

***HYDROPROCESS*2008**

II International Workshop on Process Hydrometallurgy

TECHNICAL AND SOCIAL PROGRAM

14-16 May 2008

Sheraton Hotel & Convention Center

Santiago, Chile



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LOCATIONS

Place	Activity
Foyers – Lobby level	Registration Desk Welcome & Closing Reception Coffee-Breaks and Internet
San Cristóbal Ballroom A	Authors and Session Chairs Coordination Meeting Poster Sessions
San Cristóbal Ballroom B & C	Inaugural Ceremony Plenary Sessions Technical Sessions Friday Closing Ceremony
San Cristóbal Ballroom B	Session 01, 03, 05
San Cristóbal Ballroom C	Session 02, 04, 06
Pedro de Valdivia Ballroom, Level Z	Lunches and Workshop Dinner

View Floor Plan at the end of this brochure

Information

Please contact the Registration Desk with any queries.

Messages

Messages can be left on the message board located in the lobby.

Lost & Found

All found items should be taken to the Registration Desk.

Recommendations

For safety reasons please keep your personal belongings with you at all times.

Please wear your delegate badge at all times. This will facilitate access to the sessions.

Lunch and dinner tickets will be requested at the ballroom entrance.

Parking at the Sheraton Hotel is available at \$3500 pesos per day (\$2500 pesos half a day). When leaving please present your HYDROPROCESS 2008 badge to the parking personnel.

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It is a pleasure for me colleagues to address the II International Workshop on Process Hydrometallurgy 2008. The first workshop was held in Iquique city in October 2006 and it was quite successful because it opened spectrum of the hydrometallurgy beyond the copper field and it effectively promoted experience exchange among areas usually independent eventhough they are too close.

HydroProcess 2008 will provide again an open forum for sharing and exchanging knowledge and expertise, identifying standards of excellence and strengthening the net of support amongst hydrometallurgy professionals. This will be an ideal setting for participants to combine arduous technical sessions and visit the attractions of our modern nation's capital. So far we have received very positive and enthusiastic responses from people whom we have had an opportunity to talk to.

We have high expectations and this workshop will provide a real contribution for disseminating the latest technological innovations and developments in the management and operation of hydrometallurgical processes, of which dynamism demands that now with even more frequency, we organize this type of events to be able to stay up-to-date in the current state-of-the-art and developments within the industry. We hope to have over 300 participants coming from various mining companies, technology and service providers, institutes and research centers, academics and students, overseas professionals who will contribute and enrich the exchanges of knowledge and expertise, together within a robust and balanced technical program.

At the same time, the interest and variety seen in the abstracts that have been received so far, allow us to commit ourselves in preparing an interesting and complete Proceedings volume, incorporating all the articles reviewed so that we can plenty satisfy participants' expectations.

Dr. Jorge Menacho

HydroProcess 2008 Chairman

WEDNESDAY 14 MAY

- 16:00-19:00 **Registration**
- 17:30-18:15 **Authors and Session Chairs Coordination Meeting.**
San Cristóbal Ballroom A.
- 19:00-20:15 **Inauguration Ceremony.** San Cristóbal Ballroom B & C.
Welcoming Words. *Dr. Jesús Casas*, Technical Coordinator
HYDROPROCESS 2008, University of Chile.
**Opening Address: “Geometallurgy: Key Feature for Design and
Operation of Metallurgical Processes”.** *Dr. Jorge Menacho*,
HYDROPROCESS 2008 Chairman, De Re Metallica Ingeniería Ltd., Chile.
**Keynote Address: “Future Challenges in the Leaching Management
of Cía. Minera Doña Inés de Collahuasi”.** *Luis Veloso*, Manager of
Leaching Plant, Cía. Minera Doña Inés de Collahuasi, Chile (Presented
by *Nelson Clavería*).
- 20:15-21:30 **Welcome reception.** Foyer

THURSDAY 15 MAY

SAN CRISTÓBAL BALLROOM B & C

PLENARY SESSION 01

Industrial Processes

Chair: *Sergio Castro*, Global Practice Leader Processing, BHP-Billiton, Chile

- 08:30-09:00 **Productive Process Technology in Heaps and Ponds of Nueva
Victoria, SQM.** *Manuel Droguett*, Manager, Heaps and Ponds of Nueva
Victoria, SQM S.A., Chile.
- 09:00-09:30 **Past, Present and Future of Cía. Minera Maricunga.** *Sergio González*
and *Andrés Montaña*, Cía. Minera Maricunga, Chile.
- 09:30-10:00 **Challenges and Opportunities of Hydrometallurgy in Codelco North.**
Alberto Cruz and *Sergio Parada*, Codelco Chile Division North.

10:00-10:50 Coffee Break / Poster Session, courtesy of **ABB**.
FOYER and SAN CRISTÓBAL BALLROOM A.

SAN CRISTÓBAL BALLROOM B

SESSION 01

Cyanidation and Cyanide Treatments

Chair: *Nathan Stubina*, Manager R&D
Process Development, Barrick Gold, Canada

10:50-11:10

Treatment of Amalgamation Residues for Recovering Gold and Mercury for Further Minimizing the Environmental Impact. *Luis Sobral* and Ary Caldas, CETEM – Centre for Mineral Technology, Brazil. Jaime Chirinos and Federico Calizaya, University of San Agustín, Peru. Juan C. Guerrero, Federal University of Rio de Janeiro, Brazil.

11:10-11:30

Alternative Methods for the Treatment of Cyanide Effluents by Air and Activated Carbon. *Ernesto de la Torre*, Alicia Guevara and Yadira Pilco, National Polytechnical School, Equator.

11:30-11:50

The Investigation of Parameters Affecting Cyanide Removal by Chemical Oxidation Process. Javier Montalvo, Pontifical Catholic University of Rio de Janeiro. *Luiz Teixeira*, Solvay-Peróxidos do Brazil Ltd. and Lídia Yokoyama, Federal University of Rio de Janeiro, Brazil.

SAN CRISTÓBAL BALLROOM C

SESSION 02

Leaching and Bioleaching of Ores and Concentrates I

Chair: *Jacques Wiertz*, Consultant and Assistant Professor. University of Chile

10:50-11:10

Strategies to Develop the Cathode Production in Anglo American Chile-Los Bronces Division. *Marcelo Bustos*, Anglo American Division Los Bronces, Chile.

11:10-11:30

Acid Leaching of Lateritic Minerals at Atmospheric Pressure. *Alejandra Hernández*, José Castellanos, José Alonso and Ileana Cabrera. Research Centre for the Mining and Metallurgical Industry (CIPIMM), Cuba.

11:30-11:50

Laboratory and Demonstration Scale Optimisation of the Quebrada Blanca Heap Leach Bacterial Regime Using Geoleach™. *Guillermo Kelly*, Enrique Carretero, Michael Gunn and Paul Harvey, GeoBiotics, LLC, Chile and USA. Günther Ahlborn, Cía Minera Quebrada Blanca, Chile.

11:50-12:10

Biogenic Sulphide for Cyanide Recycle and Copper Recovery in Gold-Copper Ore Processing. Mike Adams, BioteQ Water Pty Ltd., Australia. Raymond Philippe and Rick Lawrence, BioteQ Environmental Technologies Inc., Canada. (Presented by *Michael Bratty*).

11:50-12:10

Acid Mine Drainage from Tizapa Mexico Tailings in Humidity Cells with Mesophilic Bacteria. Ventura Becerril, José Flores, Yanet Zamora and *Rosa Rivera*. UNAM, Chemistry Faculty, Metallurgical Engineering Department, Mexico.

12:10-12:30

Progress on the Assessment of CANMET Enhanced Silver Leaching Technology for the Gold and Silver Leaching of High Grade Ores. *Guy Deschênes*, Mike Fulton, Chen Xia and Allen Pratt. CANMET, Natural Resources, Canada.

12:10-12:30

Discussion Panel.

12:30-14:00

Lunch. PEDRO DE VALDIVIA BALLROOM (Level Z)

SAN CRISTÓBAL BALLROOM B

SESSION 03

Biohydrometallurgical Studies and Developments

Chair: *Luis Sobral*, Head of Service of Metallurgical and Biological Processes, CETEM, Brazil

SAN CRISTÓBAL BALLROOM C

SESSION 04

Automation, Optimization and Control of Equipments and Industrial Plants

Chair: *Juan C. Tapia*, Metallurgy Manager, AMEC, Chile

14:00-14:20

AMIRA International and Collaborative Research in Chile. *Deming Whitman* and *Alicia Blancarte*, AMIRA International Ltd., Australia.

14:00-14:20

Optimization of the Irrigation System in Tintaya Heap Leaching Plant. Héctor Málaga and José Cáceres, Xstrata Tintaya S.A., Peru (Presented by *Sandro Frisancho*).

14:20-14:40

Removal of Copper and Zinc from Gold Ore Tailings Solutions Using Chitosan. *Martha Benavente* and Erick Álvarez, National University of Engineering, Nicaragua. Luis Moreno and Joaquín Martínez, Royal Institute of Technology, Sweden.

14:40-15:00

Cadmium and Lead Biosorption using Eucalyptus Sideroxylon Seed as Biomass. *Rosa Rivera* and Marcos Martell, UNAM, Chemistry Faculty, Metallurgical Engineering Department, Mexico.

15:00-15:20

Controlling Bacterial Growth in Process and Cooling Waters with Hydrogen Peroxide. Fernando Serrapio, National Institute of Technology. *Luiz Teixeira*, Pontifical Catholic University of Rio de Janeiro. Lídia Yokoyama and Marco Lemos, University Federal of Rio de Janeiro, Brazil. Cristian Márquez, INNOVA Andina, Peru.

15:20-15:40

Discussion Panel.

14:20-14:40

Optimizing Heap Processes Using Real-Time In Situ Monitoring. *Howard Grahm*, Errol L. Montgomery & Associates Inc., USA.

14:40-15:00

Evaluation of Minimum Electrodes Machine Performance with Failures, Refinery Plant No 2 – Chuquicamata, Division Codelco Norte. *Rodrigo Mendoza*, José Henríquez and Bruno Lértora, Codelco Chile Vicepresidencia Corporativa de Proyectos, Chile.

15:00-15:20

Hazop in the Chilean Mining Industry a Good Business Strategy?. *Harry Commentz* and Dick Celmer, Fluor S.A., Chile.

15:20-15:40

Discussion Panel.

15:40-16:10 Coffee Break. FOYER

SAN CRISTÓBAL BALLROOM B

SESSION 05

Electrolytic and Solvent Extraction Processes

Chair: *Pablo Amigo*, Director of Technology, Aker Kvaerner, Chile

16:10-16:30

Designing High Performing Copper Solvent Extraction Circuits: Tips and Tricks. Andrew Nisbett and *Stephen Peabody*, Cognis Corporation, Mining Chemicals Technology, USA.

16:30-16:50

Review of Ion Exchange Resin Applications in the Hydrometallurgical Industry. *Francis Gula*, Novasep Process, France.

16:50-17:10

Effect of Cobalt and the Fe²⁺/Mn²⁺ Ratio on the Morphology of the Oxide Layer Formed in Pb-Ca-Sn Anode with Different Tensile Stress. *Jorge Ipinza* and Juan P. Ibáñez, Arturo Prat University, Chile. Antonio Pagliero and Froilán Vergara, University of Concepcion, Chile.

17:10-17:30

Co-Matrix™ Filter – Operation Results and Applications in Solvent Extraction Plants. *Diego Rubio*, Delkor, Chile and David Kim-Hak, Delkor, USA.

SAN CRISTÓBAL BALLROOM C

SESSION 06

Modeling of Hydrometallurgical Operations and Processes

Chair: *Marcelo Jo*, Manager Technical Center, Xstrata Copper, Chile.

16:10-16:30

A Simple Model for Heap Leaching Recovery. Mario Mellado, Scientific Technical Center for Mining Research, (CICITEM). Luis Cisternas, University of Antofagasta and *Edelmira Gálvez*, Catholic University of North. Chile.

16:30-16:50

Simulation Model Applied to Heap Leach, SX and EW for Process Control. Nelson Collao and *Rodrigo Cortés*, Aker Kvaerner, Chile.

16:50-17:10

Fluid Flow, Mixing and Particle Suspension in Pachuca Tanks. *Esperanza Rodríguez*, Humberto Castillejos and Andrés Acosta, Research Center and Advanced Studies of IPN, CINVESTAV, Mexico.

17:10-17:30

Simulation of the Start-Up of Hydrometallurgical Plant. Juan C. Tapia, *Rudi Fester*, Eduardo Zavala and Pamela Aguayo, AMEC International (Chile) S.A., Chile.

17:30-17:50

Organic Recovery Stages. *Igor Polski,*
Pip Proceso, Chile.

17:30-17:50

Discussion Panel.

19:00-22:30

Cocktail and Congress Dinner. PEDRO DE VALDIVIA BALLROOM (Level Z)

End of Day 2

FRIDAY 16 MAY

SAN CRISTÓBAL BALLROOM B & C

PLENARY SESSION 02

Hydrometallurgical Processes and Engineer Demand

Chair: *Gustavo Tapia,* VicePresident Metallurgy, Anglo American Chile

08:30-09:00 **Profile of Process Engineer Required by the Mining Industry.** *Percy Mayta,* Sociedad Contractual Minera El Abra, Chile. (Presented by *Boris Medina*).

09:00-09:30 **Review of Modern Techniques of Monitoring Specific Gene Species and Metabolites in Bioleaching Process: Its Relevance in the Design and Process Control.** *Cecilia Demergasso,* Catholic University of North, Chile.

09:30-10:00 **State-of-the-Art in Bioleaching Technology.** *Jorge Menacho,* De Re Metallica Ingeniería, Chile.

10:00-10:50 Poster Session / Coffee Break . FOYER

SAN CRISTÓBAL BALLROOM B & C

SESSION 07

Leaching and Bioleaching of Ores and Concentrates II

Chair: *Gino Slanzi,* Superintendent Innovation and Technological Development, Codelco Chile - Division Andina, Chile

10:50-11:10

Acid Leaching for Uranium Ores. *Oscar Tinoco,* Corporación Minera San Manuel S.A.C., Peru.

11:10-11:30

Copper Kinetics and Bacterial Diversity Determinations in Bioleaching Test of Chalcopyrite Ore Concentrates by GEOCOAT™ Process. *Juan Rivadeneira*, Sociedad Punta del Cobre S.A., Chile.

11:30-11:50

Percolation Bioleaching of Copper Sulphides Flotation Concentrate. Renata Lima, Carlos Gomes de Souza and *Luis Sobral*, Centre for Mineral Technology, CETEM. Selma Leite, Federal University of Rio de Janeiro, UFRJ. Paulo Medeiros da Silva, Caraíba Mining Company S/A, Brazil.

11:50-12:10

High Grade Leaching of Tretared Ores in Anglo American Chile-Mantos Blancos Division. Claudio García and Miguel Politis, Anglo American, Division Mantos Blancos, Chile (Presented by *Marcelo Argandoña*).

12:10-12:30

Newly Designed Lightnin Attrition Scrubber Shows Potential Yield Benefits in Copper Processing. *Marcos Filgueiras*, LIGHTNIN Mixers, USA. Roddy Espinoza, HRI S.A. Bafco Procesos, Chile (Presented by *Bernie Gigas*).

12:30-14:00

Lunch. PEDRO DE VALDIVIA BALLROOM (Level Z)

SAN CRISTÓBAL BALLROOM B & C

SESSION 08

Innovations and Developments in the Hydrometallurgical Processes

Chair: *Manuel Guzmán*, Corporative Manager Research and Development, MOLYMET S.A., Chile

14:00-14:20

Security in Hydrometallurgical Operations and Processes. *René Rojas*, SERNAGEOMIN, Chile.

14:20-14:40

Crystallization and Equilibrium of Phase of Aqueous Systems of Arsenic, Calcium and Iron. *María E. Taboada*, Pía Hernández, Elsa Flores and Teófilo Graber. University of Antofagasta, Chile.

14:40-15:00

Crystallization as a Function of Temperature and Concentration Inside the Operation of Metal and Not Metal Recovery - Process. *Sergio Rivera*, Ademir Ramírez and Bárbara Brito, Process Department, SKM-Minmetal, Chile.

15:00-15:20

Support to Selection of Samples for Metallurgical Tests at Large Scale. Exploration of Economic Surrounding. *Nelson Díaz*, Codelco Chile, Division Salvador, Chile.

15:20-15:40

Extraction of Metallic Species from Tailings of Caron Process by Sulphuric Acid Combined with Pyrolysis Organic Agent. *Margarita Penedo* and *José Falcón*, East University, Cuba. Felisa González, María Blázquez, Jesús Muñoz and Antonio Ballester, Complutense University of Madrid. Spain

15:40-16:00

Discussion Panel.

SAN CRISTÓBAL BALLROOM B & C

CLOSING SESSION. Wrap-up and Final Comments

16:00-16:10 **Final Comments and Workshop Balance.** *Jorge Menacho*, Chairman; *Jesús Casas*, Technical Coordinator; *Carlos Barahona*, Executive Director, HYDROPROCESS 2008 and *Esteban Domic*, Chairman HYDROCOPPER 2009.

16:10-16:20 **Presentation of Forthcoming Hydrometallurgical Events.**

16:20-17:30 Closing Reception. FOYER

End of Day 3

POSTERS

A Simple Model for Heap Leaching Recovery.

Mario Mellado, Scientific Technical Center for Mining Research, (CICITEM). Luis Cisternas, University of Antofagasta and *Edelmira Gálvez*, Catholic University of North, Chile.

Laboratory and Demonstration Scale Optimisation of the Quebrada Blanca Heap Leach Bacterial Regime Using Geoleach™.

Guillermo Kelly, Enrique Carretero, Michael Gunn and Paul Harvey, GeoBiotics, LLC, Chile and USA. Günther Ahlborn, Cía Minera Quebrada Blanca, Chile.

Biogenic Sulphide for Cyanide Recycle and Copper Recovery in Gold-Copper Ore Processing.

Mike Adams, BioteQ Water Pty Ltd. Australia. Raymond Philippe and Rick Lawrence, BioteQ Environmental Technologies Inc. Canada (Presented by *Michael Bratty*).

Acid Leaching for Uranium Ores.

Oscar Tinoco, Corporación Minera San Manuel S.A.C., Peru.

Secondary Leaching in Anglo American Chile-Mantos Blancos Division.

Claudio García and *Miguel Politis*, Anglo American, Division Mantos Blancos, Chile (Presented by *Marcelo Argandoña*).

Cathodes Plant in Anglo American Chile-Mantos Blancos Division.

Miguel Politis and *José Fernández*,

Anglo American, Division Mantos Blancos, Chile.

The Enrichment of Touilila Quartz Sand Deposit (Algeria) by Percolation Leaching Method.

Abdelkrim Kheloufi, Djamel Merzoug and Nadjib Drouiche. Unité of Development of the of Silicon Technology (UDTS), Algeria.

Newly Designed Lightnin Attrition Scrubber Shows Potential Yield Benefits in Copper Processing.

Marcos Filgueiras, LIGHTNIN Mixers, USA. Roddy Espinoza, HRI S.A. Bafco Procesos, Chile (Presented by *Bernie Gigas*).

STUDENT POSTER

Cristalización y Equilibrios de Fase de Sistemas Acuáticos de Arsénico, Calcio y Hierro.

Pía Hernández, University of Antofagasta, Chile.

Equilibrios de Fases y Cristalización de Sales de Cobre.

Orlando Rocha, University of Antofagasta, Chile.

Balances Térmicos en Operaciones de Biolixiviación de Sulfuros de Baja Ley.

Oscar Valerio, University of Chile.

Metodología de Control de la Calidad del Aglomerado Mediante Mediciones de Intensidad de Corriente Eléctrica.

Juan Reinoso, Arturo Prat University and Cía. Minera Doña Inés de Collahuasi, Chile.

Planificación de Cosecha en Pozas de Evaporación Solar.

Karla Ossandón, University of Antofagasta, Chile.

Use of Microencapsulated Extractants for the Removal of Chrome from Aqueous Solutions.

Felipe Pozo, Fernando Valenzuela, Carlos Basualto and Jaime Sapag-Hagar, University of Chile.

FLOOR PLAN



GECAMIN Ltd. is a private company founded in 1998 in Santiago, Chile, with the purpose of designing, planning and producing technical events focused on technology innovations and process management in the mining and metallurgical industry. GECAMIN strives to produce high quality events which allow Chile to be a centre of excellence for meetings on mining related topics.

GECAMIN is committed to efficiently serving the mining professionals by constantly monitoring the industry trends, detecting and satisfying the clients' needs of technical knowledge exchange, by organising events that meet their highest expectations. This commitment is sustained through a quality management system based on the international ISO 9001:2000 standard.

GECAMIN aims to:

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- Generate a culture of constant innovation and search for excellence in its organisation
- Promote the exchange of knowledge and creation of collaborative technical networks between mining professionals worldwide
- Maintain highest standards of customer satisfaction.

GECAMIN annually organises various international technical conferences, courses and seminars with attendance averaging 300 delegates. The events calendar can be found at **www.gecamin.cl**.

COMING EVENTS

WIM2008

WATER IN MINING - I INTERNATIONAL
CONGRESS ON WATER MANAGEMENT IN
THE MINING INDUSTRY

9-11 JULY 2008. Santiago, Chile
www.wim2008.com

MININ2008

III INTERNATIONAL CONFERENCE ON
MINING INNOVATION

6-8 AUGUST 2008. Santiago, Chile
www.minin2008.com

MAPLA2008

V INTERNATIONAL MINING PLANT
MAINTENANCE MEETING

3-5 SEPTEMBER 2008. Santiago, Chile
www.mapla.cl

Procemin2008

V INTERNATIONAL MINERAL
PROCESSING SEMINAR

22-24 OCTOBER 2008. Santiago, Chile
www.procemin.cl

MANTEMIN2008

III INTERNATIONAL MINE EQUIPMENT
MAINTENANCE MEETING

5-7 NOVEMBER 2008. Santiago, Chile
www.mantemin.cl

2008 GEOSTATS

VIII INTERNATIONAL
GEOSTATISTICS CONGRESS

1-5 DECEMBER 2008. Santiago, Chile
www.geostats2008.com

MOLTEN2009

VIII INTERNATIONAL CONFERENCE ON
MOLTEN SLAGS, FLUXES AND SALTS

18-21 JANUARY 2009. Santiago, Chile
www.molten2009.com

HydroCopper2009

V INTERNATIONAL COPPER
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