

AMC

CONSULTANTS

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DIGGING DEEPER

2006: A YEAR OF EXPANSION

An exceptional year of expansion in terms of projects and staff numbers saw AMC grow to further consolidate its position as Australia's leading independent minerals industry consultancy during 2006.

The value and number of projects increased and despite the industry-wide shortage of experienced staff, AMC's permanent staff grew 24%, further positioning it to be an employer of choice within the mining services sector.

Each of AMC's core capability areas reported strong growth during the year and we are currently working in more than 35 countries throughout six of the seven continents.

We look forward with anticipation to 2007 – a year in which we plan to work on challenging and interesting projects in more countries and to employ more of the world's smartest and most innovative mining professionals.

The future at AMC is as exciting as it has ever been.

MINING

- Surface Mine Planning
- Underground Mine Planning
- Ventilation
- Backfill

GEOMECHANICS

- Underground Rock Mechanics
- Open Pit Slope Stability

GEOLOGY

- Resource and Reserve Modelling
- Resource Audit
- Exploration

FEASIBILITY STUDIES

- Scoping Studies
- Pre-Feasibility Studies
- Feasibility Studies

EXPERT REPORTS

- Target Statements
- Prospectus Reports
- Valuations
- Due Diligence
- Insurance Investigations

MINE OPTIMISATION

- Benchmarking
- Optimisation
- Simulation



AMC's Andrew Hall, Leo Dawson and Paul Harper, with Mark Moffatt at CVRD Inco's Copper Cliff mine in Sudbury, where they undertook benchmarking and review work relating to the Copper Cliff Deep project.



AMC Administration staff Kellie Cooper, Joy Rollason and Kate Puddicombe venture underground

Mining

AMC's mining groups worked on a wide variety of projects such as:

- Evaluation of potential future underground operations for Abosso Goldfields Limited (Ghana).
- Underground mining study for Hindustan Zinc Limited (India).
- Dredge mine planning for Consolidated Rutile Limited.
- Advising the European Bank for Reconstruction and Development on the Centerra Gold and Kumtor mine (Kyrgyzstan).

Two notable aspects were the surge in uranium work and the increase in the provision of technical support to small and mid sized operations that were unable to maintain in-house engineering capabilities.

Ventilation

AMC's ventilation experts continue to be kept fully occupied, working on most of Australia's underground mines, and for Diavik diamond mine in Canada.

Backfill

AMC's backfill specialists reported a year of interesting projects including investigation of shaft stabilisation in Fiji, technical support for commissioning a paste plant in Indonesia using volcanic tuff as the main material, innovative applications of backfill in New Zealand coal and investigations of mining through cemented fill in open stopes.

The group helped clients to extract additional ore from resources and reserves that were already mined, and is currently working on integrated approach to mine waste management.

Coal

The coal group continued to consolidate its place in the industry with work on the feasibility study for the Bontang underground coal mine in Indonesia, completion of the ACARP fault consolidation review, optimisation of the Kogan Creek coal project and the Oaky North Longwall assessment.

The group's geotechnical team has introduced new methods for assessing support capacity requirements for new longwall systems and ground control issues for operating longwalls. During 2007 the group will be actively pursuing more projects involving optimisation of open cut coal operations and is expecting to be involved in due diligence projects and more feasibility studies for underground and open cut coal mines.

UK

The UK office now boasts six full-time technical staff who are supported by secondments from the Australian offices. It now offers a competent and reliable geology and mining consulting service to the London market as a real alternative to the well established consultancies and supports projects in Finland, Kazakhstan, Kyrgyzstan, Cyprus, Mongolia, USA, Spain, Bulgaria, Turkey, Ireland, Canada, Australia and the UK.

Geomechanics

AMC's team of geomechanical experts logged another busy and challenging year, with work primarily in Kazakhstan, Mongolia, Tanzania, South Africa, Canada, India, Papua New Guinea and Australia. Larger projects during 2006 were the geotechnical components of feasibility studies for the Limpopo, Pandora, Gwalia Deeps and Cliffs projects and the Mongolian Oyu Tolgoi shaft geomechanics.

Other notable projects were numerical modelling of slope stability at Porgera, caving studies for Afton, and the review of the Savage River open pit plan. The group continued to install and monitor seismic systems in Australian mines.

Geology

AMC's geology group continues to expand in terms of the variety and location of the work it is doing and the calibre of its staff.

The group worked in Kazakhstan, Peru, Ghana, Senegal, Spain, Indonesia, Botswana, South Africa, Indonesia, Mongolia, Peru, Russia and Australia.

Notable projects included the Ryst Kuill uranium scoping study, exploration procedures review on a silver prospect in northern Peru, Senegal mineral sands resources modelling and preparation of a Qualified Persons Report for an exotic copper project in Mongolia. Resource and reserve modelling and open pit design for the King Island tungsten mine also kept the group busy for some time.

Training continued to be a significant part of activities during 2006, as did resource estimates and audits and reviews in a wide range of

MESSAGE FROM THE MANAGING DIRECTOR



In a paper published in the December 2006 edition of Mining Engineering, authors SP Harteis and DR Dolinar state that "...comprehensive engineering guidelines for the construction of reliable underground bulkheads do not currently exist. This makes it difficult for mine operators to design bulkhead installations." The paper describes efforts by the US National Institute for Occupational Safety and Health (NIOSH) to remedy this situation for coal mines.

Elsewhere in the world backfill bulkheads continue to fail, each with potentially serious or fatal consequences. Bulkhead performance depends on good design, good construction and careful management of backfill placement. Getting all three legs right is a challenge for many mine management teams, particularly with the chronic shortage of experienced technical staff. The problem is technically complex because a backfill bulkhead may have to enable drainage from hydraulic fill types as well as retain all fill solids. The bulkhead must be capable of withstanding the expected pressure from the fill materials. In nearly all cases it is not feasible to design the bulkhead to the hydraulic head of the fully saturated stope.

AMC's Tony Grice was part of a team that did the only proof testing of full-sized underground bulkheads that I am aware of, when he worked for Mount Isa Mines back in the 1980s. Despite suggesting such tests to individual clients and to research bodies, we have not been able to generate support for similar trials in Australia or elsewhere. It is easy to show that the cost would be trifling compared with the consequences of a bulkhead failure. Backfill research is being conducted at some academic institutions but the efforts are miniscule compared to the use of backfill technology by industry. A couple of mining companies are also carrying out their own internal studies. Hopefully, these should be reported at the upcoming MineFill 2007 conference in Montreal.

This is one example of the general problem of a lack of coordinated research into practical mining issues. Whether we talk to the global mining companies or to the local mid-tier or junior companies, the very limited research funds are directed to the "cutting edge" issues of new technology or "big bang for your bucks" opportunities, rather than to practical short-term challenges such as safer operation of

remote-controlled loaders, tyre changing, or management of sign-off protocols for underground development.

The NIOSH research will probably be useful in North America coal mines but fail to address features of backfilling in metal mines. We will continue to investigate bulkhead failures and worry about the consequences.

Peter McCarthy
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commodities including gold, silver, copper, diamonds, iron ore, zinc, lead, nickel, uranium, mineral sands and coal.

Mark Sweeney, a geostatistics and resources expert was appointed as a Principal Consultant and the geology group recruited its first participant onto AMC's Graduate Development Programme. Early 2007 saw the appointment of Zygmunt Jakubiak as a Principal Geologist, who brings a wealth of international experience with him.

The group looks forward to more expansion in 2007, with the increasing growth of geological capabilities in the uranium sector and Australian Stock Exchange companies advisers training already in the pipeline.

Feasibility studies

Feasibility studies continue to be AMC's growth area with projects being commenced and/or completed in many countries and in many commodities. Major studies during 2006 included:

- Banpu's Bontang underground coal mine (Indonesia).
- New Gold Inc's New Afton copper gold project (Canada).
- Lonmin Platinum's Limpopo and Pandora projects (South Africa).

- Oxiana's Prominent Hill project (South Australia).
- St Barbara's Gwalia Deeps Mine (Western Australia).
- BHP Billiton's Cliffs project (Western Australia).
- Involvement in the evaluation of the dewatering of the Batu Hijau open pit via underground pumping infrastructure.

Expert reports

A number of Expert and Specialist Reports were prepared during 2006 including a due diligence for St Barbara Mines on Sons of Gwalia gold assets, a Specialist Report was completed for El Tesoro (Chile) and other due diligence work was completed for banks and potential purchasers of mineral assets in Australia, Chile, Indonesia, Kazakhstan, Russia, Singapore and Tanzania. The UK office prepared a number of Competent Persons Reports including one for Shalkiya Zinc for its successful London Stock Exchange listing and subsequent US\$100M capital raising.

Commodities reported included copper, diamonds, gold, iron ore, manganese, magnetite, nickel and phosphate.

Mine optimisation

To reflect its increasing value to its clients in recommending effective and innovative business solutions, AMC's mine optimisation group has evolved into the Business Improvement Group.

A dynamic simulation tool, MineOpSim, has been developed and successfully used to simulate material movement in a number of surface and underground mining studies and rail, port and shipping activities.

During 2006, AMC's CaveSim programme was used to estimate production from the block cave at the New Afton copper gold project in British Columbia (Canada) and the Life of Business Optimisation System (LOBOS) was further developed with production scheduling at Ok Tedi.

To support the specialist work performed by the Business Improvement Group, a mathematician was employed during 2006 and further expansion is planned during 2007.

SUPPORTING THE AusIMM

AMC continues its commitments to supporting The AusIMM. In various forms, AMC sponsors many of The AusIMM conferences and events, which are in turn peppered with presentations by AMC's senior consultants. AMC's Managing Director, Peter McCarthy is the President of The AusIMM for 2007.

Two of AMC's staff members were 2006 AusIMM Award Winners:



Pat Stephenson – Institute Service Award.

In addition to his contribution to the Australasian Joint Ore Reserves Committee (JORC) since the early 1980s in the roles of Secretary (5 years) and Chairman (6 years), Pat has played a major role in the advancement and promotion of international standards for reporting of ore reserves through CRIRSCO. His contributions have included publication of papers, technical articles, conference presentations and liaison with the ASX and the industry.



Michael Bartlett – New Professionals Award.

For his leadership in student branches, organisation of conferences, mining games and for his leadership in encouraging others into the mining industry and The AusIMM. Now a graduate with AMC.

Peter McCarthy and Mark Berry presented a paper titled Practical Consequences of Geological Uncertainty at the 6th International Mining Geology Conference.

Brian Hall presented a paper titled Short Term Gain for Long Term Pain – how focussing on tactical issues can destroy long term value, at the 2nd International Seminar on Strategic versus Tactical Approaches in Mining.

Andrew Hall and Brian Hall presented a paper titled Doing the Right Things Right – identifying and implementing the mine plan that delivers the corporate goal, at the International Mine Management conference

Pat Stephenson co-wrote a paper titled Developments in International Mineral Resource and Reserve Reporting which was presented at the International Mine Management conference.

PRINCIPAL APPOINTMENTS AND PROMOTIONS

AMC welcomed the following Principals to the business during 2006:



Andy Robb, Principal Mining Consultant, specialising in managing mining studies, mine production, project and risk management.



William Gibson, Principal Geotechnical Engineer, specialising in geotechnical, mining and civil engineering projects as well as the use and development of computer programmes.



Zygmunt Jakubiak, Principal Geologist, specialising in the selection and assessment of mineral project opportunities and the design, budgeting, management and monitoring of mineral exploration programmes and due diligence audits for acquisition, financing and development decisions.



Mark Sweeney, Principal Geologist, specialising in geological modeling and resource estimation including advanced geostatistics, technical audits, reviews and due diligence studies over a wide range of commodities.

We also congratulate the following staff members who were promoted to Principals during the year:



Andrew Hall, Principal Engineer, specialising in business and operational analysis, strategic and operational planning and technical assessment.



Patrick Smith, Principal Mining Engineer, specialising in the design and operation of open pit mines.



Rod Webster, Principal Geologist, specialising in deposit modeling, resource estimation and due diligence reviews.

FURTHER EDUCATION

AMC's Company Secretary, Joy Rollason was awarded a Graduate Diploma in Applied Corporate Governance.



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