Managing and Prioritising Rehabilitation of Abandoned Mines in Australia

C Unger, A Lechner, V Glenn, M Edraki and D Mulligan
unsafe
unstable
unsustainable
ABANDONED MINES

...are mines where mining leases or titles no longer exist, and responsibility for rehabilitation cannot be allocated to any individual, company or organisation responsible for the original mining activities.

Source: Strategic Framework for managing abandoned mines (MCMPR/MCA2010)
Australian abandoned mine records July 2011

[Map showing distribution of abandoned mines across Australia with numbers indicating record counts in different regions.]
The following characteristics of mine sites required for risk assessment were not part of any state abandoned mines spatial database:

- Mining and Processing techniques
- History of mining / Start Dates
- Accessibility
- Cultural and heritage record

**Data Availability**

- **yes**
- **incomplete**
- **no**

**Physical Size**

**Commodity Size**
OVERVIEW

• Australian context
• Strategic Framework - MCMPR/ MCA
• Global context
• Conceptual model
• Maturity chart
• Implementation
AUSTRALIA
State/NT responsibility, policy & programs
Commonwealth government - NT
Not all states have programs

2003 ACMER workshop
2006-2010 working group
Strategic Framework
A national strategy is needed....
STRATEGIC FRAMEWORK
WORKING GROUP UNDER
MCMPR – MINES MINISTERS & MCA – MINERALS COUNCIL OF AUSTRALIA 2006-2010
2006 - 2010 Strategic framework

1. Valuing abandoned mines
2. Data collection and management
3. Risk assessment and management
4. Resourcing and partnership opportunities
5. Information sharing and ‘leading practice’
Significance of a Strategic Framework?

- Commonwealth dialogue with states
- Promotes a strategic approach
- Other SFs; safety, water, closure
- Sets expectations for states/NT
- Promotes convergence
- Foundation for an “Implementation Plan”
GLOBAL

ICMM/IUCN legacy mine roundtable forum 2008
Case studies and networks
Churchill Fellowship 2009
Leading practice abandoned mine rehabilitation and post-mining land use

1. IAEA – Vienna, Austria
2. Wismut – Chemnitz, Germany
3. Lusatian lignite mining region - IBA-SEE, Germany
4. Eden Project Post-Mining Alliance – Cornwall, England
5. NOAMI – Ottawa, Canada
6. Crown Contaminated Sites Program – Victoria, Canada
Churchill Fellowship – 2009

SCALE

- Local
- Regional
- State
- National
- International

STAKEHOLDERS

- Government
- Industry
- NGOs
- Research
Lusatia, Germany - challenges

- Reunification
- Brown coal mine closures
- Mines + communities abandoned
- Environmental wasteland
- Depressed economy
Former East Germany, coal mining region, Lusatia
Lusatia landscape transformation – IBA-SEE

- Vision – new landscape, new economy
- Demonstrated SD
- Conserved Industrial heritage
- Provided the organisational structure
- Governments took responsibility and collaborated
- Staged process
- Creativity & innovation
Cornwall England - Challenges

• Rapid expansion and closure of metal mines
• Dormant clay pits
• Mines + communities abandoned
• Environmental degradation
• Depressed economy
• World Heritage Listed region
Eden Project Post-Mining Alliance
‘Heartlands’ within the World Heritage Listed Area
Geevor tin mine
Collaboration

• Pendeen Community heritage (Geevor Tin Mine)
• Cornwall Council - archaeology
• National Trust
  – Guided - Levant
  – Self-guided tours - Botallack
Eden Project Post-Mining Alliance - learnings

- Unconventional partnerships
- Creative financial mechanisms
- New legal instruments
- Innovative consultation
- Value of cooperation
- Mining industry innovation
- New economies from mining heritage
NATIONAL ORPHANED /ABANDONED MINES INITIATIVE, OTTAWA CANADA

Secretariat + Multi-stakeholder advisory group
Contaminated sites in British Columbia, Canada

• Auditor–General’s report 2003
  – Foundation lacking for planning
  – Information gaps
  – Few plans
  – Lack of coordination & accountability
  – No lead agency
Crown contaminated sites program

- One lead agency
- Full liability accounting
- 2 levels of evaluation
- Risk tool
- External review
- Systematic process
- Performance reporting
CONCEPTUAL MODEL

12 key elements of leading practice programs
Grouping of elements to define maturity
Define interactions
Maturity chart integrated with Strategic Framework
2006 - 2010 Strategic framework

1. Valuing abandoned mines
2. Data collection and management
3. Risk assessment and management
4. Resourcing and partnership opportunities
5. Information sharing and ‘leading practice’
CHAPTER 2 DATA COLLECTION AND MANAGEMENT

- Data and information management
- Jurisdiction-wide knowledge of impacts/liability
- Site-specific rehabilitation plans
CHAPTER 3 RISK ASSESSMENT & MANAGEMENT

- Data and information management
- Legislation, policy and guidance
- Site-specific rehabilitation plans
- Risk assessment and prioritisation
- Jurisdiction-wide knowledge of impacts/liability
CHAPTER 1 VALUING ABANDONED MINES

- Data and information management
- Legislation, policy and guidance
- Risk assessment and prioritisation
- Jurisdiction-wide knowledge of impacts/liability
- Site-specific rehabilitation plans
- Secondary mining opportunities
- Beneficial post-mining land and water uses
- Heritage conservation
CHAPTER 5 INFORMATION SHARING

Communication & networks

Stakeholder engagement

Data and information management

Jurisdiction-wide knowledge of impacts/liability

Legislation, policy and guidance

Risk assessment and prioritisation

Program leadership and capacity

Site-specific rehabilitation plans

Secondary mining opportunities

Beneficial post-mining land and water uses

Heritage conservation

Funding

Resourcing in partnership

Resourcing in partnership

Resourcing in partnership
MATURITY CHART

A tool to support jurisdictions
Map risk and progress of programs towards resilience
Figure 1: Minerals Industry Risk Management (MIRM) Maturity Chart, based on the Hudson Ladder and a similar approach used by Bayside Aluminium, a BHP Billiton site in Richards Bay, South Africa. Source: NSW Department of Primary Industries, 1997.

MINERALS INDUSTRY RISK MANAGEMENT (MIRM) MATURITY CHART

Accept that incidents happen

Vulnerable

Prevent incidents before they occur

Reactive

Compliant

Proactive

Resilient

Improve the systems

Way we do business

Way of life

- Comes natural

- Personal involvement by all to prevent incidents

- Complete understanding

- All informed at all times about everything

- Prevent incidents by leadership

- Video clips of near misses

- Near misses not considered

- No communication

- Disciplinary action

- Minimising/Consistent training

- Regular people involvement and focus

Ownership culture

- Involvement at all levels

- High level of training/ awareness

- Communication at a high level hiding nothing

- Near misses/ discussions

- Acceptable training/ awareness

- Established and good communication channels

- Regular people involvement and focus

Compliance culture

- Some participation

- Near misses

- Discussions

- Acceptable training/ awareness

- Some window dressing e.g. pre-inspection cleanups and light duty

- Some near misses reporting

- Some window dressing e.g. pre-inspection cleanups and light duty

- Disciplinary action

- Minimum/Consistent training

- Some communication on a need to know basis

Blame culture

- Accept need to care

- Some near misses reporting

- Some window dressing e.g. pre-inspection cleanups and light duty

- Disciplinary action

- Minimum/Consistent training

- Some communication on a need to know basis

No care culture

- Apathy/resistance

- Near misses not considered

- Negligence

- Dishonesty

- Hiding of incidents

- No or little training

- Poor or no communication

- No care culture

- Apathy/resistance

- Near misses not considered

- Negligence

- Dishonesty

- Hiding of incidents

- No or little training

- Poor or no communication

- Administrator driven

- Loose systems, elements of a HS Management System

- Reactive risk assessment

- Minimum legal compliance

- Apply PPE as a way of eliminating exposure

- Incident investigation but limited analysis

- Focus on what happened

- No systems focus

- Human fault focus

- Ad hoc monitoring/audits

- No occupational hygiene or health initiatives

- Reactive medical monitoring

- Monitoring as per regulations

- OH&S Coord. driven

- OH&S stds system and ISO 9002 or equivalent

- Risk assessment through existing systems

- Total legal compliance

- Strictly enforce the use of PPE where required (knowing risk)

- Causal incident analysis based on event potential

- Info sharing from events

- Planned occupational hygiene/ environmental monitoring

- Periodical medical examinations

- Planned monitoring/audits

- Safety meetings & talks

- Some task observations

- Line drivensystems improvement

- ISO 14001 and OHSAS 18000 or equivalent

- Pro-active formal risk assmt

- Beyond legal compliance

- Seek to actively engineer out process/equipment inadequacies

- Incident learnings shared with all levels

- Well designed plans/procedures

- Focus on adhering to site plans and procedures

- Integrated audits

- Peer evaluation and discussion

- Individually internalised

- Integrated management systems

- Risk assessment integrated into all systems

- Self regulating style

- Eliminate problems before they occur

- All threats considered in decision-making

- Systems enhancement through external evaluation/auditing

Accept that incidents happen → Reactive → Prevent incidents before they occur → Proactive → Improve the systems → Resilient

Way we do business

Resources, Energy and Tourism, LP series 2008
<table>
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## Jurisdictional Maturity chart - extract

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<th>Proactive (4)</th>
<th>Resilient (5)</th>
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| 1  | Spatial database/information management | - No inventory  
   - No estimate of total liability to state/NT  
   - Absence of knowledge base upon which to apply risk assessment for decision making | - Inventories and data exist only for sites of concern raised by communities, landowners or other stakeholders | - State/NT-wide database exists  
   - an estimate for liability can be determined  
   - data cannot be compared across jurisdictional boundaries  
   - definitions, size classifications vary between jurisdictions  
   - no specific data manager | - State/NT-wide database exists for all AM features  
   - Can delineate risks by feature as well as by site  
   - full liability estimate exists  
   - spatial data base is publicly accessible  
   - regular review and update of data  
   - personnel dedicated to data/information management  
   - data for priority sites current  
   - data of sufficiently high quality with the appropriate meta data | in addition to proactive descriptors;  
   - databases include appropriate meta data based on ISO standards  
   - full liability estimated and updated regularly  
   - data set compatible across jurisdictional boundaries, so potential impacts on national values can be undertaken;  
   - regular collaboration across Australia on data sets and information management; |

### Strategic framework

Chapter 2: Data collection and management

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**SMICMLR**  
Centre for Mine Land Rehabilitation  
The University of Queensland  
Australia
IMPLEMENTATION

Where to from here?
SCALE

- Local
- Regional
- State
- National
- International

STAKEHOLDERS

- Government
- Industry
- NGOs
- Research
Next steps….

- Establish a National hub
- Develop an Implementation Plan for Strategic Framework
- Develop networks in Australia and globally
- Develop risk model for Australia
- Collaborate to attract funding
- Prevent new legacies
- **Address legacies this generation**
SUMMARY

• Australian context
• Strategic Framework - MCMRP/ MCA
• Global context
• Conceptual model
• Maturity chart
• Implementation
Acknowledgements

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