

JULIO M. BRUNA NOVILLO

GEOLOGIST EXPLORATION AND OPEN PIT MINE

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Email: jbruna_geo@hotmail.com **Linked in**® <http://ar.linkedin.com/pub/julio-bruna-novillo/56/701/915>
Date of birth: 19 of July 1964.
Nationality: Argentina.

SUMMARY OF PROFESSIONAL ACTIVITIES

Mineral Resource Geologist solid geological experience and extensive knowledge in:

- Integration of the mining process at different stages: from greenfield-brownfield exploration, pre-feasibility studies, feasibility to mine production.
- The basics of recoverable resource model: sampling (database – QA/QC) and geological model.
- Geological Modeling epithermal deposits and porphyry Cu-Au-Mo, using field observations and drill core.
- Design, management, and execution of drilling programs.
- Training, leadership, management and supervision of work teams.
- Preparation and cost analysis, planning and implementation of budgets and estimated. Design, management and execution of drilling programs.
- Strong commitment demonstrated in environment, communities and safety of the daily work with contractors.
- Leadership and management of geological studies in phases of pre-feasibility and feasibility according to international standards (JORC, NI-43101), including geotechnical studies, metallurgical and hydrogeological for the development of the project.

EDUCATION

National University of Catamarca (Argentina). **PhD in Geology**. 2012 in process.
Title: "Geology and Genesis of the Porphyry of Au-Cu of the Bajo El Durazno, Province of Catamarca, Argentine Republic".
Director: Florencia Marquez Zavalía and Christoph A. Heinrich.
Collage of Economy and Business Administration (ESEADE), Argentina. **Magíster**. MBA (Master in Business Administration). Accreditation by CONEAU, Resolution N° 522/04. Argentina. 2006-2009
National University of Córdoba (Argentina). **Geologist**. 1993

TEACHING EXPERIENCE

National University of Buenos Aires. F.C.E.F. and N. 2012 to date
Post-graduate of specialization in Mining Geology. Module 2: Prospecting and Exploration (40 h)
National University of San Luis. F.C.E. and N. 2009
Geology and geotechnical applied to open pit mine. Department of mining (20 h)
Minera Alumbrera Ltd. – Xstrata Copper. Leadership Development Program. 2004 – 2013.
Senior Facilitator. 2006 -2013
Facilitator. 2004 - 2006
National University of Córdoba. F.C.E.F. y N. Geology – Department of Applied Geology.
Subject: **Well Drilling and Sludge Injection (160 Hs.) Assistant Professor for public contest**. 2002 - 2013.

SUSCRIPTIONS

Canadian Institute of Mining, Metallurgy and Petroleum. **MEMBER CIM # 152176**. 2011 to date
Australasian Institute of Mining and Metallurgy. **MAusIMM # 992246 CP (Geo)** (Member Chartered Professional Geology). 2008 to date.

COMPETENT PERSON AS JORC AND NI 43-101

Cordoba Geology Professional Board. 1993 to date
Professional Registry: M.P. N° X-518.

EXPERIENCE WORK

MINERA PANAMA S.A. – FIRST QUANTUM MINERALS LTD.

Abril 2013 to date.

Proyecto "Cobre Panamá". Panamá.

⇒ **SUPERINTENDENT GENERAL OF GEOLOGY.**

MINERA ALUMBRERA LTD.

Nov. 1998 to March 2013.

"Bajo de La Alumbreira" Mine and "Agua Rica" Project. Province of Catamarca (Argentina).

⇒ **SUPERINTENDENT OF GEOLOGY & EXPLORATION** (Greenfield – Brownfield areas). Disseminated areas and Agua Rica Project (feasibility study). November 2008 to date

⇒ **SUPERINTENDENT OF GEOLOGY** (Department of Geology, Geotechnics & Dewatering). Nov. 2007 / Nov. 2008

⇒ **SUPERINTENDENT OF GEOLOGY** (Department of Geology & Geotechnics). June 2005 – Nov. 2007

⇒ **SENIOR GEOLOGIST** (Department of Geology). February 2004 - June 2005

⇒ **ORE CONTROL GEOLOGIST**. March 2003 – January 2004

⇒ **EXPLORATION GEOLOGIST**. November 1998 – October 1999; April 2000 – February 2003

IAMGOLD ARGENTINA S.A.

Nov. 1999 – March 2000

Project: "Mesa". Province of Santa Cruz (Argentina).

EXPLORATION GEOLOGIST. (PROJECT CHIEF).

ARGENTINA MINERAL DEVELOPMENT

August – October 1998

Project: "La Cabeza". Province of Mendoza (Argentina).

EXPLORATION GEOLOGIST.

WESTERN MINING CORPORATION

January – June 1998

Project: "Río Frío", "Regalito", "Guanaco Zonzo" and "Fabiana". Valle del Cura. Province of San Juan (Argentina).

EXPLORATION GEOLOGIST.

MINERA ELDORADO S.A.

August 1996 – September 1997

Project: "Peña Negra" and "Laguna Verde". Province of La Rioja and Catamarca (Argentina).

EXPLORATION GEOLOGIST. (PROJECT CHIEF).

HIGH AMERICAN GOLD S.A.

February 1995 – July 1996

PROSPECTING AND EXPLORATION GEOLOGIST.

TECHNICAL TRAINING

MINERA ALUMBRERA LTD.

"Community Relations Management and Conflict Environmental Social in the Mining Sector". (Intercede. Consultancy & Training). 200 h. April 2012 to April 2013.

"International Regulations for the certification of resources and mineral reserves". UNSL. By M. Rossi. 24 h. April 2011.

"Balanced Score Card Applied to the Mining Industry". (Intercede. Consultancy & Training). 40 h. February 2011

"Management of Mining Projects". (Intercede. Consultancy & Training). 40 h. September 2010

"Public report and Code JORC". Workshop Xstrata Copper (AUSIMM – A. Clark). h. Junio 2010.

"Geostatistics Applied to Resources and Reserves Calculation". Nivel I y II. UNSL. By M. Rossi. 60 h. March – Nov. 2008

"Basic Statistics course and Sampling for Deposit Evaluation". Mine Engineering. University of Chile. 30 h. December 2006.

"Geotechnics Applied to Open Pit Mine". (E-Mining Technology. Chile). 30 h. October 2006

"Advanced Course on Acquire". (Metech Chile). 40 h. March 2005

"Geostatistic and Modelling of Minesigh". (Mintec Chile). 40 h. March 2004

"Basic Minesight". (Mintec Chile). 40 h. May 2003

"Basic Autocad 2000". (Center Kandinsky). Córdoba. Argentina. 40 h. November 2002.

IAMGOLD ARGENTINA S.A.

Workshop Field of 10 days of duration. Directed by E. Llambías. "Massif North Patagonic and "El Deseado". (Argentina). December 1999.

MINERA EL DORADO S.A.

Handling and interpretation of sampling data (macroscopic and drilling), with PIMA II (Portable Infrared Spectrometer). By Spectral International, Inc. 30 h. December 1997

"Introduction to linear Geostatistics Applied to Evaluation of Mineral Resources". Superior Professional Council of Geology. Bs. As. Argentina. 30 h. September 1995.

CAPACITACION MANAGEMENT

XSTRATA COPPER / MINERA ALUMBRERA LTD.

LEADERSHIP DEVELOPMENT PROGRAM (LDP). Facilitator and trainer of facilitators from other divisions. December 2004 -2103.

Participation in the design and realization of STRATEGIC PDL WORKSHOP OF MINERA ALUMBRERA LTD. June 2009

Course: "TRAINING THE TRAINER". Level I y II (IGH Group, Tucumán. Argentina). 60 h. August 2008

Course: "PROFESSIONAL SUPERVISOR". University de Queens, Canadá. (Tucumán, Argentina). 30 h. August 2003.

CONFERENCES AND PUBLICATIONS

SPANISH SOCIETY MAGAZINE MINERALOGÍA. MACLA N° 15 (BARCELONA, ESPAÑA)

"Mineralogy of the Project Bajo Agua Tapada, Catamarca, Argentina".

Authors: D.G. Torrente, A. Carrazana, J. Bruna Novillo and J.L. Fernández Turiel. September 2011.

REGIONAL CONFERENCE MINESIGHT (SANTIAGO, CHILE)

"Using the Minesight Software 3D, in the Fundaments of the Model of Recoverable Resource".

Authors: J. Bassan and J. Bruna Novillo. November 2010.

CONFERENCE MINING 2010 (SAN JUAN, ARGENTINA)

"The Board of Control like Management Tool in the Model of Recoverable Resources".

Authors: J. Bruna Novillo, J. Bassan and M. Rossi. Speaker: J. Bruna Novillo. August 2010.

CONFERENCE MINING 2010 (SAN JUAN, ARGENTINA)

"The System of Veins Intermediate-sulfidation, in Bajo de La Alumbrera Mine, Catamarca, Argentina".

Authors: N. Montenegro, A. Carrazana and J. Bruna Novillo. August 2010.

XVI MINE ENGINEERING SIMPOSIUM. SIMIN 2009 (SANTIAGO, CHILE)

"Fundamentals of the Recoverable Resources Model".

Authors: J. Bruna Novillo, J. Bassan and M. Rossi. August 2009.

CONFERENCE MINING DAY 2009 (CATAMARCA, ARGENTINA)

"Process and Stages of an Exploration Program for Copper Porphyry Deposits".

Authors: J. Bruna Novillo. Speaker: J. Bruna Novillo. May 2009.

INTERNATIONAL CONFERENCE ON MINING INNOVATION - MININ 2008 (SANTIAGO, CHILE)

"Ore Control System in Bajo de La Alumbrera, Catamarca, Argentina".

Authors: I. Zapata, J. A. Bassan and J. Bruna. Speaker: J. Bruna Novillo. August 2008.

INTERNATIONAL CONFERENCE ON MINING INNOVATION – MININ 2006 (SANTIAGO, CHILE)

"Geotechnical Characterization and Modeling of its Variables in Bajo de La Alumbrera Mine, Catamarca, Argentina".

Authors: C. Giraud, J. A. Bassan and J. Bruna. May 2006

ACQUIRE REGIONAL CONFERENCE (SANTIAGO, CHILE)

"Use to Acquire in the Processes of Minera Alumbrera".

Authors: J. A. Bassan and J. Bruna Novillo. March 2005.

38° BRASILIAN CONGRESS OF GEOLOGY (CAMBORIU, BRASIL)

"Methodological extensions of the Matheron corrector in the petro-structural analysis of para-granite massif, Copina area ("Sierras Chica" and "Grande" in Cordoba) – Argentina."

Authors: Bruna Novillo J. and Lucero Michaut H. October 1994.

LANGUAGES

ENGLISH: Translation, speaking and writing (Level Intermediate).

COMPUTATION

Management and advanced knowledge of:

- ⇒ AcQuire
- ⇒ Minesight 3D
- ⇒ MSDA: Data Analyst
- ⇒ Microsoft Office (Word, Excel, Access, etc.)

SUMMARY OF PROFESSIONAL ACTIVITIES - LAST SEVEN YEARS

MINERA PANAMA S.A. – FIRST QUANTUM MINERALS LTD.

April 2013 to date.

"Cobre Panamá" Project. Panamá.

04/2013 TO DATE

SUPERINTENDENT OF GENERAL GEOLOGY

- ✓ Analysis and recommendations in the geological models.
- ✓ Interpret, define and build geological wireframe models. Realization of the exploratory data analysis. Interpretation and definition the Geological Units.
- ✓ Work with the FQM Mineral Resource group in Perth (West Australia) to review and re-build the entire Cobre Panamá resource.

MINERA ALUMBRERA LTD.

1998 to March 2013 (12.5 años).

"Bajo de la Alumbra" Mine and "Agua Rica" Project. Province of Catamarca (Argentina).

08/2011 TO 03/2013

SUPERINTENDENT OF GEOLOGY AND EXPLORATION

- ✓ Agua Rica project. System porphyry Copper-Molybdenum-Gold. Feasibility study: implementation of infill drilling programs.
- ✓ Total=28,500 m DDH (diamond drilling program). Geological, geotechnical, structural and metallurgical logging. Interpretation and geological modeling in 3D from outcrop mapping and diamond drill holes. Select and send samples to Canada for metallurgical testing.
- ✓ Survey measurement with Z-Trac and Maxibor II. Measurement core sample oriented with Reflex ACT II RD.
- ✓ Total=1,500 m RC (reverse circulation drilling + ODEX). Geotechnical (SPT test) and hydrogeological drill holes for condemnation of dumps. Observation and pumping holes. Permeability and air lift tests.
- ✓ Measurement of technical parameters in drill core: density, GSI, RQD, PLT, etc.
- ✓ Design, construction and migration of the database using Acquire software. Sampling drill holes. Design and implementation of QA - QC program, according to the JORC and NI 43-101 standards.
- ✓ Preparation and management of budgets (Capex) and cost analysis. Management contracts with drilling companies, chemical laboratories, consultants, auditors and general contractors. Budget: 15 M USD.
- ✓ Interdisciplinary work with: geologists, engineers, metallurgists, hydro-geologists, anthropologists, etc., from different countries and companies.
- ✓ Preparation of IIA (Environmental Impact Report). Technical responsible of the project against the government province in the EIS (Environmental Impact Statement). Environmental management, interaction with government agencies and communities.
- ✓ Preparation of Geology Section, for the technical report of the feasibility study.
- ✓ Formation, management and supervision of exploration teams: 10 geologist, 20 samplers, 70 contractors drilling program. 8 diamond rigs and 1 RC rig.
- ✓ Compliance with safety goals: LTI=0 (Lost Time Injury). Xstrata HSEC standards. Environmental audits before, during and after drilling campaigns. Safety audits to drilling contractor.
- ✓ Bajo de la Alumbra Mine, Copper-Gold-Molybdenum Porphyry system: Annual statement of reserves and resources, by code JORC. **MEMBER AUSIMM # 992246** (Chartered Professional Geology).

10/2008 TO 07/2011

SUPERINTENDENT OF GEOLOGY AND EXPLORATION

- ✓ Design and implementation of exploration programs in disseminated areas: system porphyry Copper-Gold and veiniform systems (Bajo El Durazno, Bajo La Chilca, Bajo Las Pampitas, Bajo San Lucas and La Josefa-Santo Domingo, in the Province of Catamarca, Argentina).
- ✓ Total=20,000 m diamond drilling program. Geological, geotechnical and metallurgical logging. Interpretation and geological modeling in 3D from outcrop mapping and diamond drill holes.
- ✓ Measurement of technical parameters in drill core: density, GSI, RQD, PLT, etc.
- ✓ Survey measurement with Z-Trac and Maxibor II.
- ✓ Design, construction and migration of the database using Acquire software. Sampling drill holes. Design and implementation of QA - QC program according to the JORC and NI 43-101 standards.
- ✓ Preparation and administration of budgets (Capex), and cost analysis. Management contracts with drilling companies, chemical laboratories, consultants, auditors and general contractors. 3-year budget: 3 M USD.
- ✓ Preparation of technical reports for different projects according to the requirements of NI-43 101.

- ✓ Quantification of recoverable resources of Project "Bajo El Durazno" (Au-Cu). Interpretation and construction 3D geological model. Block modeling, using Minesight software. Exploratory data analysis (EDA). Interpretation and definition of geological units of estimate (UG).
- ✓ Formation, management and supervision of exploration teams: 8 geologist, 10 samplers, 20 contractors drilling program. 2 diamond rigs.
- ✓ Compliance with safety goals: LTI=0 (Lost Time Injury). Xstrata HSEC standards. Environmental audits before, during and after drilling campaigns. Safety audits to drilling contractor.
- ✓ Bajo de la Alumbrera Mine, Copper-Gold-Molybdenum Porphyry System: grade control, forecast daily, weekly and monthly material sent to crusher. Perform daily, weekly and monthly control grade. Mining plan weekly, monthly and yearly; database; optimizing the open pit reserve through the accurate delineation of ore and waste; provision of periodic production and reconciliation reports. Annual statement of reserves and resources, by code JORC. **MEMBER AUSIMM # 992246** (Chartered Professional Geology).

06/2005 TO 10/2008

SUPERINTENDENT OF GEOLOGY AND GEOTECHNICAL

- ✓ Bajo de la Alumbrera Mine, Copper-Gold-Molybdenum Porphyry System: responsible for different areas of the technical services department:
- ✓ Grade control: Geological mapping of bench; forecast daily, weekly and monthly material sent to crusher; perform daily, weekly and monthly control grade. Mining plan weekly, monthly and yearly; provision of daily ore mining and grade control functions, database; optimizing the open pit reserve through the accurate delineation of ore and waste; provision of periodic production and reconciliation reports. Estimated production reports: monthly, quarterly and annual. Budgets and annual narratives LOM. Assurance and Quality Control (QA-QC) of the material sent from stocks to mine and concentrator. Budget: 0.7 M USD.
- ✓ Waste control: classification of rock material as environmental variables. Performing QA-QC samples blast holes of material sent from mine dumps, database using Acquire. Forecast daily, weekly and monthly material sent to dumps and material for rehabilitation. Monitoring progress in the dumps. Control of rehabilitation sectors in dumps and sampling.
- ✓ Geotechnical: construction and maintenance of geological & geotechnical models. Geotechnical design and operational. Implementation of automatic monitoring robotic and use of radar for monitoring walls. Optimization of final pit: recommendation inter-ramp slopes angles. Database using Acquire. Geotechnical mapping of bench. Budget: 0.6 M USD.
- ✓ Dewatering: design and implementation of the RC drilling program for monitoring and pumping. Budget: 7 M USD.
- ✓ Exploration: design and implementation of DDH programs, for delineation and geotechnical. Updating the geological and geotechnical model, using Minesight software. Design and implementation of QA-QC program, according to the JORC and NI 43-101 standards.
- ✓ Interdisciplinary work with: Engineering Short and Long Term, Topography, Strategic Planning, Drilling and Blasting, Mine Operations and Services, Environmental, Chemistry Laboratory, Concentrator Plant, Port, etc.
- ✓ Formation, management and supervision of exploration teams: 8 geologist, 10 samplers, 10 contractors drilling program. 1 diamond rigs.
- ✓ Compliance with safety goals: LTI=0 (Lost Time Injury). Xstrata HSEC standards. Environmental audits before, during and after drilling campaigns. Safety audits to drilling contractor.
- ✓ **Five consecutive years of increases mineral reserves. 218 MTn additional ore reserves in the period 2003 to 2008, expansion of mine life in six years. Increase from changes in the geological model, pit design, metal prices and optimizing inter-ramp angles. Diamond drilling program: infill geological and geotechnical. Total 38,000 m. Annual budget: 3 M USD.**
- ✓ **In 1999, diamond exploration program of 15,000 m. Re-logging of previous campaigns (40,000 m DDH). Interpretation and construction 3D geological model, Bajo de la Alumbrera. Defining grindability domains and metallurgical samples collected for testing in Canada.**