



MARCELLO MARIZ da VEIGA

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Brazilian Professional Engineer, CREA 36806-D, Rio de Janeiro, Brazil
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Dual Citizenship: Brazilian and Canadian
Born in Rio de Janeiro, Brazil, on May 25th 1954
Hobbies: Guitar and harmonica player; choir singer
Languages: Portuguese, English and Spanish

My goal as an academic is to generate mining engineers who understand that applying ethical principles while creating wealth for society will change the image of mining and make a positive difference to local communities.

RESEARCH TOPICS AND FIELDS OF INTEREST

- Biogeochemical cycle of heavy metals in the environment
- Bioaccumulation and adverse health effects of metals in the environment
- Artisanal and small-scale gold mining
- Mercury pollution from gold mining and hydroelectric reservoirs
- Acid Rock Drainage
- Process mineralogy applied to mining and mineral processing
- Sustainable development in mining
- Mining communities and social issues related to mining
- Mine closure and reclamation planning
- Mineral processing (in particular gold)
- Industrial minerals

TEACHING ACTIVITIES AT UBC

- Mining and the Environment
- Process Mineralogy
- Mineralogy for Mining Engineers
- Mine and Mill Design
- Undergraduate Seminar
- Environmental Technologies and Issues in Mining - graduate level
- Environmental and Health Risk Assessment – grad level
- Mining and the Society - graduate level

EDUCATION

Bachelor Degree (1973-1977) in **Metallurgical Engineering** - Catholic University of Rio de Janeiro (PUC/RJ) Dept. Metallurgy and Materials Science.

M.Sc. (1979-1984) in **Environmental Geochemistry** - Federal Fluminense University (UFF), Niteroi, RJ, Inst. Chemistry, Dept. Geochemistry. Thesis: "Geochemical Properties of Cu-Hydrous Ferric Oxides: A Case Study of the Weathered Ores from Salobo, Carajás, Pará, Brazil".

Ph.D. (1992-1994) in **Mineral Process Engineering** - University of British Columbia, Dept. Mining and Mineral Process Engineering, Vancouver, Canada. Thesis: "A Heuristic System for Environmental Risk Assessment of Mercury from Gold Mining Operations".

PROFESSIONAL ACTIVITIES

Jul-Dec 12: Leader of the CIDA Proposal to establish the Canadian International Institute of Extractive Industries and Development. This Institute's mandate is to strengthen capacity building in policy, legislation, regulatory development and implementation, training, technical assistance and applied research related to the developing country's extractive industry sectors. In Dec 2012, UBC and SFU won the proposal to establish this Institute with funds of \$25 million.

Jul 10 - Aug 11: Visiting Professor at the University of São Paulo, Dept of Mining Engineering

Mar 05 – Apr 08: Chief Technical Advisor of the GEF/UNDP/UNIDO Global Mercury Project based in Vienna and Vancouver. Project Countries: Brazil, Indonesia, Laos, Sudan, Tanzania and Zimbabwe. Affiliated Countries: Colombia, Ecuador, Ghana, Guinea, Mozambique, Suriname, and Venezuela (www.globalmercuryproject.org).

Nov 02 – July 04: Seconded to United Nations Industrial Development Organization (UNIDO) based in Vienna to work as Small-scale Mining Expert in the Global Mercury Project.

Dec 97 – present: Full Professor (since 2012) of the Norman B. Keevil Institute of Mining Engineering, University of British Columbia, Vancouver, Canada

Oct 98 - Mar 01: Director of Brazilian International Goldfields Ltd. Exploration/mining company based in Vancouver and operating in Brazil. Director of Hydromet Technologies Ltd., company developing new clean technologies for the mining and metallurgical industry.

Nov 97: Consultant to UNIDO - United Nations Industrial Development Organization - evaluation of the artisanal gold mining activities and mercury pollution in Suriname and Guyana.

Sept 97 – Dec. 97: Senior Advisor to the Board of Brazilian Goldfields Ltd. Exploration/mining company based in Vancouver and operating in Brazil.

Jan 96 – Nov 97: Adjunct Professor in the Dept. of Mining and Mineral Process Engineering, University of British Columbia. Instructor of Artificial Intelligence Applications.

Dec 96 – Jul 96: Consultant to UNIDO for issues related to artisanal gold miners and mercury pollution in Latin America, Vancouver and Vienna.

Jul 95 – Nov 96: Consultant for Canadian junior companies. Development of new businesses in Brazil. Pilot plant to reprocess gold mining tailings, São Paulo and Goiânia, Brazil.

May 95 – Jul 95: Consultant to UNIDO - alternative gold mining techniques and mercury remediation for the artisanal goldfields, Puerto Ordaz, Venezuela.

May 94 - Dec 95: Director of Madison do Brasil Ltd. - a Brazilian subsidiary of a Canadian geological exploration company, Madison Holdings, Rio de Janeiro.

Jun 89 - May 94: Director Techmat Ltd. Consultant for different engineering and mining companies, São Paulo.

Jul 86 – Jun 89: Paulo Abib Engenharia S.A. (an engineering company specialized in mining projects), manager of the Research & Development group. Developed new opportunities and technologies in fine chemistry, São Paulo.

Nov 84 – Jul 86: DOCEGEO - Rio Doce Geologia e Mineração (CVRD group), subsidiary of Companhia Vale do Rio Doce, technical assistant to the Director of Geology, Rio de Janeiro.

Apr 79 – Oct 84: Center of Mineral Technology (CETEM). Engineer of the Chemical Analysis Division, working at the Laboratory of Mineralogical Analyses, Rio de Janeiro.

Mar 79 – Dec 83: Catholic University - PUC/RJ - Lecturer of Mineralogy & Petrography in the Dept. of Metallurgy and Materials Science, Rio de Janeiro.

EXPERIENCE

*** As Professor (Dept. of Mining Engineering, UBC, Vancouver, Canada):**

- Research activities on: effects of trace metals released by acid rock drainage; reactions of mercury-contaminated tailings with natural organic acids; mercury speciation; social and environmental impacts of geological and mining companies; public perception of mining, reclamation and sustainability of local communities.
- Member of the following successful proposals for the Canada Foundation of Innovation:
 - Center of Industrial Minerals Innovation: C\$ 250,000
 - Center for Environmental Research on Metals, Minerals and Materials: C\$3,800,000
- Visiting Professor at the Dept of Mining Engineering of Univ. São Paulo, Brazil (sabbatical Jul 2010-Jul 2011)

teaching graduate courses: Gold Processing Methods, Sustainable Development in Mining and Management of Mining Projects

- Head of the Peru Mercury Project sponsored by the US Dept of State. Piura, Peru (Nov 2010 – present)

*** As consultant:**

- Consultant for Cassius Venture, Nicaragua (Apr 2012). Assessment of environmental and social impacts of artisanal gold miners in the country
- Consultant of AngloGold Ashanti Colombia, Gramalote Project (May-Aug 2011); assessment and suggestion to improve relationship of company with local artisanal gold miners
- Consultant for U.S. Dept of State, Washington, DC (2011-2013). Reduction of mercury use in artisanal gold mines in the Andes, Piura, Peru, Portovelo, Ecuador
- Consultant of Blacksmith Institute. Reduction of Mercury Emissions in Dept of Antioquia, Colombia. Sept 2010.
- Consultant for AngloGold Ashanti in Colombia. Stakeholder engagement, Bogota, Jul 7-11, 2010 and 8-15 Sept 2010 (La Colossa Project, Cajamarca).
- Consultant for Infinito Gold Ltd. Crucitas Mine. Environmental risk assessment; cyanide; mine closure; public perceptions. Sept – Dec. 2009. Costa Rica
- Consultant for NRCan-CANMET on feasibility study of small-scale cyanidation plants replacing the use of mercury (Portovelo, Ecuador, Feb-Apr 2009).
- Consultant for Hatch Engineering (Vancouver) to the Environment and Community Interface. Development of community-company strategies for the Sustainable Development Design Group. (Vancouver, Jun 2008 – present)
- Consultant for IAMGold Inc. on artisanal mining (French Guyana and Suriname, Sept. 2008)
- Consultant to Colossus Minerals Inc., Serra Pelada Mine, Brazil Environmental impact assessment of mercury in sediments, water, air and fish (May 2008)
- Technical Advisor of the Aboriginal groups (Ti'azt'en and Nak'azdli bands) in Pinchi Lake Mine Closure, BC, related to the closure process of the Teckcominco mercury mine. Review of the Environmental and Health Risk Assessment documents and Closure Plans; participation in the Technical Working Group (Vancouver and Fort St James, Jul 2005 – present)
- Consultant for Blacksmith Institute (New York) to teach techniques to reduce Hg emissions and vapor exposure to artisanal miners in Mozambique (May 2005) and Guinea (Apr 2006)
- Consultant for Teckcominco through Azimuth Group on Mineralogical Characterization of Hg-rich Sediments from Pinchi Lake Mine, BC (Vancouver and Fort St James, Nov 2002)
- Consultant for Cadre Resources Ltd. introducing concepts of sustainable development to a diamond, gold, ilmenite and gravel dredging operation in the Caroni River (Vancouver and Puerto Ordaz, Venezuela, Oct 2001).
- Consultant for Ministry of Mines of Peru to assess issues related to the mercury spill from Yanacocha Mine, operated by Newmont. (Cajamarca, Peru, Nov. 10 - Dec. 5, 2000).
- Consultant for Ministry of Economy of Chile as part of the Mullin Consulting Ltd. team - part of an assessment methodology to review the activities of various public technology institutes in Chile. Evaluation of the scientific and technological role of the National Service of Geology and Mining (SERNAGEOMIN) (Santiago, Chile, Mar 2000).
- Consultant for Raytheon Ltd. to the SIVAM Project - development of a model for mercury emissions and distribution in the Amazon. Use of GIS for monitoring artisanal mining (Garland, Texas, Jul 1998; Jul 1999; Jan 2000, Brasilia, Brazil, Feb 2000).
- Consultant for Placer Dome to develop in-situ synthesis of sodium cyanide using urea as a raw material. (Vancouver, 1999 - 2000).
- Consultant to CETEM to develop electro-oxidation process to leach sulfide gold ores using seawater. (Vancouver and Rio de Janeiro, 1999-2000)
- Consultant for Brazilian Goldfields Ltd and El Misti Gold Ltd – property selection and acquisition in Brazil. Metallurgical studies of Peruvian gold ores (Vancouver, Sept. 1997).
- Consultant with Round Table Group, Inc. for Braxton Associates, Boston, USA - applications for natural polymers in the mineral industry (Vancouver, Sept 1997).
- Consultant for Boojum Technologies, Ltd., Toronto on studies of zinc removal from acid mining drainage of an abandoned tailings pond in Ontario. (Vancouver and Toronto, Jan- Mar 1997)
- Consultant for the Ministry of Environment of Venezuela, Pro-fauna - Studies on Mercury Bioaccumulation in Guri Hydroelectric Reservoir (Caracas, Venezuela, Sept 1995).
- Consultant for Enerconsult Engineering S.A., São Paulo - lab. and pilot plant testwork of gold placer deposits in Lillooet River, British Columbia. A feasibility study for a 130 t/h plant was prepared. For this same Enerconsult client, a 12 t/h grinding-gravity concentration-flotation plant of a sulphide ore from Texada Island was designed and operated. (Vancouver and São Paulo, Dec 1990 - 92).
- Consultant for the project "Forecasting the Use of New Materials". Client: CETEM. This study highlighted how the market of new materials affects the mining sector and how mining engineers must be adapted to this new approach

of materials use. (Rio de Janeiro, Mar-Set 1990).

- Technical Advisor of "The Poconé Project". Client: CETEM, sponsored by the Brazilian National Congress. Field study of mercury behaviour in the aquatic environment of Poconé, located near the Pantanal Ecological Park. Implementation of small-scale remedial procedures for polluted areas impacted by artisanal gold miners. Studies of mercury extraction from contaminated tailings. Biological and geochemical monitoring. Social aspects were also examined (Rio de Janeiro and Poconé, Brazil, Jun,1989 - Feb,1990).

*** As consultant for UNIDO - United Nations Industrial Development Organization:**

- Consultant for the UNIDO Mercury Project in Antioquia, Colombia. Assessment of mercury pollution from artisanal gold mining in the towns of Remedios, Segovia, Zaragoza, Caucasia, El Bagre, Nechi, San Martin de la Loba. Demonstration of methods to reduce mercury pollution (Dec 09 – present).
- Chief Technical Advisor (Project Manager) of to the GEF/UNDP/UNIDO Global Mercury Project. Participating countries: Brazil, Indonesia, Lao PDR, Sudan, Tanzania and Zimbabwe. Managing 56 people implementing Transportable Demonstration Units and Awareness Campaign on mercury pollution in artisanal gold mining sites in six participating countries (US\$ 6.8 million). Additional work assessment and implementation of cleaner techniques were conducted in Chile, Colombia, Ecuador, Guinea, Mozambique, Suriname and Venezuela. Coordination of activities related to policy for mercury for UN. Establishing UN strategy on the subject and design of Project Documents for the new phase of the project (30 countries) (May 05 – Jun 08).
- Technical Expert of UNIDO (headquarter in Vienna) to the GEF/UNDP/UNIDO Global Mercury Project. Activities: development of Environmental and Health Assessment Protocols, building capacity in local laboratories for monitoring Hg pollution, teaching miners cleaner technologies, participation in the plan for training miners and awareness campaign for the general public. Elaboration of the concept of the Transportable Demonstration Units, selection and teaching local manufacturers how to fabricate pieces of equipment. Conducted environmental assessments and workshops in Brazil, Ghana, Indonesia, Lao PDR, South Africa, Sudan, Tanzania, Venezuela and Zimbabwe, (Vienna, Nov 02-Jul 04).
- Implementation of alternative technologies to reduce mercury emissions in El Callao, Venezuela. Evaluation of the mercury emissions, participation in the health assessment. Use of LUMEX CVAAS spectrometer for "in situ" urine, hair and sediment analyses (Venezuela, Nov. and Dec., 03)
- Evaluation of analytical equipment for mercury monitoring in Ghana (Sept. 03)
- Evaluation of the artisanal gold mining activities in Suriname and Guyana. Proposal for establishment of Experimental Mining Centers (Paramaribo and Georgetown, Nov. 1997)
- Environmental pollution assessment and health impacts from artisanal gold mining operations in Latin America - Introducing new technologies for abatement of global mercury pollution. Overview of the technical, social and environmental situation of artisanal gold mining in Latin America (Vancouver and Vienna, Nov. 1996 - Jul. 1997).
- Evaluation of the artisanal gold mining sector in Venezuela. Estimate of Hg release for the environment. Study of alternatives and remediation procedures (Puerto Ordaz, May-Jul., 1995).

*** As director of Madison do Brasil (Rio de Janeiro, Brazil):**

- Selection and acquisition of gold properties in Brazil.
- Definition of ore processing flowsheet of gold deposits.
- Property negotiation with artisanal miners in Brazil.

*** As engineer of Paulo Abib Engenharia S.A. (acquired by Kilborn Eng.) (São Paulo, Brazil):**

Manager of the following projects:

- Feasibility studies of: bentonite, gold, wolframite, kaolinite, zirconite, manganese, calcite, feldspar, etc.
- Studies of characteristics and availability of raw materials for new materials and fine chemicals.
- Recycling of vanadium catalyst used in sulfuric acid production.
- Synthesis of K-Mg phosphate fertilizer - conceptual project, pilot plant and feasibility study. This pioneer project introduced glauconite as a source of potassium into magnesium fused phosphate. Outstanding results were obtained in the greenhouse using different plants and lateritic soils. Client: CVRD (Companhia Vale do Rio Doce).
- Fine chemicals - synthesis in lab and pilot plant of trichloroisocyanuric acid (TCCA) and cyanuric acid: this project was partially supported by GENCO Chemicals which is the main Brazilian supplier of chlorination products. Pilot tests (3.5 kg/h of TCCA) confirmed the technology developed by the Paulo Abib research group. Feasibility study for a production of 1000 t/y of TCCA and 500 t/y of other cyanurates.
- Synthesis in lab of sodium cyanide from urea: this is an alternative and cheap process to produce NaCN near gold cyanidation plants.
- Batch gravity and cyanidation tests of gold ores - clients: CVRD, Utah Mines.
- Study of the market of natural and precipitated calcite as filler for plastic, paint, paper, rubber and carpet;
- Study of the market of new materials in Brazil (client: Ministry of Science & Technology).

*** As engineer of DOCEGEO (CVRD-Companhia Vale do Rio Doce group) (Rio de Janeiro, Brazil):**

- Assessor for the Director of Geology for strategic businesses.
- Evaluation of ore deposits (Au, Cu, P, Al). Mineral processing flowsheet design.
- Implementation of CIP gold leaching pilot plant in Bahia State.
- Study of alternative potassium fertilizers (glauconite as K₂O source).
- Study of aluminum fluoride synthesis from fluosilicic acid wasted by fertilizer manufacturers..
- Studies of new opportunities for the mining and chemical sector. Ideas to expand markets of the CVRD group and create new products.

*** As engineer of CETEM (Rio de Janeiro, Brazil):**

- Engineer of the Mineralogical Analysis Laboratory
- Implementation and operation of the following instruments:
 - ⇒ x-ray diffractometry (for mineral processing products and ceramics): qualitative and quantitative analysis using internal standard method.
 - ⇒ x-ray fluorescence spectrometry (establishment of operating conditions for major, minor and trace elements).
 - ⇒ polarizing optical microscope (thin & polished sections).
 - ⇒ scanning electron microscopy (with EDS analysis)
- Use of applied mineralogy to define processing flowsheets of the following minerals:

◆ clay minerals	◆ fluorite	◆ molybdenite	◆ tungsten ore
◆ coal	◆ gold ore	◆ Ta-Nb ore	◆ uranium ore
◆ copper	◆ iron ore	◆ tin ore	◆ zinc ore
◆ diatomite	◆ lead ore	◆ titanium ore	◆ zirconium ore

NOTE: The list above is part of CETEM projects for different clients.

*** As Lecturer of PUC-RJ - Catholic University of Rio de Janeiro**

- Teaching theoretical and laboratory classes on Applied Mineralogy (core course for 3rd year students in Chemical and Metallurgical Engineering).
- Concepts of mineral identification using polarizing optical microscope.
- Degree of liberation; heavy liquid separation; density gradient.
- Magnetic and electrostatic separation to identify minerals.
- Concepts of wet-chemical and instrumental analyses.
- Estimate of deleterious effect of certain minerals on hydrometallurgical processes (reagent consumption).
- Establishment of mineral processing flowsheets based on mineral properties.
- Processes to characterize the refractory nature of gold ores.

*** Other activities**

- Guest Speaker on the Mineral Exploration Roundup 2013, Teacher's Day, about "Mining or Not Mining: This is Not a Question". Vancouver, BC, Jan 31, 2013.
- Instructor of the Course of Small-scale Responsible Gold Mining, INIGEMM, Quito, Ecuador, Nov 19-21, 2012
- Guest Speaker on the UNIDO Conference on Reduction of Mercury Pollution from Artisanal Mining, Quito, Ecuador, Nov 14-17, 2012.
- Guest Speaker at the Anthropology Seminars: Social and Environmental Problems of Artisanal Gold Mining, Dept Anthropology, UBC, Vancouver, Oct 10, 2012
- Guest Speaker at Soil Science Grad Seminar: Artisanal Gold Mining: Pollution and Poverty Trap, UBC, Dept of Soil Science, Vancouver, Sept 14, 2012
- Guest Speaker on Sustainability in Latin America, LatinCouver, Mining and Poverty Alleviation in Latin America, Vancouver, Apr 24, 2012
- Guest Speaker on the Mineral Exploration Roundup 2012, Teacher's Day, about "Small and Large-scale Gold Mines". Vancouver, BC, Jan 27, 2012.
- Guest Speaker at the SFU-UBC Latin American Studies Workshop, about "Small versus Large Gold Mining", Vancouver, BC, Nov 17, 2011.
- Guest Speaker of the 24th Brazilian Conference on Mineral Processing and Extractive Metallurgy about "Small Mining Can Be Beautiful", Salvador, Bahia, Brazil, Oct. 16-19, 2011.
- Guest Speaker at the University of São Paulo, Dept of Psychology, Lab of Experimental Psychology about "Uses of Mercury and Cyanide in Artisanal Gold Mining", São Paulo, Brazil, Aug 16, 2011.
- Instructor of the course "Mining and Society". CETEC, Belo Horizonte, Brazil. Aug 10-12, 2011
- Guest Speaker at the Federal University of Alfenas, Inst. Science and Technology about "Interdisciplinarity in Engineering" Poços de Caldas, Brazil, Aug 5, 2011.
- Guest Speaker at the University of São Paulo, Dept Civil Engineering about "New Methods to Teach Sustainability in

- Engineering”, São Paulo, Brazil, Apr 26, 2011.
- Instructor of the graduate level course PMI 5774, “Management of Mining Operations”, University of São Paulo, Dept of Mining Engineering, São Paulo, Brazil, Apr-Jun, 2011.
 - Guest Speaker at the University of São Paulo, Dept of Legal Medicine, Dec 14, 2010.
 - Lecturer of the course Gold Ore Characterization and Processing. Course of 24 hours for the professionals of the Guyana Geological and Mining Commission. Georgetown, Guyana, Dec 6 to 10, 2010.
 - Guest Speaker of Conference on Mercury and Cyanide Pollution in Artisanal Gold Mining. Ministry of Energy and Mines of Peru, Lima, Peru, Dec 3, 2010.
 - Instructor of the graduate level course PMI 5003, “Gravity Concentration Methods: Case Studies of Gold Mining”, University of São Paulo, Dept of Mining Engineering, São Paulo, Brazil, Sept-Nov, 2010.
 - Instructor of the graduate level course PMI 5755, “Mining and Sustainable Development”, University of São Paulo, Dept of Mining Engineering, São Paulo, Brazil, Sept-Nov, 2010.
 - Guest Speaker of the Course of Risk Assessment PMI 2064 at the Dept of Mining Engineering of the University of São Paulo, Brazil, Oct 27, 2010.
 - Guest Speaker on “Cyanide, Myths and Realities”, Tolima Chamber of Commerce, Ibagué, Colombia, Sept 8, 2010
 - Guest Speaker of the Mercer University about “Environmental Impacts of Artisanal Gold Mining”, Maicon, GA, US, Feb. 8, 2010.
 - Guest Speaker of the Conference on Mercury Pollution in Colombia, Medellin, Colombia, Dec 14, 2009.
 - Guest Speaker of the 2009 Canada-China Natural Resource, Environmental & High Tech Trade Mission, Richmond, BC, Nov. 22, 2009
 - Guest Speaker of the College of William & Mary, Williamsburg, VA, US, Oct 1-3, 2009
 - Guest Speaker of the International Seminar of Health and Ecosystems, Guaranda, Ecuador, Jul 6-9, 2009
 - Guest Speaker of the Seminar Small-scale Mining in Ecuador, Portovelo, Ecuador, Jul 1-2, 2009
 - Guest Speaker of the Bridging the Gap Conference of Engineers without Borders, Vancouver, Mar 14, 2009
 - Guest Speaker at the University of São Paulo, Dept Environmental Management, São Paulo Oct 16, 2008
 - Guest Speaker of the 8th Annual General Meeting of Communities and Artisanal and Small-scale Mining, World Bank, Brasília, Brazil, Oct 6-11, 2008
 - Instructor of the Course on Artisanal Gold Mining, French Guyana and Suriname, Sept 7-13, 2008.
 - Guest Speaker of the Latin American Congress 2008, Miami, FL, US, June 17-19, 2008
 - Guest Speaker of the WWF Guianas Regional Goldmining Workshop, Georgetown, Guyana, May 20-22, 2008
 - Guest Speaker of the Dept of Geological Survey and Mines of Uganda. Entebbe, Uganda. June 5, 2007
 - Guest Speaker of the Dept of Geology, University Eduardo Mondlane, Mozambique. May 31, 2007
 - Instructor of Short Course on Training for Trainers: Education of Small-scale Gold Miners in Cleaner Extraction Technologies Paramaribo, Suriname, Feb 19 – 23, 2007
 - Guest Speaker of the 24th UNEP Governing Council Meeting. Nairobi, Kenya, Feb 3 - 10, 2007
 - Guest Speaker of the 2nd Forum of the National Institute of Minamata Disease (NIMD): Current Issues on Mercury Pollution on the Asia-Pacific Region. Minamata, Japan, Nov. 28-29, 2006
 - Instructor of the Course UNIDO - GMP - Training of Trainers for Implementation of Mercury Awareness Campaign and Demonstration Unites. Crepurizão, Para, Brasil, Oct 29 – Nov. 1, 2006.
 - Members of the Steering/Organizing Committee of the 8th ICMGP - International Conference on Mercury as a Global Pollutant, Madison, Wisconsin, Aug 6-11, 2006 and Guest Speaker of the Conference Panel
 - Guest Speaker of the II International Forum on Small-scale Mining in Bolivar State, Venezuela, Puerto Ordaz, Venezuela, May 12-13, 2006.
 - Instructor of the Course Mining and the Environment. Part of the UBC Master Course on Sustainable management of Environmental Health Risks – Module VI. Zaruma, Ecuador, May 5-7, 2006
 - Instructor of the Course Environmental and Health Problems with Mercury Uses in Artisanal Gold Mining. Course for the Ministry of Environment, Ministry of Mines of Guinea, Conakry, April 18-20, 2006.
 - Guest Speaker of the CASM – Community and Artisanal and Small-scale Mining, 5th Annual General Meeting, Salvador, Brazil. Sept 19-24, 2005
 - Guest Speaker of Mercury Meeting organized by the Pan American Health Organization (PAHO), Dept. Sustainable Development and Environmental Health, Washington, D.C., Aug 22-23, 2005
 - Guest Speaker at “Global Partnership for Mercury Management in Artisanal and Small-Scale Gold Mining”, UNEP-US EPA, Washington, D.C., Jun15, 2005.
 - Members of the Steering/Organizing Committee of the 7th ICMGP - International Conference on Mercury as a Global Pollutant, Ljubljana, Slovenia, Jun 27 – Jul 2 , 2004.
 - Guest Speaker of the Workshop of the Nordic Council of Ministers on Mercury. Brussels, Mar 29-30, 2004.
 - Guest speaker at the Communities and Small Scale Mining (CASM) Annual General Meeting and Learning Event. Elmina, Ghana, Sept. 7-10, 2003.

- Guest speaker, US EPA Office of International Affairs. Mercury from Artisanal Mining: Myths, Impacts, Solutions. April 11, 2002.
- Guest speaker, 1st International Forum on Mercury in Hydroelectric Reservoirs: Guri Case. Ciudad Bolivar, Venezuela, May 17 - 19, 2001.
- Guest Speaker, Forum'2001-National Institute of Minamata Disease, Minamata, Japan, March 19-20, 2001.
- Instructor, Course on Mine-closure. CYTED. La Rabida, Huelva, Spain, Sept. 25-29, 2000.
- Instructor, Course on Gold Extraction from Lateritic Ores. CYTED/CETEM, Rio de Janeiro, Jul 3 - 7, 2000
- Guest Speaker, University of Chile. Environmental and Social Aspects of Mining. Santiago, Mar 31, 2000
- Member of the Steering/Organizing Committee for the 6th International Conference on Mercury as a Global Pollutant, Minamata, Japan, Oct 15-19, 2001.
- Guest speaker at the Forum'99-National Institute of Minamata Disease, Minamata, Japan, Oct. 12-13, 1999.
- Keynote Speaker at the 5th Int. Conference on Mercury as a Global Pollutant, Rio de Janeiro May 23-28, 1999
- Guest Speaker of the Experts Meeting of Artisanal Gold Mining, Jul. 1-3, 1997. UNIDO headquarter, Vienna, Austria.
- Guest Speaker of the Brazil-Canada Meeting on Sustainable Development. CANMET, Ottawa, Mar 5-6, 1997.
- Guest Speaker of Mining Engineering Program, University of Toronto - Mercury Pollution in the Amazon, Toronto, Jan. 24, 1997
- Guest Speaker of the 1st International Symp. on Small Mining, Mar. 28-30, 1996. Ciudad Bolivar, Venezuela.
- Guest Speaker of the 16th Brazilian Symposium on Mineral Processing and Hydrometallurgy. Lecture: Mining and the Environment. Rio de Janeiro, Sept. 17-22, 1995.
- Instructor of the course: Knowledge Base Construction for Industrial Fuzzy Systems, Belo Horizonte, Jul. 31 to Aug. 2, 1995. Organized by ATAN - Automation Systems Ltd.
- Instructor of the course: Industrial Fuzzy Systems for Mining, Metals and Materials, São Carlos, Dec. 7-9, 1994
- Instructor of two-day course on Mercury Contamination and Artificial Intelligence Applied to Environmental Sciences. Universidad Experimental de Guayana, Ciudad Guayana, Venezuela, Sept. 14-15, 1995.
- "Speaker of the Month" at Canadian Institute of Mining, Metallurgy and Petroleum, Vancouver, April 29, 1994
- Teaching Assistant at the University of British Columbia (1993-1994).
- Instructor of the course: Geology and Mineral Processing of Gold Ores. 40 hours. Organized by ABM - Brazilian Association of Metals. Rio de Janeiro, Dec. 8-12, 1986.

PUBLICATIONS

Referred Journals

65. **Veiga, M.M.** Velasquez-López, P.C., Angeloci, G. (2013). Processing Centers in Artisanal Gold Mining. Submitted to *Journal of Cleaner Production*
64. Drace, K.; Kiefer, A.M.; **Veiga, M.M.**; Williams, M.K.; Ascari, B.; Knapper, K.A.; Logan, K.M.; Breslin, V.M.; Skidmore, A.; Bolt, D.; Geist, G.; Reidy, L.; Cizdziel, J.V. (2012). Mercury-Free, Small-Scale Artisanal Gold Mining in Mozambique: Utilization of Magnets to Isolate Gold at Clean Tech Mine. *J. Cleaner Production* v.32, p.88-95.
63. Spiegel, S.; Ribeiro, C.; Sousa, R., **Veiga, M.M.** (2012). Mapping Spaces of Environmental Dispute: GIS, Mining and Surveillance in the Amazon. *Annals of the Association of American Geographers*, v. 102, n. 2, p. 320-349.
62. Gunson, A.J.; Klein, B., **Veiga, M.**; Dunbar, S. (2012). Reducing Mine Water Requirements. *J. Cleaner Production*, v. 21, p.71-82.
61. Shandro, J.; Koehoorn, M.; Ostry, A.; Gibson, N.; **Veiga, M.M.** (2012). Mental Health, Cardiovascular Disease and Declining Economies in British Columbia Mining Communities. *Minerals 2011*, v.1, n.1, p.30-48.
60. Metcalf, S. and **Veiga, M.M.** (2012). Using Street Theatre to Increase Awareness of and Reduce Mercury Pollution in the Artisanal Gold Mining Sector: A Case from Zimbabwe. *J. Cleaner Production*, v.37, p.179-184.
59. Cordy, P.; **Veiga, M.M.**; Salih, I.; Al-Saadi, S.; Console, S.; Garcia, O.; Mesa, L.A.; Velásquez-López, P.C.; Roeser, M. (2011). Mercury Contamination from Artisanal Gold Mining in Antioquia, Colombia: the World's Highest Per Capita Mercury Pollution. *The Science of the Total Environment*, v. 410, p.154-160.
58. Shandro, J.; **Veiga, M.M.**; Shoveller, J.; Scoble, M.; Koehoorn, M. (2011). Perspectives on Community Health Issues and the Mining Boom-Bust Cycle. *Resources Policy* v. 36, p.178-186
57. Sousa, R.N.; **Veiga, M.M.**; Van Zyl, D.; Telmer, K.; Spiegel, S.; Selder, J. (2011). Policies And Regulations For Brazil's Artisanal Gold Mining Sector: Analysis and Recommendations. *J. Cleaner Production*, v.19, p.742-750.
56. Sousa, R.N.; **Veiga, M.M.**; Meech, J.A.; Jokinen, J.; Souza, A. (2011). A Simplified Matrix of Environmental Risks to Assess Small Scale Mining Impacts. *J. Cleaner Production*, v.19, p.580-587.
55. Velasquez-L., P.C.; **Veiga, M.M.**; Klein, B.; Shandro, J.; Hall, K. (2011). Cyanidation of Mercury-rich Tailings in Artisanal and Small-scale Gold Mining: Identifying Strategies to Manage Environmental Risks in Southern Ecuador. *Journal of Cleaner Production*, v.19, p.1125-1133.
54. Sousa, R.N.; **Veiga, M.M.**; Klein, B.; Telmer, K.; Gunson, A.J.; Bernaudat, L. (2010). Strategies for Reducing the Environmental Impact of Reprocessing Mercury-contaminated Tailings in the Artisanal and Small-scale Gold Mining

- Sector: Insights from Tapajos River Basin, Brazil. *J. Cleaner Production*, v.18, p. 1757-1766.
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Further training programs:

May 4-7, 1993: Fuzzy Expert Systems. Short course with L. Zadeh, J. Meech, C.A.Harris. Richmond, BC.

Jan-Dec, 1992: As a visiting scholar at the Univ. British Columbia, Dept. Mining and Mineral Process Eng., Vancouver, BC - with Dr. John A. Meech - Expert Systems, Fuzzy Logic Applications.

Mar-Jul, 1984: Visiting researcher at the Univ. of Western Ontario, Dept. Geology, London Ontario - with Dr. W.S. Fyfe. Instrumental Geochemical Analysis applied to Environmental Geochemistry.

Patents in Brazil:

- "Process for synthesis of alkaline metal dichloroisocyanurates"
- "Process for producing trichloroisocyanuric acid"
- "Process for producing high grade cyanuric acid"
- "Process to manufacture sodium cyanide from urea"

Awards:

- Killam Teaching Prize, UBC, May 2012
- Top 25 Canadian Immigrant, 2009. – Canadian Immigrants Magazine
- CIM - Canadian Institute of Mining, Metallurgy and Petroleum - Distinguished Lecturer 2002-2003
- CIM - Canadian Institute of Mining, Metallurgy and Petroleum - winner of the graduate student contest with the work: "Mercury Transformations in the Natural Environment" (Feb. 1994).
- George E. Winkler Memorial Scholarship, in recognition of academic achievements (Dec. 1993)

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Graduate Students of Marcello Veiga (in progress)

Student	Previous Degree	Title	Degree
Andre Xavier	Business Administration	Economic Diversification of Mining Communities	PhD
Paul Cordy	Geology	Atmospheric transportation of mercury in Latin America	PhD
Gustavo Angeloci	Mining Engineering	Flotation and intensive leaching of concentrates: adapting novel technologies for ASM	MASc

NOTE: ASM = Artisanal and Small-scale (Gold) Mining

Already Graduated

Student	Previous Degree	Title	Degree	Year
Lucas Mlekwa	Mining Eng.	Integrated Use of Hg-Cyanide for Gold Recovery – Impacts in Tanzania	MEng	2012
Flavio Guimarães	Mining Eng.	Use of Ozone as a Catalyst for Gold Cyanidation Reaction	MEng	2012
Adrian Daniel	Metallurgical Eng.	Investigating the Reprocessing of Carolin Mine Tailings, BC	MEng	2011
Jennifer Hinton	Geological Eng.	Gender Differentiated Impacts and Benefits of Artisanal Mining: Engendering Pathways out of Poverty A Case Study in Katwe Kabatooro Town Council, Uganda	PhD	2011
Janis Shandro	Biology	Investigation into the Economic, Social and Health fabric of Mining Communities in B.C.	PhD	2011
Patricio C. Velasquez	Aquaculture Eng.	Mercury balance in ASM plants: strategies to reduce pollution in Southern Ecuador	PhD	2010
Rodolfo Sousa	Forest Eng.	Rehabilitation of impacted areas and reduction of Hg use in Brazilian ASM	PhD	2010
Jeffrey Selder	Geography	Filtration of sulfide concentrates using the new Dry-Vac System	MEng	2010
Edson Sieszka	Civil Eng.	Surface and underground water management in open pits	MEng	2009
Paulo Cardoso	Civil Eng.	Environmental and social impact evaluation of the transportation corridor of iron ore , Brazil	MEng	2009
Rebecca Chouinard	Geology	Evaluating complex value-based community mine education strategies: Tlichio Tribe, NWT	MASc	2009
Wook Jin Choi	Geology	Applicability of Canadian mine reclamation cases to Korean abandoned metal mines	MEng	2008
Simon Handelsman	Mining Eng.	Human rights and mining	PhD	2008
Steve Metcalf	Geology	Identifying strategies for effective ASM interventions in Zimbabwe	MASc	2008
Silvana Costa	Environmental. Planing	Mineworkers' quality of life in remote communities: Brazilian Amazon	PhD	2008
A. Carolina Silva	Business Administration	System analysis perspectives: Pb-acid battery recycling in British Columbia	PhD	2008
Samuel Spiegel	Political Science	Policy and governance strategies to address Hg and ASM	MSc	2008
Shefa Siegel	Public Policy	Political ethics, Hg abatement and interventions in ASM sites	PhD	2007
Jemma Scoble	Social Science	Adapting economic games for organization of ASM in Tanzania	MASc	2006
Stephen Roberts	Landscape Architecture.	Stakeholder perceptions in the closure of HVC Mine, British Columbia	PhD	2005
Andrew Thrift	Mining Eng.	Decision analysis in stakeholder consultation	MASc	2005
A.J. Gunson	Mining Eng.	Hg and ASM in China	MASc	2004
M.Claudia Sandoval	Industrial Chemistry	Environmental Impacts of Riverbed Dredging: Lower Caroni River, Venezuela	MASC	2003
Jennifer Hinton	Geological Eng.	Earthworms as a bioindicator of Hg pollution in ASM, Brazil	MASc	2002
Christine Lussier	Biology	Geochemistry of Selenium in coal from Elkview, British Columbia	MASc	2001
Stephen Roberts	Political Science	Landscape aspects of the reclamation plan for Telkwa Coal Mine, B.C.	MLA	2000

