Mineral Resource Estimation Conference 2023

Perth, Australia
24-25 May 2023

ISBN: 978-1-7138-9254-0

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571

Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2023) by Australasian Institute of Mining & Metallurgy (AusIMM)
All rights reserved.

Printed with permission by Curran Associates, Inc. (2025)

For permission requests, please contact Australasian Institute of Mining &Metallurgy (AusIMM)
at the address below.

Australasian Institute of Mining & Metallurgy (AusIMM)
P.O. Box 660
Carlton South Victoria 3053
Australia

Phone: 61 3 9658 6100
Fax: 61 3 9662 3662

publications@ausimm.com.au

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

CONTENTS

AI and machine learning

Introducing deep learning and interpreting the patterns – a mineral deposit perspective 2
D M First, I Sucholutsky, D Mogilny and F Yusufali

ML and AI for resource estimation – what could possibly go wrong? Nothing! Everything! 15
M J Nimmo

Best practice

A guide to reporting Mineral Resource exclusive of Mineral Reserve 36
T Rowland, H Arvidson, M Noppé, M Mattera, B Parsons, V Chamberlain and R Marinho

Environmental, social and governance considerations in public mineral reporting 45
T Rowland, J Joughin, F Cessford, V Chamberlain, T Flitton, H Arvidson and N Pollock

Application of three lines model in resource and reserve estimation and reporting 63
D K Mukhopadhyay, D Hope and J D Harvey

Best practice in Multiple Indicator Kriging (MIK) – importance of post-processing and comparison with Localised Uniform Conditioning (LUC) 76
G Zhang and I Glacken

Beyond zero cut-off – validation at economic cut-offs

Optimising underground resources – a case study 87
P Boamah, G Squissato Barboza and D K Mukhopadhyay

Case studies

Testing and quantifying geological uncertainty (or a gram of drill data is worth a kilogram of geological interpretation) 96
C M D Barton and M P Murphy

An evolution of drill hole spacing studies at Newmont Corporation 111
A Jewbali and L Allen

Maximising the value of a drilling program – case study in a challenging environment 124
A A Latscha and D O'Connor

Schrödinger's kittens – lifting the lid on resource drill hole data after mining 141
J Moore, M Grant, D Corley and W Randa

Classification

Assembling the geological complexity in mineral resource classification 152
B C Afonseca

Comparison of two quantitative mineral resource classification methods – a case study from a large copper porphyry-skarn deposit 166
C Artica

Drill hole spacing analysis for classification and cost optimisation – a critical review of techniques 179
I Glacken, O Rondon and J Levett

Resource and Reserve category inflation – known rewards, hidden risks 192
G W Booth, R R Hargreaves and M Bond

Risk assessment of iron mineral resources using conditional simulations 203
W Patton

Estimation methods

Modelling metal recovery by co-kriging the feed and concentrate masses of metal 232
A Adeli, P Dowd, C Xu and X Emery

Failures and disasters

An estimation error 245
D A Sims

Geological modelling and estimation software – development, opportunities and limitations

Overcoming implicit modelling software limitations using Python scripting – an innovative geological modelling workflow for George Fisher Mine, Queensland, Australia 251
L Bertossi and D Carvalho

SBRE framework – application to Olympic Dam deposit 266
I Minniakhmetov and D Clarke

Open to anything

Benchmarking and cross validation of the multivariate conditional simulation model of the Olympic Dam deposit 278
D Clarke and I Minniakhmetov

Reconciliation of resource estimates

Why I don't believe in reconciliation 295
S Dunham

Author Index 304