Welcome

Welcome to the Centre for Mined Land Rehabilitation (CMLR) Managing Mining Legacies newsletter. The immediate goal of this newsletter is to keep stakeholders interested in abandoned/legacy mine challenges and opportunities informed.

Further feedback on the Value Proposition for a national abandoned mine hub in Australia should be directed to either Prof David Mulligan, Director of CMLR and/or Corinne Unger, Senior Research Officer.

For background on this project visit the Managing Mining Legacies web page here.

Thank you to volunteers Alison Walton and Ros Howse for assistance with compilation of this newsletter. In this issue, we introduce you to Longbin Huang and his research.

Research Frontiers in Tailings Revegetation - The integration of engineered pedogenesis (soil formation from tailings) and root zone system reconstruction

Dr Longbin Huang, Senior Research Fellow (soil-plant systems)
The successful closure of tailings storage facilities is a critical and challenging component of the mine closure of base metal mines. Phytostabilization or revegetation with native plant ecosystems on the TSF has been advocated as a sustainable and cost-effective option, but challenged by the lack of adequate topsoil to reconstruct root zones and to overcome hydro-geochemical constraints in the tailings.

Longbin Huang and Thomas Baumgartl at the Centre for Mined Land Rehabilitation, The University of Queensland, are leading research frontiers of tailings revegetation, through investigating the relationship between hydro-geochemical dynamics and engineered pedogenesis (soil formation) in tailings, and the rehabilitation of root zone processes and functions sustaining plant system requirements.

The integrated concepts and approaches have been applied in a case study of Cu-Pb-Zn mine tailings to identify revegetation options under semi-arid climatic conditions, with promising outcomes. The research has also involved the development of a framework for the use of biochar technology and its application in stabilising mine tailings. Expected research findings will increase the long-term confidence in the sustainability of plant ecosystems established on tailing storage facilities as a key component of the mine closure strategy.

For further information contact Dr Longbin Huang.

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**New Mining Securities Laws in WA**

*by Phil Gorey, Executive Director Environment at Department of Mines and Petroleum Western Australia*

The future of mining securities in Western Australia has fundamentally changed with the Western Australian Parliament passing new legislation in late 2012 to replace unconditional performance bonds for mines sites with a single government-held Mining Rehabilitation Fund. The new legislation, the Mining Rehabilitation Fund Act 2012, establishes a new ‘Mining Rehabilitation Fund’, sets out a process for the statutory declaration of abandoned mine sites, defines the obligation for certain tenement holders to pay into the fund and allows for money in the fund to be spent on abandoned mine sites.

The objective of any mining securities system is to ensure that sufficient funds are available to government to rehabilitate mine sites in the event that operators do not fulfil their mine rehabilitation and closure obligations. The Mining Rehabilitation Fund has been developed to deliver this principle, while addressing the high costs to industry, as well as the inflexibility that arises from individual bond arrangements.

Of significant benefit, money in the Mining Rehabilitation Fund can be spent on any abandoned mine site in the State, regardless of when it was abandoned. This legislation establishes for the first time a sustainable funding model for managing, protecting and rehabilitating abandoned mines. The administration of the new Mining Rehabilitation Fund is the responsibility of the Department of Mines and Petroleum (DMP), which has already commenced developing the supporting administrative procedures.

The development of the Mine Rehabilitation Fund was led by the DMP, and followed more than two years of research, policy analysis and consultation. Ongoing stakeholder engagement regarding the operation of the Mining Rehabilitation Fund (including the expenditure on rehabilitation of abandoned mine sites) will be occur through the statutory Mining Rehabilitation Advisory Panel.

A copy of the new Mining Rehabilitation Fund Act 2012 is available [here](#).

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**Brukunga Mine Case Study**

The Brukunga Mine, located approximately 40 km east of Adelaide, was operated between 1955 and 1972 and was worked for the recovery of iron sulphide minerals used as a source of sulphur in fertiliser. The site continues to be a source of acid and metalliferous drainage (AMD) downstream of the mine.

Since the State Government took ownership of the Brukunga mine site in 1977, it has been investigating and implementing various measures to mitigate (water treatment plant and diverting the local creek) and remediate the mine site.
The Government is addressing a long-term remediation strategy to sustainably improve water quality without the need to indefinitely treat the mine water. The strategy has been developed by the Department for Manufacturing, Innovation, Trade, Resources and Energy (DMITRE) and an expert Technical Advisory Group.

The preferred remediation option involves the compaction and saturation of co-disposed waste rock, tailings and limestone, contained by mine voids, an engineered embankment and cover system. Saturating the co-disposed waste prevents oxygen entering the system and the addition of limestone acts as a buffer for any latent acidity generated by secondary mineralisation of the co-disposed material, to prevent the generation of AMD.

DMITRE is currently in the detailed investigation and design stage for a proportion of Brukunga (Days Creek Domain). It is intended that this area can be a proof of concept for the remediation of Brukunga as a whole.

Subject to approvals, construction of the Days Creek Remediation Domain will take a couple of years, followed by ongoing monitoring and validation of the site.

The benefits of pursuing this approach include:

- Addressing the source/cause of the acid and metalliferous drainage (AMD), not just the symptoms
- Contamination of the water from three small creeks crossing this area is prevented
- A section of the open-cut mine area is remediated
- Fully testing the preferred option for remediation methodology
- Demonstrating the long-term commitment to developing a sustainable solution for Brukunga
- Reducing the volumes of AMD generated that require treatment, so reducing associated costs at the water treatment plant.

The following components are building on prior investigations and research. The project itself is in the final stage, prior to construction works for this domain involving the following:

- Detailed Investigation sub-projects - Geotechnical Materials Investigation, Geotechnical Assessment-Impoundment Area, Highwall and Pit Hydrogeology, Phase 2 Contaminated Site Investigation
- Test & Field Trials – Batch Testing, Materials characterisation, Column Leach Trials, Demo Trial (100 t), Field Mixing Trial (10,000 t)
- Risk Management - Risk Analysis - Non Technical & Technical, Technical Advisory Group (TAG) Direction for Failure Modes and Effects Analysis (TAG Workshops), Audits
- Consultation and Engagement with stakeholders
- Closure plan finalisation
- Monitoring for Success - Pre-remediation monitoring, During construction monitoring, Post-remediation monitoring
- Detailed Design for Construction – feasibility and detailed
- Diversion Extension - Dawesley Creek Diversion Extension – to ensure Dawesley Creek does not become impacted with AMD from the site
- Research - Column Leach tests, alternative reuse and disposal options of sludge generated at the water treatment plant

Thanks to Antonia Scrase Senior Environmental Project Manager - Mine Completion (DMITRE) who provided the above information and can be contacted via email.

Further information is available here.
Sierra Leone Video on UQ Research the Frontrunner in International Competition

As part of the initial research, SMI’s Dr Daniel Franks and Dr Peter Erskine travelled to Sierra Leone and visited five industrial and three artisanal mines as part of a tour organised by the Sierra Leone Environmental Protection Agency.

A video created by staff at the Centre for Social Responsibility in Mining is the front runner in an international video competition hosted by the Extractive Industries Transparency Initiative (EITI).

The video, titled Cleaning up Diamond Legacies – Transparency in Sierra Leone, details the challenges for the Sierra Leonean government in protecting their natural resources and harnessing the development potential of mining. It provides insight as to how international standards such as the EITI can provide support for these challenges.

The video emphasises the need for governments to adopt policies of revenue payment transparency in the extractive industries, in order to improve accountability in the sector and promote responsible engagement with communities and the environment.

The video can be viewed [here](#) and further information can be obtained from James Morrell.

Celebrating 20 years with the Central Queensland Mining Rehabilitation Group

The CQMRG conducted a workshop in Rockhampton at the CQU on 4-5 April 2013 with more than 100 participants celebrating a successful 20 years; an impressive milestone for a voluntary organisation.

The initial goal of the group according to Craig Whiteford (ex Forestry), one of the foundation members, was to provide support for environmental officers working at the mines to answer the question ‘what trees should we grow in mine spoil?’ He was pleased to report that rehabilitation is now taken much more seriously than it was 20 years ago. Brenda Berry was once again the champion behind the scenes and has served for many years as the coordinator of the group.

PRESENTATIONS

The topics of the presentations were wide-ranging including speakers from universities, government, a conservation group, mining companies and service suppliers.

Neil Hoy from DNRM has a long association with the group and provided his insights of the value of the group in
his presentation "CQMRG – A Best Practice Forum".

Michael Rodgerson from Moranbah North (AngloAmerican) provided an overview of their water management system in particular the reverse osmosis plant which is producing two million litres of potable water every day from mine water stored in dewatering dams. Further information is available via the following link: http://www.angloamerican.com/development/case-studies/environment/moranbah

John Merritt noted the support of the Australian Coal Association Research Program (ACARP) which brought about a significant step change in promoting research to address key mine rehabilitation and water management knowledge gaps since the inception of CQMRG’s.

Melina Gillespie presented an overview of research projects undertaken by CMLR since 1995 including several projects supported by ACARP, one of which is the DIG database of coal mine rehabilitation (refer also to Newsletter 2)

As a representative of the Capricorn Conservation Council, Ian Herbert in reviewing past mine performance, concluded that “there is a great disconnect or dichotomy between the good work that is being achieved by practitioners on the ground and the strategic position taken by government and corporate head office. While the on-ground work is steadily improving, the direction from government and company boards is diminishing”. In considering future directions Ian commented that “… we all thought Mount Morgan was a one-off from a long time ago and these circumstances couldn’t happen again – but could they?” Ian referred to USA reclamation laws under the Surface Mine Reclamation Act (SMCRA) 1977 where backfilling of final voids has been a requirement for many decades. He was adamant that central Queensland community expectations need to be properly considered particularly with respect to the elimination of final voids for future remediation scenarios.

CQU researchers presented their various research projects including blue green algae by Larelle Fabbro and rehabilitation by Nanjappa Asthwath. The social impacts of “drive in/drive out” were also discussed by Susan Kinnear in her overview of sustainable regional development.

Luke Bewley explained the proposed review of the fifteen handbooks developed by the Leading Practice Sustainable Development Program following consultation with the Australian mining industry and other interest groups. The handbooks can be downloaded here.

Corinne Unger (CMLR) was first involved with the group when she worked for the Queensland Government and about 12 years ago hosted a CQMRG meeting at Mount Morgan mine. Corinne commented that "Those in government managing abandoned mines (in NRM) have much in common with mine rehabilitation personnel at active mines, and CQMRG has been fundamentally important for sharing technical challenges and solutions over the decades.”

The workshop was deemed a success. There were at least three “take home messages” as follows:

1. The focus on water management has changed significantly in the last few years with the control of excess water releases becoming a major priority.
2. In general there remains a need for the mining industry to demonstrate successful rehabilitation and mine closure to the community and regulators, throughout Central Queensland.
3. There is a desire to document the extensive rehabilitation knowledge which has been gained over the last few decades, in order to improve knowledge sharing in the future. CQMRG meetings promote information transfer, particularly to the next generation of mine environmental and rehabilitation officers, but we need a way to capture this knowledge so it is not lost when experienced practitioners retire or leave Central Queensland to work elsewhere.

The following ABC link includes interviews with Craig Whiteford as one of the founders of the CQMRG, Stuart Ritchie, the current chair of CQMRG and Ian Herbert from the Capricorn Conservation Council.

http://blogs.abc.net.au/queensland/2013/04/mining-rehabilitation-group-celebrates-20-years.html

Further information can be obtained from Brenda Berry, CQMRG Co-ordinator:
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In the news

Tasmania
This short video is about legacy mines in Tasmania’s Tarkine. Great to see Minister Burke recognising the problem, hopefully this leads to Australian action on the thousands of legacy mine sites across Australia.

Canada
"Living with Zombie Mines" is the subject of a blog by the Rachel Carson Center for Environment and Society,
written by researchers John Sandlos and Am Kelling about their research project “Abandoned Mines in Northern Canada”.

John Sandlos is a Fellow at the Rachel Carson Center for Environment and Society in Munich, Germany, and an Associate Professor of History at Memorial University of Newfoundland. Arn Keeling is an Associate Professor of Geography at Memorial University. Together they direct the Abandoned Mines in Northern Canada Project, with funding from the Social Sciences and Humanities Research Council of Canada (SSHRC) and ArcticNet.

Alison Walton