

Leading Practice Handbooks, Mine Closure and changes to the existing paradigm of Minerals Extraction

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MINE REHAB CONFERENCE 2018

Presentation Today

- History of closure guidelines in Australia
- Gaps analysis identified
- Improvements
 - Post-closure management
 - Systems “thinking”
 - Minerals Resource Legacy a paradigm for change
- Concluding observations

Leading Practice Sustainable Development Series

<http://www.industry.gov.au/resource/Programs/LPSD/Pages/LPSDhandbooks.aspx>

15 Titles
7 Languages



Mine Closure

Kim Bennett
and
Harley Lacy
Lead Authors
2.5 years



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Australian Government



**MINE
CLOSURE**

*Leading Practice Sustainable Development
Program for the Mining Industry*

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INDUSTRY.GOV.AU | DFAT.GOV.AU

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- Ms Ishara Davey
- Ms Jaqueline Styants
- Mr Richard McAllister
- Mr Chris McCombe
- Prof Neil McIntyre
- Dr Carl Grant
- Federal Minister Ian Macfarlane (06-15)
- “To assist all sectors of the mining industry to reduce the negative impacts of minerals production on the community, and the environment, by following the principles of leading practice sustainable development” (Australian Government, 2006).

History and Motivation

- Ensure the guide series remain credible, current and relevant
- Strategic Framework for Mine Closure (ANZMEC/MCA, 2000) (and State guides)
- 2002 - Two Lead Authors and Editor Team
- 2006 - Chair and Steering Committee Sections
- 2014 - Two Lead Authors - 13 contributing authors

Gap Analysis (8 years of change) Upgraded Aspects (Lacy & Bennett 2015)

- Supporting information and flowcharts;
- Collection of environmental baseline data and material characterisation;
- Consideration of local and regional biodiversity;
- Development of and agreement with, closure objectives and completion criteria;
- The community and mine closure;



Upgraded Aspects (cont.)

- Identification, mitigation and management of risks associated with closure;
- Financial matters;
- Stakeholder and legal components;
- Mine completion and relinquishment;
- Case studies; and
- Guidance on closure issues, closure options and techniques in Appendix B.

APPENDIX B: Closure Issues and Consequences; Options and Techniques for Reducing Impacts *Underground voids and shafts* (example)

Underground voids and shafts

Issues and consequences	Options and techniques
Stope failure or void collapse • Surface subsidence	<ul style="list-style-type: none"> • Backfill upper levels with waste rock or paste (during operation)
Planned surface subsidence • Surface water impacts	<ul style="list-style-type: none"> • Integrate subsided landform • River diversion
Acid rock drainage and hydrocarbon pollution • Adverse groundwater quality	<ul style="list-style-type: none"> • Recover water table (flooding of underground) • Treat and replace acidic water, sulphide-reducing bacteria • Segregate known aquifers (operational) • Cement and seal adits
Public safety • Human injury or death	<ul style="list-style-type: none"> • Prevent access into underground workings by backfilling decline to portal then place engineered cement cap (plug) over portal and all surface entrances (such as escape ways, vent rises)
Fauna • Injury or death • Loss of habitat	<ul style="list-style-type: none"> • Fauna survey • Creation of habitat (bats) • Prevent access (see above)
Post-mining land uses	<ul style="list-style-type: none"> • Stakeholder engagement to identify community preferences • Research • Tourism • Waste disposal • Bio-reactors (methane production) • Water supply.



Yes there were more

- Focus on ongoing stakeholder consultation - cyclical;
- Legal section;
- Climate change and radiological issues;
- Monitoring and maintenance;
- Mine completion and relinquishment.



Post Closure Management

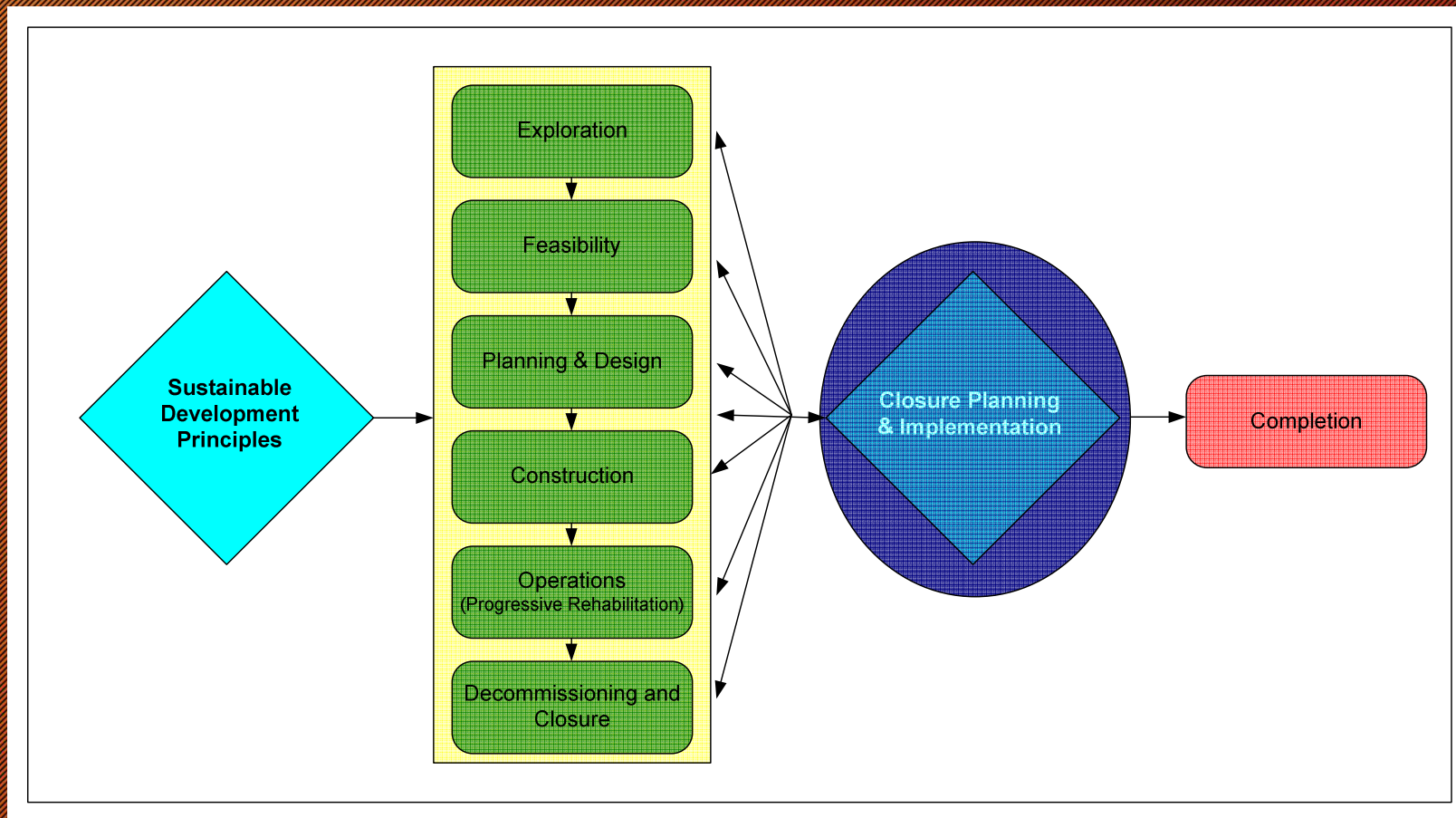
- A requirement for ongoing management and monitoring of the site (Sec 3.7).
- Chapter 8 Relinquishment (legal process).
- Further defining the concept that completion and relinquishment incorporate delivery of a defined post-mining land use.
- Long lead items: effectiveness of mitigation systems (AMD), impacts on water resources, developing revegetation.
- Closure Criteria may need to be monitored for an extended period (possibly 10 to 20 years).
- Considerable resourcing, retaining key staff, post closure monitoring, many tasks, logistics, personnel, safety issues and responses to change to consider.

Systems Thinking - LOM Cycle “2002” Statements (Chapter 6)

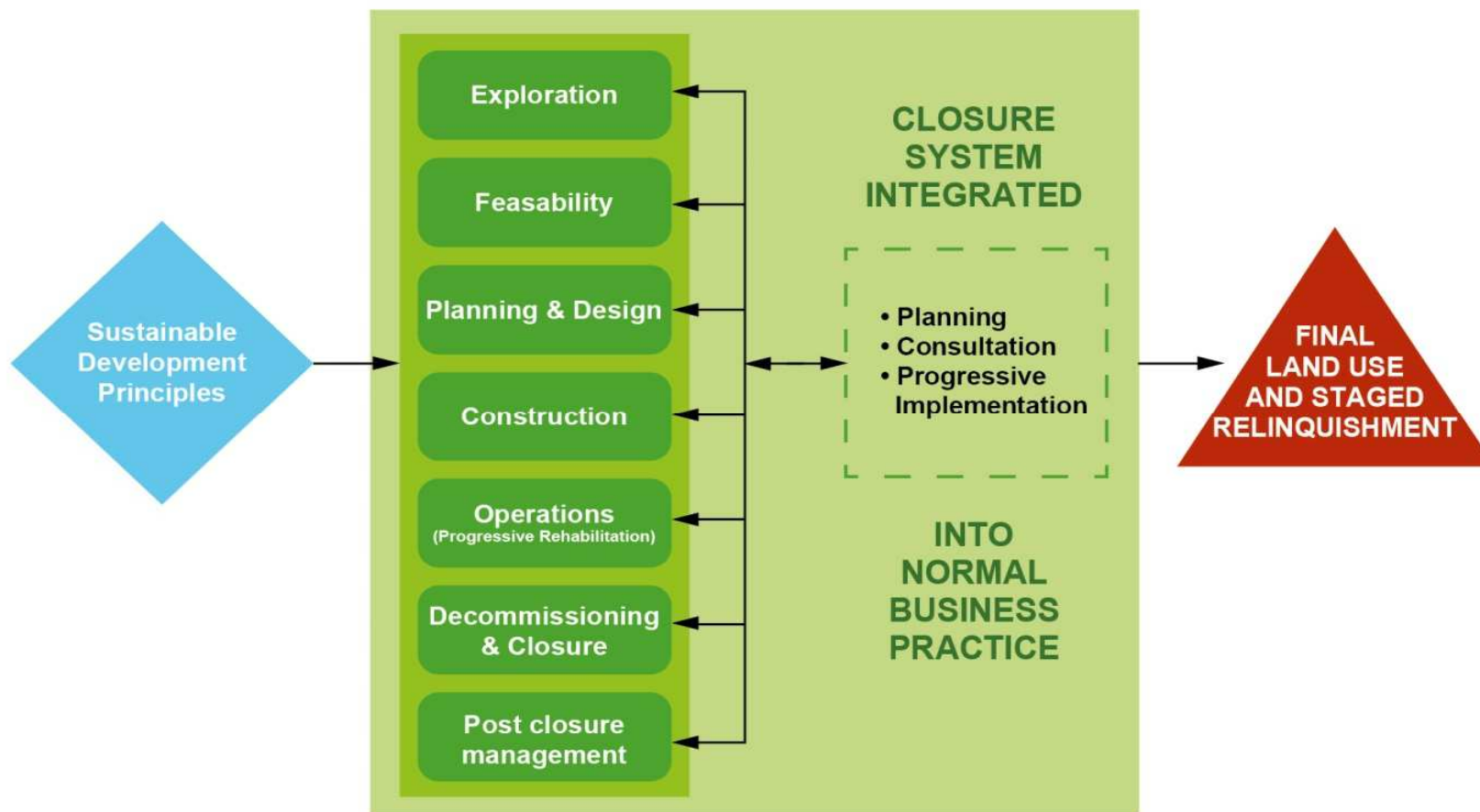
- “mining operations needed to approach mine decommissioning and closure on a *systematic basis* from the very beginning of the operation”
- added that “mine closure planning must be a dynamic process including regular review and updating” (Lacy and Koontz, 2002)



2006 Six Phases of a Mining Project (non-integrated)

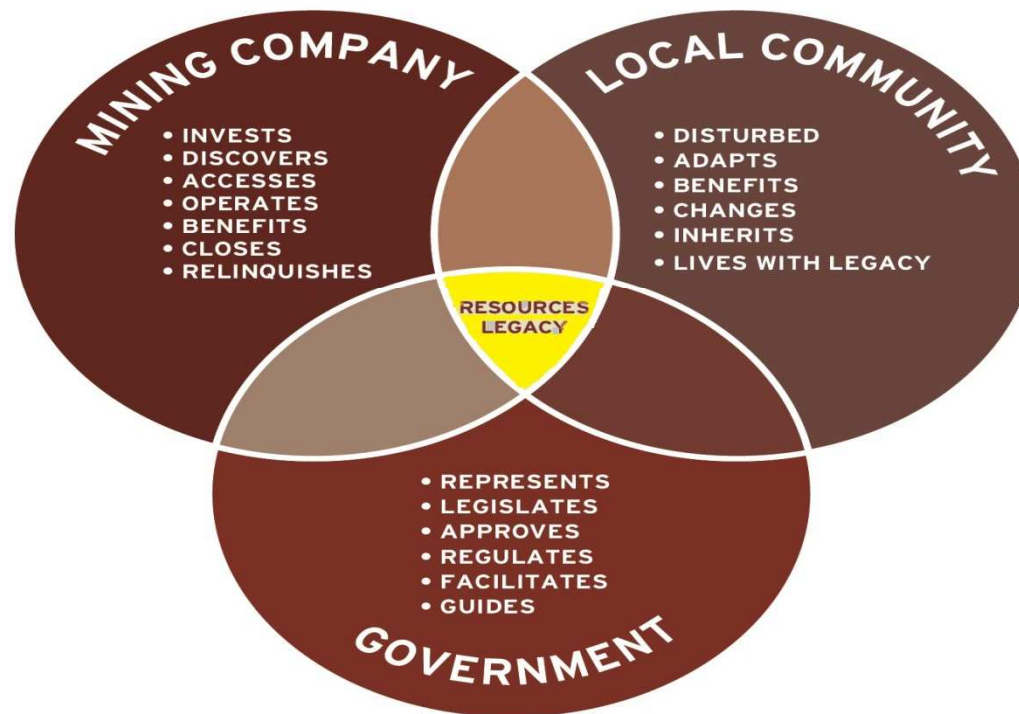


2016 Seven Identified Mining Phases “integrated within” a Closure System



Minerals Resource Legacy a basis for communication

MINERAL RESOURCES - THE LEGACY



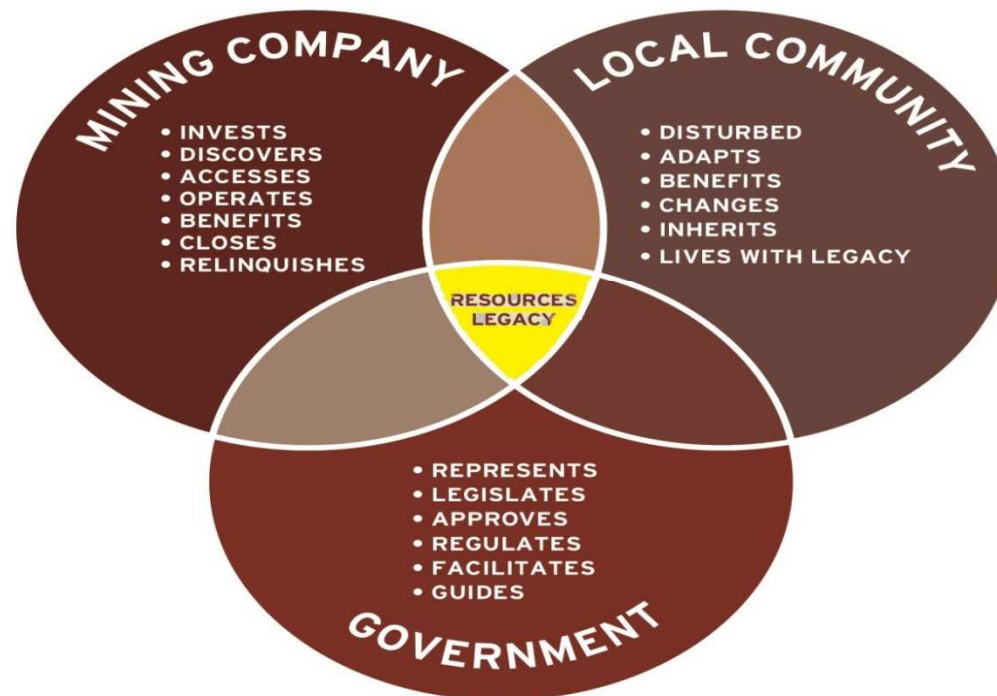
Mineral Resource Legacy to seek a paradigm shift

- Introduces the mineral resource legacy framework for general discussion around the issue of legacy associated with the mineral industry, and the cyclical nature of mining and subsequent responsibilities in managing that legacy.
- *legacy* is mentioned many times in the three closure handbooks and is a critical term however, in reality, legacy is defined as, and implies “a gift handed down”
- Naturally points of view differ, and in relation to mining its become negative rather than positive.
- The interrelationships in the discovery and utilisation of minerals involve mining companies, communities and government, and are represented simply in the framework



Minerals Resource Legacy Framework

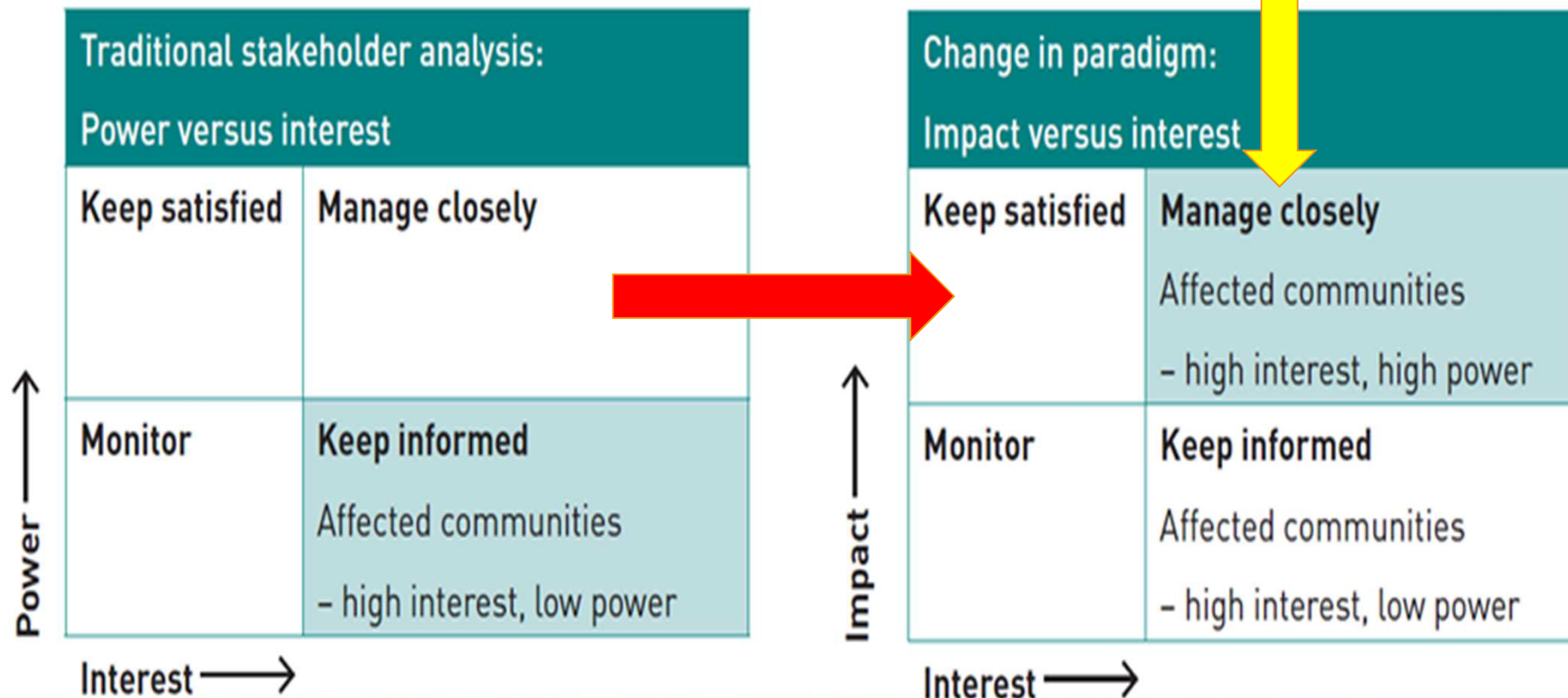
MINERAL RESOURCES - THE LEGACY



Change the Paradigm

Stakeholder mapping from a human rights perspective
(International Alert 2016)

“Work Closely With”



New Paradigms

- KIN 2012 Catalyst for the
- “*Mining Company of the Future*”
- Kin Mining Networks *aspiration* is for the mining industry to transform the traditional business model into one where mining companies become true *development* partners with communities and other stakeholders.
- Three pillars:
 - Shared purpose
 - Thriving ecosystems
 - Competitive companies, communities and countries
- <http://www.kinglobal.org/mining-catalyst.html>
- *Seeking a Paradigm Shift: Integrating Closure Planning and Providing Positive Legacy through Mine Closure (Santiago 2016).*



In Closing “it’s a perfect storm”

- MCA; policy divergence on Climate Change vs BHP/RIO (response/divestment)
- BHP Leaves World Coal Association (Zero Net Co2 >50 - 100)
- Legal action against F. Fuel Corp. Exxon - recently announced Shell
- March of commercially viable renewables (Paris Emission targets)
- NGO activity; Adarni, polarisation, project funding evaporates
- Fossil Fuel Industry; divestment, insurance, preparedness
- Stress; 2015-Downturn, and Premature Closure Fears
- Political Leadership; “Conservative” backlash (short or long term?)
- Mine Closure/Rehabilitation Technology and Science; Advanced vigour
- Senate Enquiry (6 hearings?) 77 Submissions (03/18)
- NT, Qld and NSW currently reviewing security bond policy and rates
- ISO Draft Standard “Mine Closure and Reclamation Management Planning”
- Local Action, Corporate Leadership, People provide impetus, Politics follow.



A big thank you for the invitation to
address the conference

To the conference organisers
at the
Tom Farrell Institute
the
Hunter Environmental Institute
the
University of Newcastle
the
NSW Government

Final reflections on the Mine Closure Guide

1. Recognise closure issues - early
2. A risk management approach to mine closure planning
3. Closure activities - in the Life of Mine cycle integrated into business via a system
4. Processes and tools in achieving good practices
5. Engagement with communities and regulators = inheritors of the “resource legacy”
6. Collect quality baseline data + high-quality knowledge base accessible
7. Develop closure objectives and completion criteria in the planning phase.



Final reflections on the Mine Closure Guideline

8. Characterisation of soils and mine waste are important component
9. Mine tailings rehabilitation and closure require a unique focus
10. Water (surface and groundwater) drainage and closure management, and interaction with the mine landforms is a critical
11. Mine closure planning and associated financial provisioning across all LOM phases
12. Pre-decommissioning and closure planning stage is critical
13. Advanced, careful planning, followed by action, to ensure the transition to the post-mining land use and relinquishment (DIS, 2016).

