

**Civil Engineer, PgDip*****Expertise***

Civil Engineer with more than 18 years of experience in water and environmental management of mining projects and operations in Chile, Peru, Bolivia, Brazil, Canada, Australia, Russia, DRC, among others. Has led development and operational areas of mining companies in hydrogeology, water resources, environmental, fluid transportation, tailings storage facilities and mine dewatering. In consultancy, has been responsible for the development of conceptual and numerical hydrogeology models used in dewatering of open pits, water resources availability studies and environmental impact assessments of mining operations. Has gained relevant experience in strategic decision-making in water management from his participation in the Water Resources Commission of the Chilean Mining Council.

***Education***

Diploma Mining Business Management, 2010, University Adolfo Ibañez  
PgDip. Water & Environmental Management, 2007, University of Bristol  
Civil Engineer, specialization hydraulics, sanitary & environmental, 2004, Universidad de Chile

***Professional Affiliations***

Int. Association of Hydrogeologists (IAH) Registration number: 140299  
Int. Mine Water Association (IMWA). Registration number: 1862

***Professional Experience***

2022 – Present

*Itasca Australia, Perth, Australia  
Hydrogeology Manager / Principal Consultant*

2017 – 2022

*Itasca Chile, Santiago, Chile  
Hydrogeology Manager / Principal Consultant*

2015 – 2017

*Doña Inés Collahuasi Mining Company, Chile  
Water, Tailings and Concentrate Manager*

2013 – 2015

*Doña Inés Collahuasi Mining Company, Chile  
Water Resources Manager*

2010 – 2013

*El Tesoro Mining Company, AMSA, Chile  
Environment & Water Superintendent*

2008 – 2010

*El Tesoro Mining Company, AMSA, Chile  
Head of Water Resources*

2005 – 2006

*Ifarle Engineering Consultants, Chile  
Projects Engineer*

2004 – 2005

*Conic - BF Civil Engineering Consultants, Chile  
Projects Engineer*

2004

*Aguas Andinas S.A., Chile  
Practicing Engineer*

01/23/23

***Project Experience***

*Mining hydrogeology:* He has led the development of conceptual and numerical hydrogeological models used on depressurization and dewatering of open pits, defining water resources sustainability for mining operations, environmental impact assessments due to groundwater extraction, and evaluation of seepage from TSFs and leaching pads. Has also been involved in designing monitoring infrastructure of water levels and pressures, through open wells and vibrating wire piezometers, generating data for operational decision-making and support for Environmental Impact Studies. Practical experience in mining companies such as El Tesoro (AMSA) and Collahuasi, and as a consultant advising various companies in Chile, Peru, Bolivia, Brazil, DR Congo, Canada, Russia, Australia, among others.

*Groundwater modelling:* Besides leading the realization of hydrogeological models for mining companies, developed the conceptual and numerical hydrogeology models of the Valleys of Chicureo and Chamicro (Chile) using Visual MODFLOW. The calibrated model and predictive simulations were used to define the Water Management Plan for that catchment, which is managed by Aguas Andinas sanitary company (Santiago, Chile).

*Water management & planning:* Responsible for water management at El Tesoro and Collahuasi mining companies, through updating water strategy and conceptual and numerical models with hydrogeological monitoring data. Implemented an Early Warning Monitoring Plan enabling environmental permits for water extraction. Has performed audits of water management systems for several mining operations. Experience in strategic decision making of water resources in mining by participating in the Water Resources Commission of the Chilean Mining Council between 2011 and 2014.

*Instrumentation for groundwater monitoring & hydraulic tests for hydrogeology characterization of fractured and low permeability media:* Has led processes for the implementation of surface and groundwater monitoring plans to analyze physical and chemical changes in water. Experience in telemetry implementation for remote monitoring points. He also developed monitoring plans and defined the necessary infrastructure to monitor potential impacts on aquifers caused by seepage from TSF's and leaching pads. Has designed and supervised step-drawdown and constant rate pump tests and packer tests to define hydrogeological parameters in karst and sedimentary aquifers.

*Implementation of projects in mining processes:* Replacement of HDPE pipes for tailings transport and coated steel for concentrate transport. As part of the responsibilities within environmental management, was responsible for the expansion of the Reverse Osmosis Plant (RO) that generated drinking and demineralized water for the processes. Led the implementation of solar energy in mining processes. Proposed and led the construction of a thermosolar plant (16 hectares and 1280 collectors) to heat up solutions in the SX-EW process, which consisted of heating water with parabolic trough technology, storing it and making water-electrolyte heat transfer. Also led the construction of a Photovoltaic Concentration Plant (CPV) to supply electricity to the onsite Data Center of Cía. Minera El Tesoro.

***Papers and Publications***

Espinoza, C.; Tore, C.; Brown, M. Sustainable Management of groundwater for valleys of Chicureo & Chamicro. Vertiente Magazine, ALHSUD, N°10, Year 10. December 2005.