

# Table of Contents

|      |                                    |
|------|------------------------------------|
| iii  | Australian Centre for Geomechanics |
| v    | Committee and Council              |
| vii  | Technical Reviewers                |
| ix   | Preface                            |
| xiii | Sponsors                           |

## Keynote addresses

---

|    |   |
|----|---|
| 3  | Innovation and beyond<br><i>JH Nantel, Nantar Engineering Ltd., Canada</i>              |
| 15 | An operational perspective of mine backfill<br><i>ML Bloss, BHP Billiton, Australia</i> |
| 31 | The evolution of paste for backfill<br><i>D Stone, Minefill Services, Inc., USA</i>     |

## New technology

---

|    |   |
|----|---|
| 41 | Economical dewatering of tailings for mine backfill with high performance disc filters<br><i>J Hahn, R Bott, T Langeloh, Bokela GmbH, Germany</i>   |
| 49 | Investigation into the development of foam mine fill<br><i>M Hefni, FP Hassani, McGill University, Canada; M Nokken, Concordia University, Canada; M Kermani, McGill University, Canada; D Vatne, Vatne Concrete Systems Ltd., Canada</i> |
| 61 | Development of a novel technique for geothermal energy extraction from backfilled mine stopes<br><i>SA Ghoreishi-Madiseh, FP Hassani, F Abbasy, McGill University, Canada</i>   |
| 73 | Large scale backfill technology and equipment<br><i>P Zhang, HY Li, SH Shi, China ENFI Engineering Corp., China</i>   |

## Geomechanics of mine fill and numerical modelling

---

|     |  |
|-----|--|
| 83  | A numerical analysis of how permeability affects the development of pore water pressure in early age cemented paste backfill in a backfilled stope<br><i>RL Veenstra, AMC Consultants Pty Ltd, Australia; MW Grabinsky, University of Toronto, Canada; WF Bawden, BD Thompson, Mine Design Engineering, Canada</i> |
| 97  | The use of numerical modelling to determine the stress within early age cemented paste used to backfill an underground stope<br><i>RL Veenstra, AMC Consultants Pty Ltd, Australia; MW Grabinsky, University of Toronto, Canada; WF Bawden, BD Thompson, Mine Design Engineering, Canada</i>                       |
| 113 | The impact of pore pressure boundary conditions in stope backfilling models<br><i>JP Doherty, The University of Western Australia, Australia</i>   |

## Barricades

---

|     |   |
|-----|---|
| 123 | Loads on barricades in hydraulically backfilled underground mine stopes<br><i>SD Widisinghe, N Sivakugan, VZ Wang, James Cook University, Australia</i>   |
| 135 | Advanced structural analysis of reinforced shotcrete barricades<br><i>MW Grabinsky, D Cheung, E Bentz, University of Toronto, Canada; BD Thompson, WF Bawden, Mine Design Engineering, Canada</i> |
| 151 | Backfill barricade design – determination of backfill behaviour and site conditions in structural barricade design<br><i>G Kay, Aquacrete, Australia</i>  |

## Laboratory testing

---

- 161 A critical look at uniaxial test procedures applied in the backfill industry  
*BJ Snyman, B van der Spuy, LDC Correia, Paterson & Cooke, South Africa*
- 175 Strategies for improving backfill quality in cold temperature mines  
*B Ting, Hatch Ltd., Canada; B O'Hearn, Lafarge, Canada; BYS Lin, Hatch Ltd., Canada; B Tungol, Hatch Ltd., Canada*
- 183 Coupled thermo-hydro-mechanical-chemical processes in cemented paste backfill and implications for backfill design – experimental results  
*M Fall, A Ghirian, University of Ottawa, Canada*

## Fill system design

---

- 199 Usage of a modular backfill preparation plant in underground ore mining  
*DR Kaplunov, MV Rylnikova, VV Eks, Institute of Comprehensive Exploitation of Mineral Resources, Russia*
- 205 Design and implementation of cemented rockfill at the Ballarat Gold Project  
*DP Sainsbury, Mining One Pty Ltd, Australia; BL Sainsbury, Castlemaine Goldfields Ltd, Australia*
- 217 Producing paste from all materials  
*MB Revell, Outotec Pty Ltd, Australia*
- 231 Case study – a high strength paste aggregate backfill at Randgold's Loulo Mine in Mali  
*C Lee, Golder Associates Ltd., Canada; P Gillot, Randgold Resources Ltd, South Africa*
- 243 Paste fill delivery/distribution failures – causes, costs and mitigation/prevention  
*A Horn, URS Corp., Australia; EG Thomas, Mine Fill Specialist Consultant, Australia*

## Binder admixture

---

- 251 Application of research on a new cementing material for full-tailings backfill in the layered filling mining method at the Gaoguaning Iron Mine  
*G Zhang, University of Science and Technology Beijing, China; Z Yang, YQ Wang, Jinchuan Group Co., Ltd., China; Q Gao, University of Science and Technology Beijing, China*
- 259 An investigation into the effect of cementation on self-heating of backfill  
*A Zarassi, FP Hassani, McGill University, Canada*
- 271 An investigation into the addition of sodium silicate into mine backfill, Gelfill  
*M Kermani, FP Hassani, McGill University, Canada; M Nokken, Concordia University, Canada; E Aflaki, Amirkabir University of Technology, Iran*
- 281 Paste improvement at La Mancha's Frog's Leg underground mine  
*J Mgumbwa, T Nester, La Mancha Resources Pty Ltd, Australia*
- 295 New perspectives for cemented hydraulic fill with chemical technologies  
*Z Martic, UGC BASF Global, Switzerland; J Gelson, UGC BASF Asia Pacific, Australia; H Brás, Lundin Mining, Portugal; Q Xu, UGC BASF Global, Switzerland; W Brosko, UGC BASF NAFTA, Canada*
- 309 Development and utilisation of Jinchuan copper slag and desulfurisation ash  
*YT Wang, University of Science and Technology Beijing, China; ZQ Yang, Jinchuan Group Co., Ltd., China; Q Gao, M Li, University of Science and Technology Beijing, China*
- 317 Experiment and analysis of hydration mechanisms on the new backfilling cementitious materials  
*M Li, Q Gao, University of Science and Technology Beijing, China; Z Yang, Jinchuan Group Co., Ltd., China; YT Wang, University of Science and Technology Beijing, China*

## Geomechanics of mine fill and field measurements

---

- 327 In situ measurements of cemented paste backfilling in an operating stope at Lanfranchi Mine  
*A Hasan, G Suazo, JP Doherty, AB Fourie, The University of Western Australia, Australia*
- 337 In situ behaviour of cemented hydraulic and paste backfills and the use of instrumentation in optimising efficiency  
*BD Thompson, Mine Design Engineering, Canada; T Hunt, F Malek, Vale, Canada; MW Grabinsky, University of Toronto, Canada; WF Bawden, Mine Design Engineering, Canada*

- 351 Interpretation of as-placed cemented paste backfill properties from three mines  
*MW Grabinsky, D Simon, University of Toronto, Canada; BD Thompson, WF Bawden, Mine Design Engineering, Canada; RL Veenstra, AMC Consultants Pty Ltd, Australia*
- 365 Constrained thermal expansion as a causal mechanism for in situ pressure in cemented paste and hydraulic backfilled stopes  
*BD Thompson, Mine Design Engineering, Canada; D Simon, MW Grabinsky, University of Toronto, Canada; DB Counter, Glencore Canada Inc., Canada; WF Bawden, Mine Design Engineering, Canada*

## Case studies

---

- 381 Transition from discontinuous to continuous paste filling at Cannington Mine  
*J Li, JV Ferreira, T Le Lievre, BHP Billiton, Australia*
- 395 Transition from mining with caving to mining with cemented backfilling – a case study  
*VA Eremenko, Institute of Comprehensive Exploitation of Mineral Resources, Russia; BB Tatarnikov, EVRAZRUDA, Russia; AA Eremenko, Chinakal Institute of Mining, Russia; EN Esina, Institute of Comprehensive Exploitation of Mineral Resources, Russia*
- 407 Utilisation of cemented rockfill, cemented hydraulic fill and paste to successfully achieve ore production expansion to 2 Mtpa at Chelopech Mine  
*D Liston, Dundee Precious Metals Inc., Bulgaria*
- 421 Fill design and implementation with challenging material – Wambo fill project – case study  
*M Helinski, MB Revell, Outotec Pty Ltd, Australia*
- 439 Industrial experiment study on full tailings cemented backfill for the downward slicing drift mining method in Jinchuan Nickel Mine  
*Z Yang, Jinchuan Group Co., Ltd., China; Q Gao, University of Science and Technology Beijing, China; YQ Wang, DX Chen, WX Yao, Jinchuan Group Co., Ltd., China*
- 449 Study on the stability of bulk backfill mass above 1,150 m horizontal pillar at Jinchuan No. 2 Mining Block  
*F Peng, S Li, J Hu, Changsha Institute of Mining Research Co., Ltd, China; H Wang, L Zou, D Gu, Jinchuan Group Co., Ltd, China*
- 459 An application of upward horizontal cut and fill stoping with fine unclassified tailings and cement in Shihu Gold Mine  
*XD Li, Wuhan University of Technology, China; B Wang, B Zheng, B Zhang, Changsha Mining Research Institute Co., Ltd., China; Y Zhang, China National Gold Group Corp., China; S Zhang, Wuhan University of Technology, China*
- 467 Upward entrance filling with hydraulic fills inside geotextile bags  
*XS Liu, Changsha Mining Research Institute Co., Ltd., China*
- 473 The application of the cemented thickened/paste tailings backfill with large flow capacity in Chinese iron mines  
*AX Wu, XX Miao, HJ Wang, HZ Jiao, YM Wang, University of Science and Technology Beijing, China*

## Legal/environmental/safety/risk

---

- 483 Filling of voids in coal longwall mining with caving – technical, environmental and safety aspects  
*J Palarski, F Plewa, G Strozik, Silesian University of Technology, Poland*
- 493 Blast vibration monitoring in cemented paste backfill during its curing stage – a case study  
*B Mohanty, LF Trivino, University of Toronto, Canada*
- 503 Stream diversion and reinstatement on a mine backfill in tropical Borneo  
*A Kemp, C Russell, A Keith, Aurecon Australia Pty Ltd, Australia*
- 517 Author Index