Short Course on
Practical Monitoring for Improved Environmental Performance for the Minerals Industry

ACMER
A unit of the Sustainable Minerals Institute

Promoting leading practice through delivery of a quality professional development program, addressing the practical challenges of sustainable development in the minerals industry

22-24 June 2009
The University of Queensland, Brisbane QLD

Mining operations today are committed to continual improvement in implementing leading practice and ensuring that monitoring and auditing are conducted to evaluate and improve environmental performance. To demonstrate this commitment, many mining companies have become signatories to "Enduring Value - the Australian Minerals Industry Framework for Sustainable Development", and the "Global Reporting Initiative"; the environmental performance of their operations is thus subject to formal scrutiny.

Local communities are increasingly monitoring closely the performance of mines, quarries and processing sites, all of which have the potential to impact the lifestyle and well-being of the communities in which they are situated. This closer scrutiny and increased expectations for a higher standard of environmental performance (and transparency) require personnel who have responsibilities for environmental monitoring to be adequately trained and competent in many different aspects of monitoring, including the design and conduct of monitoring programs, and the ability to interpret and report on data produced in such programs. Similar training is required by personnel in government agencies with responsibility for assessing industry environmental performance.

Water has become a major issue for the Australian mining industry, due to growing demand and increasing scarcity. The need for companies to have secure access to water and to use water more efficiently requires companies to demonstrate leading practice at the operational level. Leading practice requires monitoring programs that both enable sites to comply with or exceed legislative requirements and also inform site management of unexpected changes in water quality and quantity.

BENEFITS OF ATTENDING

Attendance at the course will provide participants with an opportunity to substantially enhance their practical skills, quality control, and ability to interpret data derived from environmental monitoring programs. At the end of this course, you should be able to recognise and translate the regulatory requirements for monitoring, practical monitoring and chain of custody that shape the work of an environmental professional in the minerals industry.

This course will focus on practical aspects of water monitoring and data handling interpretation supported by an appropriate level of theory. It includes:
(1) a generic introduction on the objectives of monitoring and the development of a monitoring program;
(2) trigger values and limits for contaminants in surface waters, ground waters and sediments;
(3) modules focussed on characterisation of soils and spoils in terms of physical, chemical and biological properties;
(4) surface water, groundwater and final void monitoring, including monitoring of physical, chemical and biological parameters;
(5) techniques in gathering, analysis and interpretation of information for the assessment of performance;
(6) contaminated sites regulations and monitoring.

The course will also include a water sampling exercise, where participants will have an opportunity to apply their knowledge to a practical situation and to experience some of the quality control, data analysis, interpretation and reporting issues involved in water sampling.

SPEAKERS

Dr Owen Nichols - EMRC
Mr Tony Bradshaw - Queensland DERM
Emer Prof Clive Bell - ACMER
Dr Rob Loch - Landloch
Mr David Salmon - Golder Associates Pty Ltd
Dr Ross Smith - Hydrobiology Pty Ltd
Mr Peter Scott - HLA/ENSR
Mr Paul Smith - Consolidated Rutile Limited
Dr Alex Pudmensky & **Dr Laurence Rossato** - CMLR, The University of Queensland
Mr Greg Ritchie - Cowal Gold Mine
Dr Sue Vink - CWiMI, The University of Queensland

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WORKSHOP PROGRAM

DAY 1 (Monday 22 June) -

Rationale for Monitoring
- What is the purpose of monitoring
- What environmental impacts require monitoring?
- Legislative and other requirements(QLD EPA/ER manuals and ANZECC/ARMCANZ water quality guidelines
- Incorporating monitoring into the ESIA/EMP
- Stakeholder consultation
- Objectives and targets,KPI's
- Monitoring in different phases of a mining project
- OHS in monitoring

Business Case for Monitoring
- Compliance with legislation/licence commitments
- Early warning of potential impacts
- Assess effectiveness of environmental management
- Detect and measure environmental trends
- Basis for decision making

Characterisation of Soils, Overburden and Tailings
- Reasons for and timing of characterisation
- Properties of soils and wastes (physical, chemical and biological)
- Survey, sampling and analysis

Erosion Monitoring
- Types of erosion and factors affecting erosion
- Components of an erosion monitoring program
- Assessing landform design; use of QC checklists
- On-site and off-site (exported materials) monitoring techniques

Designing Water Monitoring Programs
- Water monitoring program design considerations for mine sites
- Water quality

Monitoring Water Quality
- Why monitor water quality
- Load vs concentration
- Quality assurance
- Implications of ANZECC/ARMCANZ water quality guidelines

Monitoring Techniques for Mine Site Discharges
- Discharge points
- Understanding site acidity, salinity and discharge concentrations and contaminant load
- Safe sample collection and handling procedures

Water Sampling Exercise
- Brief
- Sampling plan
- Sample collection and handling procedures

DAY 2 (Tuesday 23 June) -

Water Monitoring – Surface Water Geochemistry and AMD
- Surface water geochemistry
- AMD
- Potential sources of AMD
- Acidity, salinity and contaminant load balance
- Cyanide
- ANZECC/ARMCANZ water quality guidelines

Water Monitoring – Sampling and Measurements of Storage Facilities
- Risk based approach
- Types of supply and storage facilities
- Health issues with waste water
- Sampling techniques, parameters, frequency
- ANZECC/ARMCANZ water quality guidelines
- DERM compliance with legislation/licence commitments

Groundwater and Groundwater Monitoring Systems
- Occurrence of groundwater
- Groundwater flow
- Sampling techniques, parameters, frequency
- Groundwater contamination
- ANZECC/ARMCANZ water quality guidelines
- DERM compliance with legislation/licence commitments

Water Monitoring Program Design Exercise
- Designing water monitoring programs
- Sampling techniques, parameters, frequency
- DERM compliance with legislation/licence commitments

Monitoring Techniques for Coal Seam Water and Dissolved Gases
- Occurrence of coal seam water and contained dissolved gases
- Monitoring and sampling coal seam water and dissolved gases
- Coal seam water monitoring systems using wells, bores and piezometers
- Sampling techniques, parameters, frequency
- Coal seam water quality
- DERM compliance with legislation/licence commitments

Sampling Waste Rock Dumps, Ore Stock Plies, TSFs, Tailings, Heap leach Pads and Underground Mines
- Monitoring waste rock dumps, ore stock piles, TSFs, tailings, heap leach pads
- Characterisation of rocks and wastes in these facilities (physical and chemical)
- Survey, sampling sites, parameters, frequency
- Monitoring for heavy metals
- Acidity/salinity/contaminant load balance
- Cyanide

Monitoring of Contaminated Sites
- Practical monitoring of contaminated sites
- Management of wastes onsite (physical and chemical)
- Survey, sampling sites, parameters, frequency
- Identification and monitoring of contamination
- Assessment of derelict and abandoned sites
- Remediation planning and risk assessment

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WORKSHOP PROGRAM (cont)

DAY 3 (Wednesday 24 June) -

Biological Monitoring
- Objectives of biological sampling programs
- Potential impacts(from mining) on aquatic ecosystems and biotia
- Sampled ecosystem components (trophic levels, water & sediment quality)
- Biological sample types
- Key analytes and "KPIs"
- Implications of ANZECC/ARMCANZ water quality guidelines
- Ministerial conditions and Env Licence conditions re biological monitoring

Practical Guidelines for Sampling Temporary Waters
- Sampling Temporary Waters
- What are temporary waters at mine sites
- Key hydrological features
- Chemistry
- Evapoconcentration
- Ecotoxicology
- Study design issues for temporary waters

Sediment Sampling in Ephemeral Streams and Marine Environments
- Sampling techniques for ephemeral streams and marine environments
- When to sample, sampling sites, parameters, frequency
- On-site and off-site (exported materials)
- Key hydrological features
- Chemistry
- Implications of ANZECC/ARMCANZ water quality guidelines
- Ministerial conditions and Env Licence conditions re marine sediment sampling

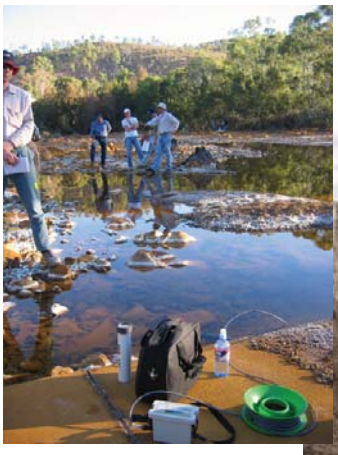
Monitoring Wetlands and a CRL Case Study
- Sampling techniques for wetlands
- When to sample, sampling sites, parameters, frequency
- Key hydrological features
- Chemistry
- Implications of ANZECC/ARMCANZ water quality guidelines
- Ministerial conditions and Env Licence conditions re wetlands sampling

Phoenix – A Mine Environmental Data Visualisation, Analysis Management System
- Demonstration of the versatile features of this system that enables an increased understanding of complex interacting processes

Data Handling, Management and Interpretation
- Conduct of monitoring
- Recording of field observations and trends
- Quality control
- Data analysis and interpretation
- Reporting to different stakeholders (e.g. industry, regulators, community)
- Environmental incidents

Chain of Custody – Practical Lessons from an Operating Mine Site
- Record keeping
- Improved record keeping
- Keeping effective field notes
- Quality control
- Laboratory and transport documentation
- Lessons learned at Cowal Gold Mine

Water Sampling Exercise
- Hands-on sampling group activity
- Data analysis and interpretation
- Risk assessment
- Quality control



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REGISTRATION FORM - SHORT COURSE ON PRACTICAL MONITORING FOR IMPROVED ENVIRONMENTAL PERFORMANCE FOR THE MINERALS INDUSTRY, 22-24 JUNE 2009, THE UNIVERSITY OF QUEENSLAND, BRISBANE QLD

DELEGATE DETAILS

Title: .....

First Name: .....

Surname: .....

Position: .....

Organisation: .....

Postal Address: .....

Suburb/Postcode: .....

State/Country: .....

Phone: .....

Fax: .....

Email: .....

Dietary Requirements: .....

REGISTRATION (Due 12th June 2009)

☐ 3 Day Workshop - $2695

☐ **Early-bird Registration - $2295 - if registration received before 15th May**

☐ Workshop Dinner (included in registration costs)

All prices include GST. Registration costs include morning/afternoon refreshments, lunches, workshop dinner on Tuesday, and a comprehensive set of notes. Limited places available.

PAYMENT DETAILS

☐ Cheque - made payable to The University of Queensland

☐ Company Purchase Order No: .....
Company ABN No: .....
Mailing address for invoice: .....

☐ Bankcard ☐ MasterCard ☐ Visa

Card Number: ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Name of Cardholder: .....

Expiry Date: .....

Signature: .....

SHORT COURSE INFORMATION

Course days will commence at 8.30am and generally conclude at 5.00pm. Please note these times may be subject to slight variations. For more information please go to: www.acmer.uq.edu.au/training/program.html

ACCOMMODATION

Delegates can book their accommodation at their own expense at the following hotels:

St Lucia Gardens
2 Gailey Road
St Lucia QLD 4067
Tel: +61 7 3870 7644
www.stluciagardens.com.au

Toowong Villas
9 Ascog Terrace
Toowong QLD 4066
Ph: +61 7 3371 4855
Fax: +61 7 3371 4661
accommodation@toowongvillas.com.au

Rydges Southbank
9 Glenelg Street
Southbank QLD 4101
Ph: +61 7 3364 0800
Fax: +61 7 3364 0801
reservations_rydges@rydges.com

Conrad Treasury Brisbane
130 William St
Brisbane QLD 4000
Ph: +61 7 3306 8888
Fax: +61 7 3306 8880
brtcreservation@tabcorp.com.au

For further accommodation options and information about Brisbane visit: http://www.ourbrisbane.com/

ACMER COMMUNICATION

☐ Tick here if you do not wish to receive our electronic ProgramUpdates

Where did you learn about this workshop?

☐ ACMER Emailing ☐ ACMER Website

☐ Colleague ☐ Other (please specify): .....

VENUE

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CANCELLATION

ACMER reserves the right to cancel any course at its discretion. Whilst we endeavour to make every effort not to do this, there could be circumstances beyond our control (e.g. insufficient numbers) that may prevent us from going ahead. In the light of this, if you need to fly, we suggest that you purchase a fully flexible airline ticket.

Delegates cancellations 14-8 days before course commencement incur an administration fee of $110. Cancellations 7 or less days before course commencement and non-attendance of the course are liable for the full registration fee. Substitutions accepted when advised.

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ABN: 63 942 912 684

PAID DATE: ..... INVOICE NO: ..... ENTRY DATE: .....