

TABLE OF CONTENTS

Australian Centre for Geomechanics	iii
Gecamin Limited	iv
Committees	v
Preface.....	vii
Sponsors.....	ix

Session 1: Rheology

Shear and Rheology Reduction for Flocculated Thickened Tailings	3
---	---

C. Salinas and R. Martinson, Paterson & Cooke Consulting Engineers (Pty) Ltd, Chile; R. Cooke, Paterson & Cooke Ltd, USA; O. Ferrada, Minera Escondida, Chile

Factorial Design 2 ⁿ in Bauxite Tailings Flocculation and Bingham Model for Rheological Characteristics	11
--	----

A.C. de Araujo and G.E.S. Valadão, Mining Engineering Department, Universidade Federal de Minas Gerais, Brazil; A. Falcucci, Minerconsult Engenharia, Brazil

Analysis of the Methodologies Used for Quantifying or Setting the Yield Stress of Copper Tailings.....	21
--	----

P.A. Garrido and R.A. Diaz, Metallurgical Department, Universidad Católica del Norte, Chile

Imaging and Modelling of Flows of Gold Paste Tailings During Deposition – Laboratory Study and Field Scale Predictions	31
--	----

J. Henriquez, Golder Associates Ltd, Canada; A. Vandervoort and P. Simms, Department of Civil and Environmental Engineering, Carleton University, Canada

Evaluation of Ciba® Rheomax™ Chemical Technology on Ferrochrome Deposits in Concrete-Lined Tailings Dams	39
--	----

R.R. Daubermann and Z. Földvári, Senmin International Pty Ltd, South Africa

Mineral Paste Comparison Between Copper and Iron Tails	47
--	----

C.A. Hernández, E.A. Pizarro and J.A. Molina, Engineering Department, Universidad Arturo Prat, Chile; A.C. de Araujo and G.E.S. Valadão, Mining Engineering Department, Universidade Federal de Minas Gerais, Brazil

Session 2: Thickening

20 Years of AMIRA P266 “Improving Thickener Technology”— How has it Changed the Understanding of Thickener Performance?	59
---	----

P.D. Fawell, J.B. Farrow, A.R. Heath, T.V. Nguyen, A.T. Owen, K. Simic, D.W. Stephens and J.D. Swift, Parker Centre (CSIRO Minerals), Australia; D. Paterson, CSIRO Materials Science and Engineering, Australia; M. Rudman, CSIRO Mathematical and Information Sciences, Australia; P.J. Scales and S.P. Usher, Department of Chemical and Biomolecular Engineering, The University of Melbourne, Australia

Paste Thickener Design and Operation Selected to Achieve Downstream Requirements	69
--	----

J.S. Slottee and J. Johnson, PasteThick Associates, USA

Design and Operation of the Kupol Project Counter-Current Decantation Circuit Using Deep Cone Thickeners.....	77
F. Schoenbrunn and C. McCleary, FLSmidth Minerals, USA; J. Rajala, Kinross Gold, USA	
Geotechnical and Structural Aspects of the Design of a Tailings Thickener	85
J.L.M. Clemente, Bechtel Mining and Metals, USA; P. de la Cuadra, A. Verdugo and C. Canteros-Gormaz, Bechtel Chile Ltda, Chile	
Polymer Aids for Flocculation of Oil Sands Tailings	93
X. Wang, Energy and Resources Conservation Board, Canada; Z. Xu and J.H. Masliyah, University of Alberta, Canada	
An Investigation into the Effect of Operational Factors on Tailings Deep Cones Efficiency at Miduk Copper Complex.....	101
M.R. Garmsiri and H. Haji Amin Shirazi, Mining Engineering Department, Shahid Bahonar University of Kerman, Iran	
A Whole Lot of Shaking – Seismic Load Considerations in Thickener Design	109
E. Hooimeyer and J. Rosart, Outotec Pty Ltd, Australia	
Development and Testing of a Laboratory Scale Paste Thickener	119
R.H. Olcay Barreda, A.C. de Araujo and G.E.S. Valadão, Mining Engineering Department, Universidade Federal de Minas Gerais, Brazil; C.A. Hernández, Engineering Department, Universidad Arturo Prat, Chile	
Introducing Mathematical Models to Define Settling Curves in Designing Thickeners.....	129
M.R. Garmsiri, H. Haji Amin Shirazi and M. Yahyaei, Mining Engineering Department, Shahid Bahonar University of Kerman, Iran	
Session 3: Water Management	
Keynote Address	
Tailings Management to Optimise Water Losses.....	139
A. Robertson, Robertson GeoConsultants Inc., Canada	
Integrated Waste Management Strategy.....	141
S. Longo and F. Palkovits, Golder Paste Technology Limited, Canada; K. Clarke-Whistler, Golder Associates Ltd, Canada	
Integrated Approach to Water Management.....	151
N. Kuyucak and F. Palkovits, Golder Paste Technology Ltd, Canada	
Improved Water Consumption at the Sishen Tailings Storage Facility Complex.....	161
J.C.J. Boshoff, SRK Consulting, South Africa; T. Kleinhans, Sishen Iron Ore Mine, South Africa	

Session 4: Transport

An Integrated Approach to Paste Thickening and Pumping at the Voorspoed Diamond Mine	169
<i>M.C. Mulligan, FLSmidth Minerals, South Africa; A.J.C. Paterson and F. van Sittert, Paterson & Cooke Consulting Engineers (Pty) Ltd, South Africa</i>	
Influence of Adverse Slope on Head Loss in a Pipeline Conveying High Concentration Slurry	179
<i>L. Bernal, Minera Esperanza, Chile; J. Rayo and R. Fuentes, JRI Engineering, Chile</i>	
High Density Thickening and Gravity Transportation of Cuajone Tailings	185
<i>J.H. Figueroa and J. Roman, Southern Copper Corporation, Peru</i>	
Innovative Transport of High Density Thickened Tailings by Means of Hydraulically Actuated MULTISAFE Double Hose-Diaphragm Pump.....	191
<i>H.M. Naegel, FELUWA Pumpen GmbH, Germany</i>	
Risk-Based Design for Slurry Launder	203
<i>R.H.A. Janssen, Bechtel Chile Ltda, Chile</i>	
Hydraulic Transportation of Highly Thickened Solids in Open Channels.....	213
<i>B. Domínguez, Pontificia Universidad Católica de Chile, Chile; A. Spichiger and R. Jara, Division Andina, Codelco, Chile; C. Pavissich, Ingeniería ATC – MN Ltda, Chile</i>	
Proposed Scaling Laws for Laminar Flow of a Bingham Plastic Down an Inclined Plane	225
<i>C.F. Ihle, BRASS Engineering Chile S.A., Chile; A. Tamburrino, Department of Civil Engineering, Universidad de Chile, Chile</i>	
High Density Thickened Tailings Transport by Gravity	233
<i>E.U. Pornillos, C.C. Loayza and J.A. Cabrejos, Golder Associates Peru S.A., Peru</i>	

Session 5: Disposal

Control and Management of Thickened Tailings Beach – A Simplified Approach.....	245
<i>D. Luppnow and J. Moreno, SRK Consulting, Australasia; M. Palape, SRK Consulting, South Africa</i>	
Evaporation, Unsaturated Flow and Oxidation in Multilayer Deposits of Gold Paste Tailings.....	251
<i>B. Fisseha, Golder Associates Ltd, Canada; R. Bryan and P. Simms, Department of Civil and Environmental Engineering, Carleton University, Canada</i>	
The Effect of Evaporation on Strength and the Stability of Thickened Tailings Beach Slopes	261
<i>K.D. Seddon and M.J. Dillon, Australian Tailings Consultants, Australia</i>	
Large Tailings Disposal – Conventional Versus Paste.....	271
<i>J. Rayo and R. Fuentes, JRI Engineering, Chile; R. Orellana, Codelco, Chile</i>	

Session 6: Liquefaction

Keynote Address

Soil Liquefaction and Paste Tailings	281
K. Been, Golder Associates Inc., USA; A.L. Li, Golder Associates Ltd, Canada	

Seismic Behaviour of Thickened Gold Tailings.....	291
---	-----

M. Al-Tarhouni, P. Simms and S. Sivathayalan, Department of Civil and Environmental Engineering, Carleton University, Canada	
---	--

Stability of Large Thickened, Non-Segregated Tailings Slopes	301
--	-----

A.L. Li, D. Ritchie and D. Welch, Golder Associates Ltd, Canada; K. Been, Golder Associates Inc., USA	
--	--

Undrained Monotonic and Cyclic Response in Thickened Tailings.....	313
--	-----

L.A. Cifuentes, Arcadis, Chile; R. Verdugo, Universidad de Chile, Chile	
--	--

Session 7: Case Studies

Performance of Composite Paste Barricades at Goldcorp Inc., Red Lake Mine, Ontario, Canada	325
--	-----

P.B. Hughes, R. Pakalnis and M. Hitch, Department of Mining Engineering, University of British Columbia, Canada; G. Corey, Goldcorp Inc., Canada	
---	--

Cerro Negro — Assessment of Beach Slope and Indetermination of the Operational Limits of Centrifugal Pumps.....	337
---	-----

S. Barrera and R. Hills, Arcadis Geotécnica, Chile	
---	--

Caserones — Option of Tailings Classifying to Improve Water Reclamation.....	345
--	-----

C. Riveros and S. Barrera, Arcadis Geotécnica, Chile	
---	--

Appraisal of Conventional and Paste Options for the Disposal of Tailings Over the Remaining Life of the Venetia Diamond Mine.....	355
---	-----

H. van der Walt, De Beers Consolidated Mines Limited, South Africa; J.M. Rusconi and P. Goosen, Paterson & Cooke Consulting Engineers (Pty) Ltd, South Africa	
--	--

Paste Fill Plant Designs for Underground Mines — A Comparison of Batch Process and Continuous Process	365
---	-----

E.U. Pornillos, Golder Associates Peru S.A., Peru; Golder Paste Technology Ltd, Peru	
---	--

Co-Disposal Plant and Distribution System to Allow the Proper Closure of Exxaro's Hillendale Mine Site.....	375
---	-----

J.M. Rusconi and P. Goosen, Paterson & Cooke Consulting Engineers (Pty) Ltd, South Africa; J. Venter, Exxaro, South Africa	
---	--

Increased Water Recovery through the Application of the TTD/Robinsky Method in Chilean Tailings Disposal Operations	383
---	-----

R. Valdebenito and R. Valdivia, VST Ingenieros Ltda, Chile	
---	--

Author Index	389
--------------------	-----