

wim2008

Water in Mining

I International Congress on
Water Management in the Mining Industry

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Editor *Jacques Wiertz*

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CHAIRMAN'S ADDRESS

You are all kindly invited to read the material herein that is the foundation of the First International Congress on Water Management in the Mining Industry. This is a unique opportunity for mining professionals and technical experts to discuss the challenges faced by countries and mining operations alike, in the context of an ever scarcer and more valuable resource. This is also an occasion to delve into the most recent breakthroughs accomplished by the mining industry in efficient water management and water availability.

Organising a conference about mining in Chile necessarily requires reviewing some relevant figures.

According to data provided by the Ministry of Mining, in 2007 the Chilean mining industry produced the equivalent to 5.5 million tonnes of fine copper, which accounts for more than 33% of the world's production. The contribution of the mining business to Chile's GDP was 24%. As far as exports are concerned, mining generated US\$ 43,700 million, accounting for 65% of total exports. Copper accounted for 58% of total shipments sent overseas, totalling US\$ 38,200 million. Thirteen out of the fifteen top Chilean exporters are in the ore exporting business.

According to official estimates, the development of new mining projects in the period 2007-2011 will account for nearly US\$ 22,000 million in investment. This industrial surge for the next five years will account for 60% of total mining foreign investment in Chile during 1990-2006.

We must also add investments in goods and services for the industry. Mining suppliers estimate that 2008 will generate business in the neighbourhood of US\$ 4,600 million.

These investments entail significant challenges for the mining industry, both in operation and project development initiatives planned for the near future, given the current context of the two most important resources: energy and water. Our hope is for this conference to foster exchange among the different stakeholders who will expose us to improved ways of using this resource.

The Chilean mining industry, mainly developed in northern Chile, has long understood the critical nature of water availability.

Large mining operations have made significant progress in minimising fresh water usage through recycling and reutilisation of process water and the introduction of new technologies.

Some players, support desalinisation, in spite of the significant

energy costs and consumption rates involved and the fact that it is only applicable in very specific cases.

Other industries share this concern about water consumption, namely, agriculture and sanitation companies that have exchanged ideas and strategies to better manage water by participating in countrywide and regional Water Tables, where the government and civil society jointly seek sustainable long-term solutions for this issue.

Another strategy to improve the situation in our country has been to exchange ideas with water management districts in desert areas elsewhere in the world. The joint efforts of the government and the private sector have resulted in remarkably successful and creative solutions.

Derechos, Extracciones y Tasas Unitarias de Consumo de Agua del Sector Minero Regiones Centro Norte de Chile, a study by the General Director of Water, recently published, states that fresh water consumption rate in cubic meters in 2006 per tonne of processed ore (m³/tonne) averages 0.79 for concentration and 0.13 for hydrometallurgy.

Fresh water consumption rates for concentration range between 0.3 and 2.1 m³/tonne. The highest values correspond to those operations where it is not possible to recirculate water from tailings impoundments. For hydrometallurgy, water consumption ranges between 0.08 and 0.25 m³/tonne.

Comparing 2000 and 2006 figures, efficient use of water shows dramatic improvement: 42% in concentration and 65% in hydrometallurgy. The conclusion of the aforementioned study is as follows: *An important mismatch can be observed during the period of interest (2000-2006) between production capacity curves, for both concentration and hydrometallurgy, and water consumption curves, which reflects a steady increase in water use efficiency by this industry.* That is to say, the authority acknowledges the effort made by this industry in an efficient use of the water.

We hope this Congress will be an opportunity for the mining industry to show other industries its commitment to improve research and development, seeking for new technologies that will enable a more efficient use of water; thus showing the commitment of the mining professionals to sustainable development.

Isaac ARANGUIZ
Chairman

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FOREWORD

Water, considered for long time a never ending and easily available resource, has become a strategic supply for the mining industry. In a context of growing scarcity and increasing demand from other activities, water supply is nowadays recognised as one of the limiting factors for the development of new mining projects and for the expansion of existing ones.

New water supply alternatives such as water harvesting, seawater desalination or direct use of seawater represent the strategy developed by the mining industry to deal with this growing scarcity and competition for the resource. A better knowledge of the existing water resources is also part of the effort developed in aim of securing the water supply for existing and new projects.

Efficient use of water throughout the mining and processing activities is a main concern in the design and operation of all the projects. Optimisation of the water reclaim from tailings ponds and a better control of water losses by evaporation are some of the main topics addressed by the designers and operators, especially in arid climate.

Water is integral to virtually all mining activities and typically the prime medium, besides air, that can carry pollutants into the wider environment. A correct characterization of the effluents is the first step towards an efficient management. Dissolved sulphate and metals removal from mine waters and mining effluents are the main challenges. Sound water management and practice are fundamental for most mining operations to achieve environmental best practices.

The 36 peer reviewed technical papers written by authors from 12 countries included in these proceedings of the WATER IN MINING WIM 2008 Congress reflect the efforts undertaken by the mining industry in aim of a more sustainable management of water resources. It should be of interest to all the professionals related to the design and operation of mining projects and in particular to those committed to adopting better water management practices.

Jacques WIERTZ

Technical Coordinator and Head Editor

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The Congress Chairman, Mr. Isaac Aranguiz, President of Mine Candelaria for finding time in his extremely busy schedule to support us with his always very helpful advice.

The authors for their invaluable contributions and willingness to share with us their knowledge, experience and new ideas.

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The GECAMIN team for their hard work, professionalism and continuous commitment to making this conference a great success.

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And to you, readers and participants, whose interest and enthusiasm made this event so versatile and the whole experience so rewarding and enriching.

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Jacques WIERTZ is Geologist Engineer graduated from the University of Liege, Belgium. He also has a Ph.D. in Applied Sciences (Metallurgy) from the University of Liege, Belgium. He began as research engineer on environmental biotechnology at the Chemical Engineering Department of the University of Liege. He worked 5 years as national expert for the United Nations in Chile in a UNEP project on Biohydrometallurgy.

Since 1992, he is Professor at the University of Chile and currently, he is Part-time Professor at the Mining Engineering Department, in the Environmental Management Chair. He also works as Technical Coordinator for GECAMIN and as consulting expert in Bioleaching and Environmental Impact Assessment of mining and metallurgical processes.

He has worked as consulting expert for the Chilean National Environmental Commission (CONAMA) in the design and formulation of atmospheric arsenic regulation and the review of environmental control and remediation programs for copper smelters. He has also participated as teacher in several short courses and workshops on environmental management of mining and metallurgical wastes and on prediction, prevention and control of acid mine drainage.

In 2007, he participated as technical coordinator of the Second International Seminar on Mine Closure and was co-editor of the seminar proceedings. Dr. WIERTZ has developed several research and development projects for the mining industry in extractive metallurgy and environmental management. He is author of a number of publications in international journals and in proceedings of international seminars and congresses.

