure = sustainable development in action
Business case for closure planning

- Significant threat associated with poor closure planning, but significant opportunity arising from good integrated planning
  - Closure costs represent a significant financial liability (total provisions as at 31 December 2012 amounted to US$8,900 million)
  - Legal requirements are increasingly rigorous (bonds)
  - Social expectations less accepting of negative outcomes
  - Long lead times on many closure solutions
  - Legacy after closure an indicator of sustainability
  - Licence to operate
Our approach – the Closure programme

- Key components of the Rio Tinto Closure programme include:
  - Mandated Group Closure standard with supporting guidance notes;
  - The governance role of the Closure Steering Committee, supported by a Closure Working Group;
  - Assurance processes including a closure management plan review programme and financial reporting; and
  - Closure planning support and knowledge sharing
Closure programme – Closure standard

• Group Closure standard addresses all relevant aspects and impacts of closure in an integrated and multidisciplinary way

• Provides a fully scoped and accurate cost of closure to the company that is documented and auditable

• Requirements of the standard include:
  – Mandatory for all managed operations
  – Development projects to submit closure plans as part of investment approvals
  – Closure planning integrated into operational activities as early as possible
  – Closure plans and cost estimates reviewed and updated on a regular basis
  – Five years from predicted closure a detailed decommissioning plan must be prepared
Closure programme – governance

- Multidisciplinary Closure Steering Committee established in 2005 to oversee the Closure Management programme
- Accountable for ensuring that the Closure programme drives improved closure planning throughout the Group, including the development of financial provisions
- Supported by a Closure Working Group that provides technical support, coordinates the closure management plan review programme and develops closure guidance
- Individual businesses retain line management responsibility for implementation of the Closure standard
Closure programme – assurance

• Closure plan review programme
  – Identifies improvement opportunities
  – Provides assurance that closure cost estimates are based on a comprehensive scope of activities

• Closure management plans are reviewed at least every seven years throughout the life of the operation, regardless of time to predicted closure

• Reviews ensure that closure plans address key risks and are aligned with stakeholders' expectations for sustainable development objectives

• Multidisciplinary review teams – community relations, human resources, environmental management, finance and engineering

• Review findings presented to the steering committee and review reports signed off by the chair
Improvement opportunities

• More than 80 per cent of closure review findings are related to four disciplines: Cost engineering, Multidisciplinary, Environment and Communities
Improvement opportunities

- Ongoing focus areas include:
  - Cost engineering
    - Completeness of scope as the basis for accurate cost estimates
    - Correct application of unit rates, quantities and contingency
  - Multidisciplinary
    - Broader analysis of closure options and post-closure land uses that take into consideration a wider variety of stakeholder views
    - More detailed closure risk assessment
  - Environment
    - Remediation of contaminated sites, rehabilitation of disturbed areas and long-term management of water (e.g. groundwater and pit lake voids)
  - Communities
    - Additional engagement with stakeholders and communities to gain endorsement for preferred closure options
Framework – closure strategy

- Baseline studies of the biological, physical, socio-economic and cultural environments
- Assessments of issues and risks across the range of closure outcomes
- Determining a long-term vision that describes the site and its surrounds after operations have finished
- Setting closure objectives for the natural and social environment consistent with the closure vision
- Identifying alternative closure options, evaluating them and selecting the preferred options
- Gaining stakeholder input and endorsement for preferred options
- Ensuring alignment with business plans including mine plans
Framework – implementing closure plan

Requirements

• Implementing rigorous planning and project management processes
• Developing solutions to mitigate potential liabilities
• Undertaking technical and socio-economic work programmes to better understand risk and reduce uncertainty
• Undertaking progressive rehabilitation of disturbed mining areas
• Maintaining consultation and communication with government, community, employees and other interested parties
• Regular updating of planning requirements as circumstances change or knowledge improves; feeding changes back into strategy
• Monitoring performance against agreed objectives and success criteria
Sustainable development and closure – life cycle planning

<table>
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<tr>
<th>Life cycle stage</th>
<th>Closure activities</th>
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| Project development (exploration, prefeasibility, feasibility) | • Closure plan at feasibility stage for funding approval  
• Identify closure risks and develop plan  
• Design mine or operation to minimise impacts  
• Understand stakeholder expectations |
| Active operations                     | • Review plan every five or seven years  
• Annual update of provisions  
• Progressive rehabilitation and remediation  
• Ongoing stakeholder consultation (vision and strategy) |
| Decommissioning                       | • Plan developed five years before closure  
• Detailed scope  
• Stakeholder endorsement |
| Post closure                          | • Monitoring to deliver objectives  
• Stakeholder engagement for relinquishment |
| Legacy management (long-term impacts, orphan sites etc) | • If required, management of long-term impacts  
• Establish partnerships with stakeholders and communities where possible |
Project development

• Simandou, Oyu Tolgoi, Bunder etc
  − Early consideration of closure aspects and impacts – vision for closure
  − Research knowledge base (social, environmental etc)
  − Stakeholder engagement

Stakeholders are requiring an increasing level of detail in closure plans for new projects
Closure planning during active operations

- Closure planning is integrated into operational activities on an ongoing basis, including progressive rehabilitation of disturbed vegetation and remediation of contaminated areas, rather than waiting until eventual closure to start this work.
Closure planning during active operations

Richards Bay, SA
Integrated closure planning

Build waste dumps to final landforms to avoid rework at closure

Regular interaction between mine planners and environment teams to integrate landform designs
Legacy management

• The legacy remaining after closure, (environmental, social and economic) is a fundamental indicator of the sustainability of a mining or minerals operation

• Team of specialists manages our legacy sites to ensure our Closure standard and sustainable development principles are applied

• Operations integrated into the Group through acquisition are required to progressively develop or update closure management plans to meet the requirements of our Closure standard within fixed timeframes
Westland Ilmenite

- Pilot scale dredge mining acquired in 2000
- 80 ha of freehold land – east coast of New Zealand’s South Island
- Vision – rehabilitate land and transfer to Department of Conservation to preserve biodiversity and coastal vegetation
- Rich biodiversity
  - Only nesting ground of the vulnerable Westland Black Petrel
  - Natural habitat of the Blue Penguin and sand plain forests
- Partnership between Department of Conservation, Conservation Volunteers New Zealand and Rio Tinto
- Local community engaged in ongoing conservation of the area.
- Rehabilitation staged over a ten year period
- 100,000 trees planted
Anglesey

• Closure of the Anglesey Aluminium Metal Limited smelter in Wales was implemented in 2009 following constraints on access to power
• Employee obligations were important considerations when assessing closure options
• Management of waste during the life of the operation minimised on site contamination and remediation required at closure
• A Regional Industrial Development process was applied to identify sustainable development initiatives
• A re-melt business employing 90 people has continued until this year
• Alternative use of deep port facility (trialling cruise ships with flow-on economic benefits for the region); planned power plant in progress
Barneys Canyon – oxide dumps

Oxide dumps in 2000 under construction

Oxide dumps today – full vegetation cover, low metals in vegetation tissue, neutral pH and low total dissolved solids and metals in seepage
Barneys Canyon sulphide repository

Sulphide repository

Repository following rehabilitation
Flambeau Mine

180 acre site
Backfilling the entire pit to ground level with lime treated waste rock
Flambeau Mine

Establishment of wildlife habitat with woodland grasslands and wetlands
Ongoing focus on monitoring and maintenance
Ridgeway Mine

Ridgeway completed operations in November 1999, focusing on reclamation of the tailings impoundment, two pit lakes and wetland systems.

State and national regulatory recognition for best practices in open pit mining and tailings reclamation provides valuable training opportunities for the mining industry, environmental regulators and university students.
Auzat Aluminium Smelter

Auzat closed in 2003 following substantial social unrest due to the then owner, Pechiney, closing several other sites in the region.

The site has been transformed into a professional sports complex; a solution strongly supported by the Mayor and the local community.
Closure planning during modernisation

- Kitimat modernisation
  - Closure of old technology smelter and construction of new smelter at the same location
  - Maintain socio-economic input into the region
  - Improve environmental performance
  - Maximise use of hydro-power
Summary

• Key elements for sustainable life of mine planning
  – A strong corporate culture that promotes sustainability and social responsibility
  – Closure seen as a core business function
  – Equitable integration of environmental, social and economic factors
  – Early closure planning
  – Stakeholder consultation throughout the closure planning process
  – Closure strategy best developed from top down; implementation from bottom up
  – The long term viability of post closure options use must be reassessed
  – Regular comprehensive and objective review of closure plans is necessary
  – Sharing of knowledge and experiences
Summary

• Environmental and social risk in constant state of change

• Achieving sustainable outcomes in mining requires:
  – A strategic approach
  – Willingness to engage and work with all stakeholders
  – Flexibility in working collaboratively across multidisciplinary boundaries
  – Long term commitment by Rio Tinto

• Effective mine closure demands all of the above

• We don’t close mines all that often – but when we do, what we leave behind shapes not only our reputation as an industry, but also impacts out future licence to operate

• Mine closure is truly sustainable development in action