

TECHNICAL AND SOCIAL PROGRAMME

2 – 4 December, Sheraton Hotel & Convention Center, Santiago, Chile

WEDNESDAY, 2 DECEMBER

16:00-19:00 **Registration.** Foyer, Lobby Level.

17:30-17:50 **Authors and Session Chairs Coordination Meeting.** San Cristóbal Ballroom A.

19:00-20:00 **Inauguration Ceremony.** San Cristóbal Ballroom B & C.

Words of Welcome. *Aldo Casali*, Director Department of Mining Engineering, Universidad de Chile.

Opening Address. *Romke Kuyvenhoven*, PROCEMIN 2009 Technical Coordinator.

Words of Welcome. *Gerhard Von Borries*, PROCEMIN 2009 Chairman, Vice President Projects, Antofagasta Minerals, Chile.

Keynote Address. *Prof. Alban Lynch*, Australia. **Copper Sulphide Flotation from 1910 to 2010. What comes next?**

20:00-22:00 **Welcome Reception. COURTESY OF FLSMIDTH MINERALS.** San Cristóbal Ballroom A and Foyer.

THURSDAY, 3 DECEMBER

SAN CRISTÓBAL BALLROOMS B & C

08:20-08:30 **Day 2 Programme Presentation and News Update.** *Romke Kuyvenhoven*, PROCEMIN 2009 Technical Coordinator, Gecamin.

Plenary Session 1

Chair: *Gerhard Von Borries*, Vice President Projects, Antofagasta Minerals, Chile.

08:30-09:15 **Reko Diq, Project Shaping Process.** *Francisco Walther*, New Projects Development Manager, Antofagasta Minerals, Chile.

09:15-10:00 **China – Low Cost Alternative?** *Vytas Svalbonas*, Director Engineering Technology, Metso Minerals, USA.

10:00-10:50 **Poster Session and Coffee Break. COURTESY OF MOLY-COP CHILE S.A.** San Cristóbal Ballroom A and Foyer.

SAN CRISTÓBAL BALLROOM B – 3 December

Session 1: COMMINUTION TESTWORK & GRINDING MEDIA

Chair: Pablo Soto, Process Discipline Leader, ARA Worley Parsons, Chile.

10:50-11:10 **Grinding Circuit Design using a Geometallurgical Approach to the Hardness Estimation of an Ore Body.** Dave Bulled & Carlos Lozano, SGS-Mineral Services, Canada.

11:10-11:30 **Case Studies on the Effect of Sample Dimensions on Comminution Testwork Results.** Derek Barratt, DJB Consultants & Alex Doll, Alex G Doll Consulting Ltd. Canada.

11:30-11:50 **Media Type Effect on Grinding Efficiency.** Levi Guzmán & Dante García, MolyCop Adesur S.A. Peru.

11:50-12:10 **Improving Zinc Recovery at the Perilya Broken Hill Concentrator by Changing the Grinding Chemistry.** Christopher Greet & Michael Myllynen, Magotteaux Australia Pty Ltd.; David MacKay, Perilya Broken Hill Mine, Australia.

12:10-12:30 **Recent Applications of Inert Regrinding to Improve Efficiency of Base and Precious Metals Extraction.** Karina Arbujo & Steve Smith, Xstrata Technology, Chile and Australia.

SAN CRISTÓBAL BALLROOM C – 3 December

Session 2: SIMULATION, CONTROL & OPTIMIZATION OF FLOTATION PROCESSES

Chair: Patricio Rodriguez, Mineral Processing Manager, OUTOTEC Chile.

10:50-11:10 **Methodology for Execution and Interpretation of Laboratory Kinetic Flotation Tests for Scale-Up – Part 1.** Roger Amelunxen, AMINPRO Canada & Peter Amelunxen, AMINPRO Chile.

11:10-11:30 **Methodology for Using Laboratory Kinetic Flotation Parameters for Plant Design and Optimization – Part 2.** Roger Amelunxen, AMINPRO Canada & Peter Amelunxen, AMINPRO Chile.

11:30-11:50 **Determination of Rougher Froth Velocity Profiles and their Implementation Through Expert Systems.** Luis Figueroa, Minera Escondida Ltda., Chile; Enrique Peragallo, Alan Gómez & Filiberto Orrante, SGS Lakefield Research Chile S.A.

11:50-12:10 **Model-Predictive Control of the Froth Thickness in a Flotation Circuit.** Hamed Foroush, Sebastian Gaulocher & Eduardo Gallestey, ABB Switzerland Ltd.

12:10-12:30 **Improved Flotation of Oolitic Hematite Ore with a Novel Cationic Collector.** Zhang Yushu & Gong Wenqi, Wuhan University of Technology; Yan Wu, Zhang Shaoxiang & Long Yunbo, Chinese Academy of Geological Sciences, China.

12:30-14:00 **Lunch.** Bohio Park (Pool Area).

SAN CRISTÓBAL BALLROOM B – 3 December

Session 3: INNOVATIONS IN EQUIPMENT DESIGN AND PLANT OPERATIONS

Chair: Cleve Lightfoot, Global Practice Leader Technology, BHP Billiton, Chile.

14:00-14:20 **Prospects for Electric Pulse Disintegration of Precious Metal Ores.** Anatoly Usov & Vyacheslav Tsukerman, Kola Science Centre, Russian Academy of Science, Russia; Rodrigo Mas Abalo, UTFSM, Chile.

14:20-14:40 **Ocampo Au/Ag Plant Expansion and Addition of a Gravity Circuit Based on a Low Capital Cost Approach.** John Wells, JAWMETC; Chris Bostwick, Gammongold, Canada.

14:40-15:00 **Advances in Stirred Milling: Improving Profitability of Copper ore Processing.** Jon Allen, Metso Mining and Construction Technology, USA.

15:00-15:20 **Energy Savings and Technology Comparison by Using Small Grinding Media.** Michel Brissette, Wheelabrator Alleward, Canada.

15:20-15:40 **The role of Discrete Event Simulation and Advanced Planning and Scheduling in Mining Supply Chains.** Craig Stewart, Chris Macquet, Maska Law & Chris Fricke, TSG Consulting, Australia.

SAN CRISTÓBAL BALLROOM C – 3 December

Session 4: FLOTATION PROCESS DEVELOPMENT AND PLANT START UP

Chair: Jorge Rosas, Director, Mining & Mineral Processing B.U. HATCH Chile.

14:00-14:20 **Commissioning of the Supercells™ - World's Largest Flotation Machines.** Dariusz Lelinski, Ian Gordon, Asa Weber, Bart Dabrowski & Frank Traczyk, FLSmidth Minerals, USA; Mick Dunn & Rick Newnam, Rio Tinto, USA. (Presented by David Kashuba).

14:20-14:40 **Chemical Study for the Selectivity and Recovery of Metals Sulphides by Flotation Using Seawater.** Leonardo Parraguez & Luis Bernal, Minera Esperanza, Chile; Gustavo Cartagena, Outside Consultant, Chile.

14:40-15:00 **A Kinetics Approach to the Design of the Moly Plant for the Codelco Andina Phase 2 Expansion.** Fernando Torres & Francisco Soto, CODELCO Chile, Andina Division; Peter Amelunxen, AMINPRO, Chile.

15:00-15:20 **Hydrodynamic Performance of the Large Flotation Cells at Codelco Norte's Concentrator.** Pedro Morales & Francisco Coddou, CODELCO Chile; Juan Yianatos & Felipe Contreras, UTFSM, Chile; Miguel Catalán, IM2, Chile; Francisco Díaz, Comisión Chilena de Energía Nuclear, CCHEN, Chile.

15:20-15:40 **Statistical Analysis of the Operating Performance of Outotec's TankCell®-300 Flotation Machine.** Hernán Elqueta, CODELCO Chile; Rodrigo Grau & Pertti Lamberg, OUTOTEC Research Center, Finland; Alejandro Yáñez, OUTOTEC Chile.

15:40-16:20 **Poster Session and Coffee Break.** San Cristóbal Ballroom A and Foyer.



SAN CRISTÓBAL BALLROOM B – 3 December

Session 5: HIGH PRESSURE GRINDING ROLLS

Chair: Fernando Torres Ardiles, Process Discipline Leader, Nueva Andina Project Phase II, CODELCO Chile.

16:20-16:40 **Uses and Benefits of Laboratory-Scale HPGR Tests.**

Mike Daniel, Ausenco Minerals; Chris Bailey, JKTech, Australia.

16:40-17:00 **A Laboratory Scale Ball Mill Grindability Comparison of the HPGR and Conventional Crusher Products.**

Rodrigo Muranda, Moly-Cop Grinding Systems, Chile.

17:00-17:20 **Success and Reliability of HPGR Crushing at**

Compañía Huasco in Chile. Frank Peter van der Meer & Ekkhart Matthies, KHD Humboldt Wedag, GMBH, Germany; Carlos Pineda & Víctor Gallardo, Cia. Minera Huasco, Chile; Pierre Negroni, Negroni S.A., Chile.

17:20-17:40 **HPGR Application in Australia - Status and Future**

Directions. Greg Lane & Mike Daniel, Ausenco Minerals, Australia; Robert Dunne, Newmont, USA; Stephen Morrell, SMCC Pty. Ltd., Australia; Dave Maxton, Humboldt Wedag Australia Pty. Ltd.

17:40-18:00 **HPGR Flowsheets – the Next Generation.** Chris

Morley & Mike Daniel, Ausenco Minerals, Australia.

18:00-18:20 **How have HPGRs fared in the current financial**

crisis? Rene Klymowsky, N. Patzelt, J. Knecht & E. Burchardt, Polysius AG, Germany.

SAN CRISTÓBAL BALLROOM C – 3 December

Session 6: FUNDAMENTALS OF FLOTATION & PROCESS DEVELOPMENT – PART I

Chair: César Gómez, Professor, McGill University, Canada.

16:20-16:40 **Three-Dimensional Liberation Analysis of Cu Feed**

and Products from Flotation Circuits using

HRXMT. Jan Miller, Chen-Luh Lin & Juan Medina, University of Utah, USA; Alvaro Videla, Moly-Cop Chile S.A.

16:40-17:00 **The Significance of Air Recovery in Flotation Bank**

Performance: Case Studies. Kathryn Hadler, C. Smith & J. Cilliers, Imperial College London, United Kingdom.

17:00-17:20 **Comparative Analysis between Desalinated and Non-desalinated Seawater for a Concentrator.**

Jorge Barrera & Mario Cerna, Fluor Chile S.A.

17:20-17:40 **Analysis, Evaluation and Selection of Flotation**

Circuits using Multiple Goals and Monte Carlo Simulation. Marcelo Montenegro, Felipe Sepúlveda & Luís Cisternas, Universidad de Antofagasta, Chile; Edelmira Galvez, Universidad Católica del Norte (CICITEM), Chile.

17:40-18:00 **Automated Mineralogy for Process Planning and Optimisation, Quality Control, Audit Studies and Trouble Shooting.** Patricio Jaime, Paul Gottlieb, Alan Butcher & René Dobbe, FEI Australia.

18:00-18:20 **Cu/Co Enrichment Study from Low-Grade Refractory Ore Dressing Tailings of Copper-Cobalt**

Ores. Tan Xin, Wei Ming-an, Wu Xi-qun & Sheng Yan-ling, Beijing General Research Institute of Mining and Metallurgy, China.

19:00-22:30 **Cocktail and Seminar Dinner, COURTESY OF FLSMIDTH MINERALS, Bohio Park (Pool Area).**

FRIDAY, 4 DECEMBER

SAN CRISTÓBAL BALLROOMS B & C

08:50-09:00 **Day 3 Programme Presentation and News Update.** *Romke Kuyvenhoven*, PROCEMIN 2009 Technical Coordinator, Gecamin.

Plenary Session 2

Chair: Aldo Casali, Director of the Mining Department, Universidad de Chile.

09:00-09:45 **Copper Mining: Present and Future.** Diego Hernández, Base Metals President BHP Billiton, Chile.

09:45-10:30 **Unlocking Optimal Flotation: Is Air Recovery the Key?** Jan Cilliers, Imperial College, London, United Kingdom.

10:30-11:20 **Poster Session and Coffee Break. COURTESY OF AMINPRO.** San Cristóbal Ballroom A and Foyer.

SAN CRISTÓBAL BALLROOM B – 4 December

Session 7: FILTRATION PROCESSES & WATER MANAGEMENT

Chair: Raymond Philippe, Senior Engineer, Hatch Water, Chile.

11:20-11:40 **A Quantum Change in the Thickening Process.** Chad Loan & Richard Triglavcanin, OUTOTEC Pty Ltd. Australia.

11:40-12:00 **Treatment of Acid Mine Drainage and Water Reuse: Flotation with Microbubbles versus Flocc Lamellar Settling.** Renato Silva, Aline Nogueira da Silveira & Jorge Rubio, Universidade Federal do Rio Grande do Sul, Brazil.

12:00-12:20 **Increased Water Recovery through the Application of the TTD/Robinsky Method in Chilean Tailings Disposal Operations.** Ricardo Valdebenito, Alvaro Fonseca & Ramón Valdivia, VST Ingenieros Ltda., Chile.

SAN CRISTÓBAL BALLROOM C – 4 December

Session 8: FUNDAMENTALS OF FLOTATION & PROCESS DEVELOPMENT – PART II

Chair: Willy Kracht, Academic, Department of Mining Engineering, Universidad de Chile.

11:20-11:40 **Crystal Chemical Study and Computer Simulation on Flotation of Several Sulfate Minerals.** Shuoshi Lu, Fuliang Wang, Ming'an Wei, Zhenguo Song & Chuanyao Sun, Beijing General Research Institute of Mining and Metallurgy, China.

11:40-12:00 **Particle Detachment in Flotation.** Omelka B., Schreithofer N., Wierink G. & Kari Heiskanen, Helsinki University of Technology, Finland.

12:00-12:20 **Molecular Mechanics Analysis of Smithsonite Flotation Behaviour by CF Collector.** Tan Xin, Sun Chuanyao, Luo Sigang & Li Changgen, Beijing General Research Institute of Mining and Metallurgy, China.

SAN CRISTÓBAL BALLROOM B – 4 December

12:20-12:40 **Water Balances of Tailing Impoundments: A New Approach.** Silvana Dal Pozzo, Raúl Souyris & Katherine Viveros, Hatch Ingenieros y Consultores Ltda., Chile; John Wates, Fraser Alexander Pty Ltd, South Africa.

12:40-13:00 **Tailings Benefits.** Antonio Jara & Luis Grünewald, Ingeniería y Construcción AJG Ltd. Chile.

SAN CRISTÓBAL BALLROOM C – 4 December

12:20-12:40 **New Developments for Brazilian Reverse Iron Ore Flotation.** Mónica Cassola & Nilson Bartalini, Clariant S.A. Brazil.

12:40-13:00 **Research on the Effect of Grinding Media on the Carbonate Flotation using Lauryl amine as Collector.** Zhenguo Song, Shuoshi Lu & Chuanyao Sun, State Key Laboratory of Mineral Processing, Beijing General Research Institute of Mining and Metallurgy, China. (Presented by Ming'an Wei).

13:00-14:30 **Lunch. COURTESY OF WEIR MINERALS.** Bohio Park (Pool Area).

SAN CRISTÓBAL BALLROOM B – 4 December

Session 9: COMMINUTION PLANT SIMULATION, CONTROL & OPERATION

Chair: Peter Amelunxen, Consultant, AMINPRO, Chile.

14:30-14:50 **Energetic Optimization of Comminution Circuits.** Jorge Soto, Hugo Jimenez, Luis Grünewald & Oscar Alfaro, Candelaria Mining Company, Chile.

14:50-15:10 **Design and Implementation of Advanced Automatic Control Strategy Based on Dynamic Models for High Capacity SAG Mill.** Iván Yutronic, Cía. Minera Doña Inés de Collahuasi; Rodrigo Toro, Honeywell Chile S.A. Chile.

15:10-15:30 **Dynamic Process Simulator of: A Tool for the Design, Analysis and Optimization of a Crushing Plant.** Juan C. Tapia, Marcial Mendoza, Hilda Callejas, Patricio Muñoz & Julio Rosales, AMEC International Ltda, Chile.

SAN CRISTÓBAL BALLROOM C – 4 December

Session 10: SLURRY & TAILINGS HANDLING AND WATER MANAGEMENT

Chair: Sergio Prado, Separation Technology Manager, FLSmidth, Chile.

14:30-14:50 **Minimum Slopes for Coarse Solids Transport in Launder.** Robert Janssen, Bechtel, Chile.

14:50-15:10 **Predicting Optimal Conditions in Copper Concentrate Filtering Plants.** Jorge Menacho, De Re Metallica Ingeniería, Chile.

15:10-15:30 **Water Supply for Mining Projects in Arid Regions.** Paula Guerra, Sergio González & Katherine Viveros, Hatch Ingenieros y Consultores Ltda., Chile.



SAN CRISTÓBAL BALLROOM B – 4 December

15:30-15:50 **Experiences and Lessons with Advanced Control Systems in Minera Los Pelambres: A practical Approach.** Daniel Silva, Minera Los Pelambres; Luis Tapia, Minera Esperanza, Chile.

15:50-16:10 **Model of Wear Rate in the SAG Liners as Function of Geometallurgical and Operational Variables at Minera Los Pelambres.** Andrea Acuña, Universidad de Concepción, Chile.

16:10-16:30 **Development of a Control System for the Size of Particle in a System of Milling in Dinamic State.** Miguel Mayta, San Agustin National University, Peru.

16:30-16:40 **CLOSING SESSION.** San Cristóbal Ballroom A and Foyer.

Seminar Balance and Final Comments. PROCEMIN 2009 Organising Committee:

Gerhard von Borries, PROCEMIN 2009 Chairman.

Romke Kuyvenhoven, Technical Coordinator.

Carlos Barahona, Executive Director.

16:40-18:00 **Closing Reception. COURTESY OF CITIC HIC.** San Cristóbal Ballroom A and Foyer.

SAN CRISTÓBAL BALLROOM C – 4 December

15:30-15:50 **Copper Concentrate Dewatering – Comparison of the Effect of Vacuum and Press Filtration.** Barbara Tora, University of Science and Technology, Poland; Peter Fecko, VSB-Technical University Ostrava, Czech Republic. Marian Kurzac, REAFLOT, Poland.

15:50-16:10 **Resistance of Concrete with Different Agregate Origin.** Oscar Nocera, Oscar Benegas, María Médici, Rodolfo Uñac & Ana Vidales, Universidad Nacional de San Luis, Argentina.

16:10-16:30 **Interaction of Feed Mass Flow and Feed Grade in Rougher Scavenger Flotation at the Miduk Cu Complex.** Mohammad Rezaee-Rad & Hassan Haji Amin Shirazi, Shahid Bahonar University of Kerman; Reza Ebrahimi & Sedighe Zeidabadi, National Iranian Copper Industries Company (NICICO). Iran.

POSTERS SESSION

Energy Efficiency and Concentrators Plants in Chile. Jorge Ipinza, Rodrigo Ortiz & Juan Rayo, JRI Ingenieria S.A., Chile.

The Significance of Air Recovery in Flotation Bank Performance: Case Studies. K. Hadler, C. Smith & J. Cilliers, Imperial College London, United Kingdom.

Copper/Gold froth Flotation and its Importance in the Floatability of Arsenite Minerals. María del Carmen Ojeda, J.F. Medina & Juan Reyes, Universidad Autónoma de San Luis Potosí, Mexico.

Determination of Rougher Froth Velocity Profiles and their Implementation Through Expert Systems. Luis Figueroa, Minera Escondida Ltda., Chile; Enrique Peragallo, Alan Gómez & Filiberto Orrante, SGS Lakefield Research Chile S.A.

Design and Implementation of Advanced Automatic Control Strategy Based on Dynamic Models for High Capacity SAG Mill. . Iván Yutronic, Cía. Minera Doña Inés de Collahuasi; Rodrigo Toro, Honeywell Chile S.A. Chile.

Automated Mineralogy for Process Planning and Optimisation, Quality Control, Audit Studies and Trouble Shooting. Patricio Jaime, Paul Gottlieb, Alan Butcher & René Dobbe, FEI Australia.

STUDENT POSTER

Green Mining. Alejandro Arias, Universidad Finis Terrae, Chile.

Modelling the Drainage of Liquid in froth Flotation Cells and Columns. Pablo Brito, Imperial College London, United Kingdom.

Development of a Control System for the Size of Particle in a System of Milling in Dinamic State. Miguel Mayta, San Agustin National University, Peru.

The Effect of Uncertainty in the Design of Flotation Circuits. Nathalie Jamett, Universidad de Antofagasta, Chile.

A Novel Method for the Design of Flotation Circuits Using Group Contribution. Felipe Sepúlveda, Universidad de Antofagasta, Chile.

Modelling the Gas Dispersion Pattern in Mechanical Flotation Cells. Felipe Contreras, Universidad Técnica Federico Santa María, Chile.

Development of a Frother Characterization Test. Daniela Muñoz, McGill University / Universidad de Concepción, Canada/Chile.

Model of Wear Rate in the SAG Liners as Function of Geometallurgical and Operational Variables at Minera Los Pelambres. Andrea Acuña, Universidad de Concepción, Chile.

Evaluación Técnica Económica de la Implementación en Planta de Reactivo Inhibidor de Corrosión de Aceros en Molienda en Minera Los Pelambres (MLP). Paola Gajardo, Universidad de Concepción, Chile.

Efecto de Aguas de Drenaje Acido de Mina (DAM) sobre el Proceso de Flotación de Minerales de Cobre. Karen Foster, Universidad de Concepción, Chile.