CRISTOBAL VARGAS DONOSO, M.Sc., P.Eng.

HYDROGEOLOGIST / GROUNDWATER MODELER

EDUCATION

M.Sc., Hydrogeology and Environmental Engineering, Technical University of Darmstadt, Germany, 2018
B.Eng., Civil Engineering specialized in Environmental, Sanitary and Hydraulic Engineering, University of Chile, Chile, 2013

PROFESSIONAL REGISTRATION

Professional Engineer, EBGC

SUMMARY

Cristobal Vargas has a M.Sc. in Hydrogeology and Environmental Engineering and a B.Eng. in Civil Engineer with specialization in Hydraulic, Environmental and Sanitary Engineering. Cristobal has over eight years of professional and research experience in the field of groundwater modeling and hydrogeology. He joined Robertson GeoConsultants Inc. in 2019.

Cristobal's technical experience includes saturated and unsaturated groundwater flow modeling, solute transport modeling and reactive transport modeling. Furthermore, he has experience in the analysis of hydraulic testing and hydrological information to model the interaction between surface water and groundwater. Cristobal is proficient in the use of the commercial numerical modeling software: GMS, Groundwater Vistas and Visual MODFLOW; geographic information system: QGIS and ArcGIS Pro; the geological modeling software Geosoft Target and Discover for ArcGIS Pro; and is experienced automatizing processes and analyses using Python and Excel Visual Basic.

His technical experience also encompasses project management and supervision of dual rotary and diamond drilling programs, included well construction and development, and hydraulic testing.

PROFESSIONAL HISTORY

2019-present:	Groundwater Modeler, Robertson GeoConsultants Inc.
2017-2018:	Co-op Student, Arcadis Germany GmbH
2015-2016:	Modeling Engineer, Arcadis Chile
2013-2014:	Modeling Engineer, Hidromas Ltda.

PROJECT EXPERIENCE

GROUNDWATER MODELING

Las Tórtolas Mill Site, Chile (2019 - present) for Anglo American Chile (AACH)

- Update the conceptual hydrogeological model and water and load balance of the Las Tortolas TSF and local receiving aquifers downstream to support the EIA
- Update the conceptual and numerical groundwater flow and transport models to assess the proposed mitigation plan downstream of the Las Tortolas TSF Ex-Bosque Sector

- Support updating the conceptual and numerical groundwater flow and transport model to assess groundwater impacts and propose a mitigation plan downstream of the West Dam Sector of the Las Tortolas TSF
- Support updating the conceptual and numerical groundwater flow and transport model to assess and improve the proposed mitigation plan for the Main Dam Sector
- Produce and extract results of the sensitivity analyses for the Ex-Bosque and West Dam transient groundwater flow and transport models
- Analyze pumping tests on monitoring and pumping wells to characterize the hydrogeological parameters from the local aquifer to support groundwater modeling

Sandy Flat Pit, Northern Territories, Australia (2023) for Nyrstar

- Post-process groundwater sulfate and copper transport results to assess the effect of operational and post-closure scenarios

Myra Falls Mine, Vancouver Island (2019 - present) for Nyrstar

- Post-process groundwater transport results to visualize quality data in support of groundwater modeling calibration

Rum Jungle Mine, Australia (2019) for NT Department of Mines and Energy

- Produce and extract results of the sensitivity analyses for the three transient groundwater flow and transport models which in series comprehends the complete modeling period

La Pampa del Tamarugal, Chile (2016) for SQM

- Update and extend the existing transient groundwater flow model
- Calibrate the groundwater flow model to assess effects of water extractions produced in the area and to identify locations of new extraction wells

XII Region, Magallanes and Antarctica basins, Chile (2015) for DGA

- Develop and calibrate the transient saturated groundwater flow models of Punta Arenas
- Produce the sensitivity analyses of the groundwater models of Punta Arenas, Tierra del Fuego, and Antarctica Continental Norte

Copiapó, III Atacama Region, Chile (2015) for Pucobre

- Generate the surface hydrological model and estimate recharge rates for the hydrogeological model
- Develop and calibrate the transient unsaturated groundwater flow model to assess future aquifer water depletion and identify the optimal location for extraction wells

Copiapó River's Basin Aquifer, III Atacama Region, Chile (2014) for DGA

- Update and calibrate the transient groundwater model of the Copiapó River's Basin
- Generate scenarios to assess future groundwater extractions and their effects on the aquifer's groundwater levels and on wells used for municipal use, agricultural and mining activities

HYDROGEOLOGICAL STUDIES

Las Tórtolas Mill Site, Chile (2019 - present) for Anglo American Chile (AACH)

- Supervise and manage dual rotary and diamond drilling programs in West Dam, Main Dam, and East Dam Sectors as part of a comprehensive hydrogeological investigation to support the design and implementation of a seepage interception system and aquifer remediation
- Analyze pumping tests to characterize the local aquifers to support permitting of pumping wells and groundwater modelling

Los Bronces Mine, Chile (2022-present) for Anglo American Chile (AACH)

- Develop a hydrogeological conceptual model to characterize water quality in the Rio San Francisco
- Develop a water and load balance model to better understand natural and mine-related contaminant sources to the environment

Los Puquíos from Llamara Salt Flat, I Tarapacá Region, Chile (2015) for SQM

- Update and improve the conceptual model of the Llamara Salt Flat based on the analysis of groundwater level and salinity
- Analyze the hydrogeological information and the effect of injection trials in the area to sustain Los Puquios's water levels and propose an injection plan on the existing artificial recharge system

SEDIMENT TRANSPORT

Piga and Collacagua Rivers, Atacama Desert, I Tarapacá Region, Chile (2016) for BHP

- Calculate the bottom and suspended sediment transport capacity in Piga and Collacagua rivers produced by extreme hydrological events

Debris Flow in Tocopilla, Antofagasta and Taltal, II Atacama Region, Chile (2015) for DGA

- Assess the damages produced by the debris flows through field visits and surveys from local authorities and inhabitants affected by these events
- Evaluate the status of the alluvial control works and the vulnerability of gullies that do not have control works