



Quantitative Group
Our Skills On *Your* Team

CV MIKE STEWART

Last updated February 2009

Quantitative Group (QG) provide geostatistical, geological and resource estimation consulting services to the mining and resource sectors. QG are specialists in mining geostatistics with a strong focus on geological context and mine geology/engineering applications. QG also has additional strengths in enabling the links to be made through the value chain (sampling, geological modelling, resource estimation, mining geology, reconciliation, metallurgy, financial risk).

PERSONAL DETAILS

Name: Michael Stewart
Date of Birth: 25th April 1964
Citizenship: New Zealand/UK (dual)

CAREER SUMMARY

Mike Stewart has a background in mining and applied geology since 1988, with specialisation in resource geology and geostatistics since 1996. He started his mining career in alluvial gold on the west coast of New Zealand with Mineral Resources (NZ) Ltd where he was engaged in activities ranging from land access negotiations to tenement evaluation to mining. Between 1991 and 1994 he was employed in the UK by the British Geological Survey, where he was engaged in geological mapping of the Yorkshire and Lancashire coalfields and multi-disciplinary project teams creating thematic planning maps.

From 1994, he was employed by Macraes Mining Company at their mine site in NZ. It was here that his interest in geostatistics was first sparked. Mike joined MPI Mines in 1998, where he occupied a variety of roles before rising to the position of Group Technical Leader Resource Estimate. This included a stint as Geology Manager at Black Swan nickel mine in WA.

In 2002-2003 Mike completed the CFSG Post-graduate Diploma in Geostatistics at the Centre for Geostatistics in Fontainebleau.

Mike joined QG as Principal Consultant in January 2005. His consulting career to date has included most commodities (including gold, copper, lead, zinc, silver, uranium, tantalum, lithium) in Australia, NZ, Asia and PNG. He has worked with mining operations ranging from large scale open pits, to large volume underground, to highly selective underground mines. Much of his consulting has been focussed on reviewing resource estimates and estimation practices with the objective of identifying weaknesses and opportunities for improvement.

In the course of this, Mike has developed a particular interest and expertise in sampling and management of data quality. In addition to consulting on this subject Mike has developed highly focussed training aimed at all personnel involved in sample data collection and management. This has been delivered to a wide variety of forums, including in-house team training and public courses.

Mike is a Member of the Australasian Institute of Mining and Metallurgy (AusIMM).

QUALIFICATIONS

B.Sc (Geology) - Department of Geology, Canterbury University, Christchurch, New Zealand, Awarded 1985.

M.Sc (Hons) - Department of Geology, Canterbury University, Christchurch, New Zealand, Awarded first class honours, 1988. Thesis on stratigraphy and structure of a Cambrian melange zone, NW Nelson, NZ.

CFSG (Post-graduate Diploma in Geostatistics) - Centre for Geostatistics, Paris School of Mines, Fontainebleau, France. 2003. Project entitled Spatial Heterogeneity of Gold Grades, Stawell Gold Mine.

PROFESSIONAL AFFILIATIONS

Australasian Institute of Mining and Metallurgy (AusIMM) Member.

Australasian Institute of Geoscientists (AIG) Member.



Michael Stewart
Principal Consultant



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WORK HISTORY

January 2005 – Current

Principal Consultant – Quantitative Group

Since joining QG in January 2005, Mike has provided consulting advice on all aspects of resource definition and estimation from sampling and assaying through to advanced non-linear geostatistics (including simulation). He has particular strengths in geological modelling, and the translation/incorporation of this into resource estimates.

The range of consulting expertise provided includes:

>> Technical consulting, and review/advice in the area of sampling, sample preparation, assaying and Quality Management;

>> Technical review of resources (open pit and underground), focussing on identification of key risks and opportunities for improvement;

>> Independent audits of resources;

>> Review of both grade control and resource estimation systems;

>> Linear and nonlinear resource estimation for commodities including Au, Cu, Ni, U, Ta, Li, Pb, Zn, and Ag;

>> Acting as Competent Person for publicly reported resources.

>> Review of classification approaches under JORC and NI43-101;

>> Structured review of geological mapping, logging, interpretation and domaining; and

>> Mentoring and training of resource geologists.

Mike has also developed a particular interest and expertise in sampling and management of data quality. In addition to consulting advice on this subject, Mike provides both public and in-house training courses aimed at staff in operational roles.

2004-2005

Group Technical Leader - MPI Mines

In September 2004, Mike was appointed Group Technical Leader - Resource Estimation, to coordinate resource estimation practises across all MPI Mines mining operations. His brief was to ensure that the practices and procedures adopted for resource delineation and estimation were optimised for each resource; to standardise resource reporting and documentation across the group; and to train and mentor company geologists.

2003 - 2004

Geology Manager - Black Swan Nickel Mine, WA

The Black Swan Nickel underground mine exploits a spectacularly high-grade massive nickel sulphide orebody, with in-situ ore grades averaging 12% nickel. As Manager Geology, Mike was responsible for all aspects of geology on site, including:

>> Developing and leading a new seven member geology team

>> Administrative and planning functions including budgeting and reporting

>> Improving geological/mining practices and ore body definition to reduce dilution

>> Implementation of technically challenging deep directional drill programs for orebody definition

>> Resource and Reserves estimation and reporting

>> Establishment of a low grade disseminated nickel sulphide open pit operation (Black Swan Disseminated)

>> Near mine exploration and target generation

At Black Swan, Mike was able to bring his previous experience in underground mine geology and geostatistics to bear on mining of nickel sulphides.



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1998 - 2003

Senior Resource Geologist - Stawell Gold Mines Pty Ltd

>> Supervision of geological interpretation and resource estimation

>> Structural analysis and determination of key sensitivities in resource estimation

>> Geological and resource inputs to mine planning and design process

>> Reporting and documentation of resources/reserves to JORC Code standards

>> Supervision of software implementation, determination of standard methodologies and procedures for construction of resource estimates

>> Supervision of technical support staff - drafting/drilling and 3D databases

>> Responsibility for "resource definition" drilling programmes (approx 30,000m/yr) - definition of Indicated and Measured resources at a rate greater than or equal to production

Mike was initially employed by SGM as a Project Geologist, with his first job being to complete drill-out, interpretation and estimation of the Big Hill open pit deposit, the surface expression of the Magdala orebody being mined underground. This position was followed by a spell gaining experience in underground mine geology, before taking on responsibility for Resource Geology. Mike was appointed Senior Resource Geologist in 2001

1997 - 1998

Resource Geologist - Macraes Mining Company Ltd, Macraes Flat Mine site

Reporting to the Senior Resource Geologist, Mike was responsible for 3D geological modelling and estimations at the Macraes Flat mining operation. During this period Macraes were generating drill samples at a peak rate of 200,000m/ annum from seven drill rigs, with rapid turn around of data into updated resource estimates.

1995 - 1997

Exploration Geologist - Macraes Mining Company Ltd, Macraes Flat Mine site

Responsible for RC drill supervision, trench mapping and sampling, soil sampling programmes and small and large scale geological mapping on the Macraes line-of-strike tenements.

1995

Exploration Geologist - Macraes Mining Company Ltd - Reefton Goldfield

Reporting to the Senior Exploration Geologist, and responsible for drill rig supervision, core logging and interpretation, rock chip, float and soil sampling programmes with follow up trenching. Steep topography combined with extensive vegetation cover and high rainfall meant that conventional field exploration techniques were frequently difficult to apply. Developed use of structural mapping to establish a structural frame-work, in this complexly folded greywacke/argillite sequence, which enabled focussing of exploration activities.



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1991 - 1994

Higher Scientific Officer - Thematic Maps and Onshore Surveys Division, British Geological Survey, Keyworth, UK

While employed by BGS, Mike was involved in two main areas of interest:

>> Geological remapping of the Carboniferous South Yorkshire and Lancashire Coalfields

>> Applied Geological Mapping (Metropolitan Boroughs of Wigan and Bradford).

The first involved 1:10,000 scale field mapping, collation and analysis of mining and borehole data and preparation of 1:10K geological map "Standards" (publicly available for purchase)

The latter were multi-disciplinary team-based projects examining geological factors related to urban planning. Mikes role in the project was in compiling geological thematic maps (such as areas of potential unrecorded mine-workings, contaminated land, geotechnical hazard etc), and communicating this information to non-geologists.

1988 - 1990

Geologist - Mineral Resources (NZ) Ltd, Greymouth, New Zealand

Responsible for planning, organisation and supervision of cable tool and RC drilling, and bulk sampling prospecting programmes on prospective alluvial gold placer deposits on the West Coast of NZ. Successful discovery and subsequent mining of two alluvial deposits.



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PUBLICATIONS

1:10,000 Scale Geological Standards, British Geological Survey

SE41NW, Ackworth, 1993

SE31NE, Crofton, 1993

SE41SW, Hemsworth, 1994

SE02NE, Ovendon, 1994

SE12NW, Shelf, 1994

SE14NW (part), Ilkely, 1994

SE14NE (part), Burley in Wharfedale, 1994

Cotton, Rj; **Stewart, M.**, 1989: *Alluvial gold resource evaluation, Hou Hou Creek, Hokitika, New Zealand.* Australasian Institute of Mining and Metallurgy Conference Bulletin and Proceedings, 1989.

Doyle S., **Stewart M.**, 1997: *Resource Estimation Practice at Macraes Minesite, Otago NZ.* NZMIA Conference Proceedings, Auckland, 1997.

Forster A., and others., 1995: *A geological background for planning and development in Wigan, Volume 1: A geological foundation for planning and Volume 2: A user's guide to Wigan's ground conditions.* British Geological Survey Technical Report No. WN/95/3.

Jackson, S., Frederickson, D., **Stewart, M.**, Vann, J., Burke, A., Dugdale, J., and Bertoli, O., 2003. *Geological and geostatistical risk at the Golden Gift and Magdala Gold Deposits, Stawell, Victoria.* In: 5th International Mining Geology Conference, Bendigo, Victoria, 17-19 November, 2003.

Nathan, S., **Stewart, M.**, Kawachi, Y., 1987: *Regional Metamorphism of basement rocks west of the Alpine Fault in South Westland.* Abstract in Programme and Abstracts Geological Society of New Zealand Miscellaneous Publication No. 37a, 1987.

Rattenbury, M., **Stewart, M.**, 1996: *Structure of the Greenland Group, Reefton Goldfield.* Proceedings of XXth Annual AusIMM Conference, Greymouth, New Zealand.

Rattenbury, M.S., **Stewart, M.** 2000. *The structural setting of the Globe-Progress and Blackwater gold mines, Reefton goldfield, New Zealand.* New Zealand Journal of Geology and Geophysics Vol 43.

Stewart M., 1994: *Geology of Hemsworth district, British Geological Survey Open File Report No. WA/93/57.*

Stewart M., 1994: *Geology of Crofton district, British Geological Survey Open File Report No. WA/93/56.*

Stewart M., 1994: *Geology of Ackworth district, British Geological Survey Open File Report No. WA/92/90.*

Stewart, M., 1995. *Structural Mapping Waiuta surrounds, MMCL Internal Report MLS R010/005*

Stewart, M., 1995, PL 31-2173, *Final report on prospecting, 1989-1995, MMCL Technical Report for Ministry of Commerce.*