

CSIRO | The University of Western Australia | Joint Venture



26TH INTERNATIONAL CONFERENCE ON PASTE, THICKENED AND FILTERED TAILINGS 16–18 APRIL 2024 | BALLROOMS 1 & 2, PULLMAN MELBOURNE ON THE PARK, MELBOURNE, AUSTRALIA

This conference is the twenty-sixth in the series of International Conferences on Paste, Thickened and Filtered Tailings (P&TT) initiated by the ACG in 1999, and reflects the developing maturity of P&TT management.

Paste 2024 seeks to explore the considerations needed to raise the mining industry leaders' awareness of how important environmental stewardship is to long-term industry sustainability, with regard to their tailings facilities.

Over the past decade, the potential benefits to be gained from adopting thickened tailings technology on mining operations have become widely accepted, and there would be few mine feasibility studies presently undertaken that do not include this as an option to be evaluated.

Very interestingly, a number of operations are now retrofitting their plants and tailings storages from conventional to thickened technology. The reason for this is the increase in the mass of tailings that can be accommodated on a given footprint and, more importantly, the greater volume of water that can be recovered for re-use in the plant in arid areas.

CONFERENCE CO-CHAIRS



Professor Andy Fourie

Professor of Civil & Mining Engineering and Program Director - Future Tails, The University of Western Australia



Dr David Reid

Research Fellow The University of Western Australia

CONFERENCE THEMES

- Thickening and filtration
- Rheology
- Emerging issues and technology
- Case studies
- Surface disposal
- Transportation
- Instrumentation and monitoring of tailings
- Underground and backfill

WHO SHOULD ATTEND

This conference presents a valuable opportunity for academics, designers, practitioners, consultants and suppliers to discuss best practice, improved methods and technology, all with an emphasis on safety, efficiency and environmental impact.

PRINCIPAL SPONSOR



SUN 14 APRIL	MON 15 APRIL	TUES 16 APRIL	WED 17 APRIL	THUR 18 APRIL		FRI 19 APRIL
Flocculation and Thickening Workshop	Rheology for Slurries and Pastes Short Course	Paste 20	24 Melbourne,	Australia	Mine Fill Seminar	Filtered Tailings Management Short Course
	Welcome Function		Conference Dinner		Agnico E	agle Fosterville Mine Site Visit

Preliminary program³

Day One: Tuesday 16 April 2024

26th International Conference on Paste, Thickened and Filtered Tailings

07:30 **REGISTRATION** SESSION 1: THICKENING AND FILTRATION (1) | BALLROOMS 1 & 2 08:30 Welcome and introduction AB Fourie, Paste 2024 Conference Co-Chair, Australian Centre for Geomechanics, The University of Western Australia, Australia 08:45 OPENING ADDRESS S Mills, BHP, Australia 08:55 KEYNOTE ADDRESS The place for filtered tailings in the search for safe and sustainable tailings management N Amoah, ATC Williams, Australia 09:40 Life cycle cost comparison: modern solid-bowl centrifuge technology outperforms filtration in tailings dewatering AP Chinchankar, Alfa Laval, Sweden 10:00 Innovative product optimisation with the AFP2500 filter: a breakthrough in dewatered tailings solutions by FLSmidth J Chapponel, FLSmidth, USA Avoiding dam failures: is filtration the best solution? TG Fitton, Fitton Tailings Consultants, Australia 10:20 10:40 A&O MORNING BREAK 10:50 SESSION 2: THICKENING AND FILTRATION (2) | BALLROOMS 1 & 2 CHAIR TBA 11:20 Critical pathways for selecting paste backfill process for Rio Tinto Kennecott, USA; JL Roberge, Responsible Mining Solutions, Canada; K Moran, Rio Tinto Kennecott, USA; B Sliede, Responsible Mining Solutions, Canada; M Hutton-Ashkenny, Rio Tinto Kennecott, 11:40 Application of wet tailings pressure filtration for filtered tailings stack and co-disposal with mine waste at various sites including upstream and downstream of the tailings storage facility K Grohs, M Liu, A Satriawan, Kunadi, Simanjuntak, PT Agincourt Resources, Indonesia 12:00 Tailings filtration toward smaller filters with higher efficiency E Sommacal, JC Brum, Matec Pacific, Australia; F Doveri, A Boriello, Matec Industries, Italy 12:20 How tailings characteristics affect capex and opex in filtration: two case studies J Hahn, BOKELA GmbH, Germany 12:40 A geotechnically derived screening method to assess the filterability of tailings B Meneses, Geosyntec, Iberia; M Llano-Serna, W Dressel, Red Earth Engineering, Australia; JP Coffey, Rio Tinto, Australia; T Gerritsen, Rio Tinto, Australia 13:00 **Questions and answers** PRINCIPAL SPONSOR ADDRESS P Proeger, Proeger Flow Solutions, Australia 13:10 13:15 **LUNCH** 14:15 Panel discussion

SESSION 3: RHEOLOGY | BALLROOMS 1 & 2

CHAIR TBA



- 15:00 Admixture impact on rheological properties of a calcined clay binder for cemented paste backfill S Dhers, D Freimut, Master Builders Solutions, Germany; Z Martic, Master Builders Solutions, Switzerland; R Salter, Master Builders Solutions, Australia
- 15:20 Application of pipe flow lubrication for reactor feeds <u>L Graham</u>, B Nguyen, J Wu, G Short, D Harris, CSIRO Mineral Resources, Australia; D Anglin, CEM, Australia
- 15:40 Questions and answers

15:50 AFTERNOON BREAK

SESSION 4: EMERGING ISSUES AND TECHNOLOGIES | BALLROOMS 1 & 2

CHAIR TBA



- 16:20 Some observations on the effects of polymer degradation on geotechnical behaviour <u>D Reid</u>, The University of Western Australia, Australia; HAW Kaminsky, Northern Alberta Institute of Technology, Canada; AB Fourie, The University of Western Australia, Australia
- 16:40 The use of methylene blue index in mine and tailings planning <u>HAW Kaminsky</u>, M Ghuzi, A Sedgwick, Y Li, Northern Alberta Institute of Technology, Canada; A Vietti, Vietti Slurrytech, South Africa
- **17:00** Dewatering capabilities of Terraflowing™ technology for tailings <u>JB Kruyswijk</u>, Weir Minerals, Netherlands; A Kilcullen, Weir Minerals, Australia
- 17:20 Investigating the transitional behaviour of tailings from a gold mine site in Australia PGN Nayanthara, C Gallage, J Rajapakse, Queensland University of Technology, Australia; DSSS Biyanvilage, Advisian-Worley Group, Australia; T Rowles, Knight Piésold Pty Ltd, Australia; E Tuplin, BHP, Australia
- 17:40 Questions and answers
- 17:50 DAY ONE CLOSE

Preliminary program*

Day Two: Wednesday 17 April 2024

26th International Conference on Paste, Thickened and Filtered Tailings

SESSION 5: SURFACE DISPOSAL (1) | BALLROOMS 1 & 2

CHAIR TBA

Paterson & Cooke

08:30 INVITED SPEAKER HAW Kaminsky, Northern Alberta Institute of Technology, Canada

09:00 Farmed tailings stacking H Li, J Hinton, J Navarro, Rio Tinto, Australia

09:20 Sustainable design for construction and operation of a storage area for filter press bauxite residue in a desert environment D Webb, F Gassner, WSP, Australia

09:40 Ultra paste and central thickened discharge: a paradigm shift in tailings management A Roshdieh, K Seddon, B Pirouz, S Javadi, P Williams, ATC Williams, Australia

10:00 Central thickened discharge scheme for Ma'aden's Mansourah-Massarah Gold Project A Roshdieh, FC Soo, ATC Williams, Australia; K Zare Al Ahmadi, A Ibnu Hamdani, A Putra Ginting, R Gonzales Valdestamon, Ma'aden, Kingdom of Saudi Arabia; S Javadi Rudd, M Sedeghipour, ATC Williams, Australia

10:20

10:30 Industry Sponsor Address: Matec Pacific E Sommacal, Matec Pacific, Australia

10:33 MORNING BREAK

SESSION 6: SURFACE DISPOSAL (2) | BALLROOMS 1 & 2

CHAIR TBA

PASTE'PRO METROLOGI

11:05 Single-phase or two-phase? The impact on tailings dam breach modelling and impact assessment M Liu, T Ganeson, C Harrington, Red Earth Engineering, Australia

11:25 Advances in dam breach analysis appropriate for dewatered tailings storage facilities S Seyedan, Geosyntec, Finland; A Arenas, ATC Williams, Australia; M Llano-Serna, Red Earth Engineering, Australia

Exploring the role of time dependency in tailings deposition flows AM Talmon, Deltares, and Delft University of Technology, The Netherlands; M Nabi, Deltares, 11.45 The Netherlands; E Meshkati, R&D Boskalis (formerly with Deltares), The Netherlands

Analysing the segregation of coarse tailings particles with a zone-formation differential settling model Y Li, D van Zyl, The University of British Columbia, Canada 12:05

12:25 Tailings storage: exploiting central thickened discharge for capping and closure TG Fitton, Fitton Tailings Consultants, Australia

12:45 Questions and answers

LUNCH

12.55

Lunch Sponsor



13:55 Panel discussion

SESSION 7: SURFACE DISPOSAL (3) | BALLROOMS 1 & 2



14:40 An alternative approach to developing compaction specifications for tailings materials T Gerritsen, Rio Tinto, Australia; R Wood, Fugro, USA; M Llano-Serna, Red Earth Engineering, Australia; B Meneses, Geosyntec, Iberia; W Dressel, Red Eargh Engineering, Australia

15:00 A holistic approach to large-scale alternative dewatered tailings management: lessons from case studies C Crystal, SRK Consulting, USA; R Jansen, Paterson & Cooke, USA

15:20 Impact of the construction of a filtered tailings stack on top of an existing slurry tailings storage facility at LaRonde gold mine E Masengo, Agnico Eagle Mines, Canada; EP Ingabire, ArcelorMittal, Canada; J Huza, MR Julien, Agnico Eagle Mines, Canada

15:40 Questions and answers

15:50 **AFTERNOON BREAK**

SESSION 8: BACKFILL | BALLROOMS 1 & 2



16:20 Enabling sustainability in mining; case study in mine backfill I Aguilar Sánchez, MT Bellver Baca, Sika Services AG, Switzerland; W Barahona, Sika Ecuatoriana S.A., Ecuador; S Arcila-Gut, Sika Canada Inc, Canada; F Erismann, Earth Resource Investment Group, Switzerland; E Avilés, Sika Ecuatoriana S.A., Ecuador; A Weinkauf, Sika Technology AG, Switzerland; M Hansson, Sika Sverige AB, Sweden; R Contador, Sika S.A. Chile, Chile

Characterisation of the geomechanical properties of cemented paste backfill for design B Sainsbury, Deakin Unviersity, Australia: D Harty, Northern Star Resources, 16:40 Australia; F Felipe, Agnico Eagle Mines, Australia; M Ruest, Lundin Mining, Canada; D McLoughney, BHP, Australia; D Sainsbury, Geotechnica Pty Ltd, Australia

17:00 Enhancing cemented paste backfill using chemical admixtures to create economic and environmentally sustainable paste fill O Sadler, Master Builders Solutions, Australia; S Ricketts, D Koupriantchik, Northern Star Resources, Australia

17:20 Questions and answers

17:30 **DAY TWO CLOSE**

CONFERENCE DINNER Hotel Windsor

Fosterville Gold Mine Site Visit

19 April 2024 | Fosterville Gold Mine, Fosterville, Australia

The ACG is facilitating a site visit for some attendees of the Paste 2024 conference. Agnico Eagle has generously offered their Fosterville mine for a site visit. Agnico Eagle seeks a diverse group of site visitors and there are restrictions on the number of visitors from the one company.

Collaborating Organisation



Correct at time of printing and subject to change. See <u>acgpaste.com</u> for updates

Preliminary program

Day Three: Thursday 18 April 2024

26th International Conference on Paste, Thickened and Filtered Tailings

SESSION 9: TRANSPORT | BALLROOMS 1 & 2

CHAIR TBA

08:30 INVITED SPEAKER: JP Coffey, Rio Tinto, Australia

09:00 Crushed rock-thickened tailings pumping at ultra-high concentrations T Wennberg, A Stålnacke, Luossavaara-Kiirunavaara Aktiebolag, Sweden; A Sellgren, Luleå University of Technology, Sweden

09:20 Monitoring bed formation in a pipeline: a comparative study of two measurement methods AG Chryss, E Zheng, CSIRO, Australia

09.40 Effect of paste pump performance on the transient pressures and forces in an underground distribution system L Correia, Paterson & Cooke, Canada; J Jacobs, Paterson &

10:00 Availability of piston-diaphragm pump in paste fill: cement savings U Gamboa, ABEL Equipos S.A., Spain; A Castilla, Sandfire MATSA, Spain

10:20 Questions and answers

10:30 Industry Sponsor Address: Weir Minerals

10:33 MORNING BREAK

SESSION 10: CASE STUDIES | BALLROOMS 1 & 2

CHAIR TBA



11:25 Backfilling tailings above an active cave mine NC Clarke, Imtech Pty Ltd, Australia

Improvement in Big Gossan paste hybrid reticulation system design to optimise gravity flow: a case study I Febritirtana, D Kuswanto, D Putra, PT Freeport Indonesia,

Stability assessment and ground support design for drifting through a cemented paste filled stope at the Big Gossan mine, Indonesia I Haque, Freeport-McMoRan, USA; 12:05 JPE Hamman, N Rohmadi, G Santosa, PT Freeport Indonesia, Indonesia; J Nguz Tshisens, Freeport-McMoRan, USA

12:25 ATA® treated tailings for underground backfill: a Harmony Gold case study C Spagnuolo, Clean Teq Water, South Africa; AJ Fischmann, Clean TeQ Water, Australia; F Sofrà, Rheological Consulting Services, Australia; R de Kretser, Acclarium, Australia; R Cavalida, Rheological Consulting Services, Australia; E Brooks, Stitchwise, South Africa; J Raath, Harmony Gold, South Africa

12:45 Questions and answers

12:55 LUNCH

13:55

SESSION 11: UNDERGROUND AND BACKFILLING | BALLROOMS 1 & 2

CHAIR TBA

Panel discussion

14:40 Development of slag alternatives for paste backfill operations NA Romaniuk, Graymont, Canada; L McFarlane, N Hariharan, Greymont, USA



Effect of brine, slag and lime inclusion on Fosterville Gold Mine cemented paste backfill strength F Sofrà, Rheological Consulting Services, Australia; F Filipe, Agnico Eagle 15:20 Mines, Australia; R Cavalida, Rheological Consulting Services, Australia

15:40 Mechanical behaviours and backfilling performance of cemented tailings-waste rock backfill with various superplasticizers: an experimental study SH Yin, M Zhang, LM Wang, W Chen, University of Science and Technology Beijing, China; presented by DP Chen, University of Science and Technology Beijing, China

16:00 Questions and answers

16:10 **AFTERNOON BREAK**

SESSION 12: SURFACE DISPOSAL (4) | BALLROOMS 1 & 2

16:40 Inferring the state parameter from partially drained cone penetration test data using the soil behaviour type index to adjust drained/undrained correlations J Ayala, Klohn Crippen Berger, Australia; AB Fourie, D Reid, The University of Western Australia, Australia; M Jefferies, Consultant, UK

Why accelerated mechanical consolidation™ delivers equal or greater benefits to other tailings management solutions O Santiago, Phibion, Australia; R Meneze, Phibion, 17:00 Chile; W McAdam, D Smirk, Phibion, Australia

17:20 Questions and answers

17:30 **FAREWELL ADDRESS**

17:40 **CONFERENCE CLOSE**

ATC

Lunch Sponsor

Q U A T T R O P R O J E C T

Technical Session Sponsor

ROJECT

McLanahan. **♦**diefenbach



Troubleshooting Your Flocculation and Thickening Processes Workshop

14 April 2024 | Melbourne, Australia

Thickening is a key unit operation in mineral processing; where suspended particles are separated by gravity settling. The addition of polymer flocculants promotes aggregation that accelerates settling and increases throughputs, but their performance can be highly sensitive to conditions. While monitoring underflow, rheology is the best means of controlling thickeners to optimise downstream outcomes. Most thickeners are controlled to an underflow solids concentration, generally because that is easier and rheology is harder.

Collaborating Organisation





	WORKSHOP PROGRAM - 14 APRIL 2024*
07:30	REGISTRATION
08:00	Introduction, overview and safety
08:15	Feed characterisation
09:05	Know your thickener
10:05	MORNING BREAK
10:25	Flocculation
11:15	Settling tests
12:05	LUNCH
13:05	Rheology – underflow transport properties
13:55	Troubleshooting thickeners – debottlenecking
14:45	AFTERNOON BREAK
15:05	Troubleshooting thickeners – underflow and overflow
15:55	Questions and wrap-up
16:30	WORKSHOP CLOSE

*Program subject to change.

Rheology Fundamentals for Slurries and Pastes Short Course

15 April 2024 | Pullman Melbourne on the Park, Melbourne, Australia

Integral to process plant design is identification of the slurry system operating window that allows increased throughput and recovery while safely decreasing capital and operating costs. For any system involving thickening, filtration or paste production, understanding the material rheological and dewatering characteristics is prerequisite to identifying this window and optimal, reliable and safe operation.

Collaborating Organisation



See the full program detail at acgpaste.com/rheology-short-course

	COURSE PROGRAM – 15 APRIL 2024*
07:45	REGISTRATION
08:20	Welcome and introduction <i>Dr Fiona Sofrà, Rheological</i> Consulting Services Pty Ltd
08:30	What is a slurry? The liquid-to-solid continuum <i>Dr Fiona Sofrà</i> Slurry rheology/flow properties <i>Dr Fiona Sofrà</i>
10:15	MORNING BREAK
10:45	Slurry rheology measurement <i>Dr Fiona Sofrà</i> Flow models - communicating data <i>Dr Fiona Sofrà</i> Slurry rheology roadmap <i>Dr Fiona Sofrà</i> Slurry surface chemistry/rheology and dewatering relationships <i>Professor Peter Scales, Rheological Consulting Services Pty Ltd</i>
12:00	LUNCH
13:00	Dewatering <i>Professor Peter Scales</i> Thickening <i>Professor Peter Scales</i>
14:30	AFTERNOON BREAK
15:00	Filtration Dr Ross de Kretser, Acclarium Tailings and Solid-Liquid Separations Consulting
	Filtration and geotechnical considerations Dr Ross de Kretser
16:40	Question and answer session
17:00	COURSE CLOSE, DRINKS & NIBBLES







Filtered Tailings Management - Planning, Design, Construction, and Operation Course

19 April 2024 | Melbourne, Australia

This short course will focus on the practical application of filtered tailings management, facility design, and operations. Current standard-of-practices in planning, design, fundamental geotechnics, construction concepts and approaches, and operations of filtered tailings storage facilities will be covered.

	COURSE PROGRAM - 19 APRIL 2024*
08:30	REGISTRATION
09:00	Welcome, introductions and safety share Rachel Jansen, Paterson & Cooke, USA
09:10	Drivers and key considerations for a holistic approach to filtered tailings management <i>Colleen Crystal, SRK Consulting, USA & Rachel Jansen, Paterson & Cooke</i>
09:40	Introduction to geotechnics of filtered tailings storage facilities Raul Norambuena, SRK Consulting, Canada & Joe Rola, SRK Consulting
10:20	COFFEE BREAK
10:30	Dewatering at the plant – key considerations Rachel Jansen, Paterson & Cooke
11:00	Designing the test Colleen Crystal, SRK Consulting
11:30	Toquepala pilot test – planning and start-up, with Q&A session <i>Dr Francesco Kaswalder, Diemme Filtration, Italy</i>
12:00	LUNCH BREAK
13:00	Large scale materials handling systems design and technical and economic considerations, testing to support conveyor design <i>Corin Holmes, Jenike & Johanson</i>
13:30	Large scale material handling challenges and holistic stacking solutions benchmarking - case studies TBA
14:10	How high is too high and static liquefaction potential TBA
14:50	AFTERNOON BREAK
15:00	Benchmarking – additional case studies risks and opportunities <i>Colleen Crystal, SRK Consulting & Rachel Jansen, Paterson & Cooke</i>
15:30	Toquepala pilot test – benchmarking, installation, and lessons learned <i>Andrea Pezzi, Diemme Filtration, Italy</i>
16:00	Where are we, where are we going? / Q& A / Closing comments <i>Colleen Crystal, SRK Consulting & Rachel Jansen, Paterson & Cooke / All</i>
16:30	COURSE CLOSE

*Program subject to change.





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Mine Fill Seminar

19 April 2024 | Pullman Melbourne on the Park, Melbourne, Australia

This seminar will start by introducing how cemented paste backfill fits within the both the mining and tailings cycles. From there it will focus on more operationally driven topics, dealing with how to monitor and document a backfill system, how to update a system due to operational changes, as well as analysing case studies on how operations have dealt with these operational changes.

The objective of this ACG seminar, facilitated by Dr Ryan Veenstra, Newmont Australia, is to bring together backfill specialists, leaders, and operators from around the globe to present a comprehensive learning experience.

Collaborating Organisation



Facilitator



Dr Ryan VeenstraGlobal Backfill Specialist
Newmont Australia

07:30 REGISTRATION 08:00 Welcome and introduction <i>Dr Ryan Veenstra</i> , <i>Newmont</i> 08:10 Backfill within the mining cycle <i>Dr Will Bawden</i> , <i>Consultant</i> , <i>Canada</i> (remote presenter) 08:55 Backfill within the tailings cycle <i>Kim Morrison</i> , <i>Newmont</i> , <i>USA</i> (remote presenter) 09:40 Dealing with tailings changes <i>Dr Ryan Veenstra</i> 10:00 <i>MORNING BREAK</i> 10:15 Types of backfill and their uses <i>Tony Grice</i> , <i>AMC Consultants</i> , <i>Canada</i> 11:00 The backfill quality control system <i>Dr Ryan Veenstra</i> 12:00 <i>LUNCH</i> 13:00 Using as-built data <i>Dr Ryan Veenstra</i> 13:20 Upgrading an operating underground distribution system <i>Leslie Correia</i> , <i>Paterson & Cooke</i> 14:00 Pipeline wear monitoring <i>Glenn MacGregor</i> , <i>ArmorPIPE</i> 14:20 Impact of cemented paste fill quality on an operation's quality control program <i>Ben Barsanti</i> , <i>Operational Geotechs</i> 14:40 <i>AFTERNOON BREAK</i> 15:10 Seismics in relation to backfill <i>Dr Matt Helinski</i> , <i>Minefill Services</i> 16:00 Panel discussion		SEMINAR PROGRAM - 19 APRIL 2024*
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17:00 SEMINAR CLOSE	16:00	Panel discussion
	17:00	SEMINAR CLOSE

*Program subject to change.

For more information on these and other associated events, visit acgpaste.com/associated-events

KEYNOTE SPEAKER



Dr Nelson Amoah

Western Australian Operations Manager, Senior ATC Williams

Presentation title: The place for filtered tailings in the search for safe and sustainable tailings management





Sue Mills

Manager Technical Services

INVITED SPEAKERS



Dr Jarrad Coffey

Manager Tailings and Dams Rio Tinto

Presentation title: Finding the balance in the tailings storage facility design and selection process



Dr Heather Kaminsky

NSERC IRCC in Oil Sands Tailings Management Northern Alberta Institute of Technology, Canada

Presentation title: Clays and tailings: how the nanoscale controls the macroscale

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On the horizon... Comprehensive Mine Fill Handbook

Background

Co-editors Professor Yves Potvin and Dr Ryan Veenstra, together with world-wide mine fill experts, are writing a new and comprehensive technical publication to examine the evolution of mine fill practice over the last two decades. This handbook seeks to advance the safe, efficient, and economic application of fill within the mining community.

Co-editors



Professor Yves PotvinProfessor of Mining Geomechanics
Australian Centre for Geomechanics



Dr Ryan Veenstra *Global Backfill Specialist*Newmont Australia

Content

This comprehensive publication will explore both the theoretical and practical aspects of mine fill application with a range of examples.

Readership

This publication will be a valuable reference for mining practitioners, early career geotechnical engineers, operating and regulatory professionals, consultants, academics, researchers and other mine fill peers.

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