

APPENDIX II

LIST OF PUBLICATIONS

Publications of which copies are included in Appendix V of this application are marked by asterisks. Names of student co-authors from the University of Manitoba are underlined.

REFEREED PUBLICATIONS:

***Larocque, A.C.L.**, Stimac, J.A., Siebe, C., Greengrass, K., Chapman, R., and Mejia, S. 2008. A high-sulfidation epithermal Au assemblage in pumice from Volcan Popocatepetl, Mexico. **Invited** for special issue of in *Journal of Volcanology and Geothermal Research* on Popocatepetl volcano, v. 170, 51-60.

Stavast, W.J.A., Keith, J.D., Christiansen, E.H., Dorais, M.J., Tingey, D., **Larocque, A.**, and Evans, N. 2006. The fate of magmatic sulfides during intrusion or eruption, Bingham and Tintic Districts, Utah. *Economic Geology*, v. 101, 329-345.

*Stimac, J.A., Goff, F., Counce, D., **Larocque, A.C.L.**, Hilton, D., and Morgenstern, U. 2004. The Crater Lake and Hydrothermal System of Mount Pinatubo, Philippines: Evolution in the Decade after Eruption. *Bulletin of Volcanology*, v. 66, 149-167.

Larocque, A.C.L., Stimac, J.A., McMahon, G., Jackman, J.A., Hickmott, D., and Gauerke, E. 2002. Ion-microprobe analysis of FeTi oxides: Optimization for the determination of invisible gold. *Economic Geology*, v. 97, p. 159-164.

***Larocque, A.C.L.**, Stimac, J.A., Keith, J.D., and Huminicki, M.A.E. 2000. Evidence for open-system behavior in immiscible Fe-S-O liquids in silicate magmas: Implications for contributions of metals and sulfur to ore-forming fluids. *Canadian Mineralogist*, v. 38, p. 1233-1249.

*Marshall, B., Vokes, F.M., and **Larocque, A.C.L.** 1999. Regional metamorphic remobilization: upgrading and formation of ore deposits. *SEG Reviews in Economic Geology*, v. 11.

***Larocque, A.C.L.**, and Cabri, L.J. 1998. Ion-microprobe quantification of precious metals in sulfide minerals. **Invited** chapter for *SEG Reviews in Economic Geology*, v. 7, pp. 155-167.

***Larocque, A.C.L.**, and Rasmussen, P.E. 1998. An overview of trace metals in the environment, from mobilization to remediation. *Environmental Geology* (special issue), v. 33, pp. 85-91.

***Larocque, A.C.L.**, Stimac, J.A., and Siebe, C. 1998. Metal-residence sites in lavas and tuffs from Volcán Popocatepetl, Mexico: Implications for metal mobility in the environment. *Environmental Geology* (special issue), v. 33, 197-208.

Boulet, M.P., and **Larocque, A.C.L.** 1998. A comparative mineralogical and geochemical study of sulfide mine-tailings at two sites in New Mexico, USA. *Environmental Geology* (special issue), v. 33, pp. 130-142.

*Stimac, J., Hickmott, D., Abell, R., **Larocque, A.C.L.**, Broxton, D., Gardner, J., Chipera, S., Wolff, J., and Gauerke, E. 1996. Redistribution of Pb and other volatile trace metals during eruption, devitrification, and vapour-phase crystallization of the Bandelier Tuff, New Mexico. *Journal of Volcanology and Geothermal Research*, v. 73, pp. 245-266.

*Hannington, M.D., Tivey, M.K., **Larocque, A.C.L.**, Petersen, S., and Rona, P.A. 1995. Evidence for hydrothermal reworking of gold in sulfide deposits of the TAG hydrothermal field, Mid-Atlantic Ridge. *Canadian Mineralogist*, v. 33, pp. 1285-1310.

- ***Larocque, A.C.L.**, and Hodgson, C.J. 1995. Effects of greenschist-facies metamorphism and deformation on the Moberly massive sulfide deposit, Quebec, Canada. *Mineralium Deposita*, v. 30, pp. 439-448.
- ***Larocque, A.C.L.**, Hodgson, C.J., Cabri, L.J., and Jackman, J.A. 1995a. Ion-microprobe analysis of pyrite, chalcopyrite and pyrrhotite from the Moberly VMS deposit in Northwestern Quebec: Evidence for metamorphic remobilization of gold (invited for special issue on Applications of Microbeam Techniques). *Canadian Mineralogist*, v. 33, pp. 373-388.
- ***Larocque, A.C.L.**, Jackman, J.A., Cabri, L.J., and Hodgson, C.J. 1995b. Calibration of the ion microprobe for the determination of silver in pyrite and chalcopyrite from the Moberly VMS deposit, Rouyn-Noranda, Quebec (invited for special issue on Applications of Microbeam Techniques). *Canadian Mineralogist*, v. 33, pp. 361-372.
- *Goff, F., Stimac, J.A., **Larocque, A.C.L.**, Hulen, J.B., McMurtry, G.M., Adams, A.I., Roldan-M., A., Trujillo, P.E., Jr., Counce, D., Chipera, S.J., Mann, D., and Heizler, M. 1994. Gold degassing and deposition at Galeras Volcano, Colombia. *GSA Today*, v. 4, no. 10, pp. 241-247.
- ***Larocque, A.C.L.**, Hodgson, C.J., and Lafleur, P.-J. 1993. Gold distribution in the Moberly VMS deposit, Noranda, Quebec: A preliminary evaluation of the role of metamorphic remobilization. *Economic Geology*, v. 88, pp. 1443-1459.
- ***Larocque, A.C.L.**, and Hodgson, C.J. 1993. Carbonate-rich footwall alteration at the Moberly mine, a possible Mattabi-type VMS deposit in the Noranda camp. *CIM Exploration and Mining Geology Journal*, v. 2, pp. 165-169.
- ***Larocque, A.C.L.**, Jonasson, I.R., and LeCheminant, G.M. 1989. Zonation of secondary minerals in hydrothermally altered lavas from Galapagos Rift. In *Current Research, Part F*, Geological Survey of Canada, Paper 89-1F, pp. 9-15.
- ***Larocque, A.C.L.** 1985. Depressions in the bottom of Lac Mégantic, Quebec: probable stagnant ice features. In *Current Research, Part B*, Geological Survey of Canada, Paper 85-1B, pp. 431-439.

NON-REFEREED ARTICLES

- Hickmott, D.D., Stimac, J.A., **Larocque, A.C.L.**, Wetteland, C., and Brearley, A. 2003. Micro-PIXE Analysis of Trace Elements in Sulfides. Duggan, J.L., and Morgan, I.L., eds. *Application of Accelerators in Research and Industry*, 17th International Conference. p. 440-442.
- Stimac, J.A., and **Larocque, A.C.L.** 2002. Pinatubo lake update. *Newsletter of the Mineralogical Association of Canada*, v. 68, p. 5.
- Stimac, J.A., **Larocque, A.C.L.**, Goff, F., Counce, D., and Torres, R.C. 2002. A rapid rise in water level in the crater lake at Mount Pinatubo: An evolving threat for local populations. Invited for the cover of the *Newsletter of the Mineralogical Association of Canada*, v. 67, p. 1, 10-13.
- Larocque, A.C.L., and Cabri, L.J. 1999. Microbeam methods of determining Au concentrations in sulphide minerals. *Baguio Symposium on Tectonics, Magmatism and Mineralization*, Extended Abstracts and Proceedings, pp. 39-43.

Hickmott, D.D., Carey, J.W., Stimac, J., **Larocque, A.**, Abell, R. Gauerke, E., Eppler, A. 1997. Lead immobilization in thermally remediated soils and igneous rocks. Los Alamos National Laboratory Technical Report LA-UR-97-1175, 21 pages.

Rasmussen, P.E., and **Larocque, A.C.L.** 1996. Trace metals in the environment: mobilization to remediation. Conference Report in *Geoscience Canada*, v. 23, pp. 154-157.

Larocque, A.C.L., and **Boulet, M.P.** 1996. Mineralogy and geochemistry of sulfide mine-tailings in New Mexico. Mining Environment Neutral Drainage (MEND) Workshop Summary Report, Winnipeg, March 12-13, 1996.

Cabri, L. and **Larocque, A.** 1993. Microbeam Analytical Techniques: Applications to Exploration and Metallurgy (invited). University of British Columbia, *Mineral Deposits Research Unit, Short Course Notes SC-12*, UBC, Vancouver, B.C., January 25, 1993.

Larocque, A.C.L. 1991. Trace Element Behaviour During Weathering of Till from Eastern Ontario, with Implications for Geochemical Exploration. *Ontario Geological Survey, Open File Report 5740*, 201 p.

Larocque, A.C.L., and Nesbitt, H.W. 1989. Residence sites of zinc in weathered till from the Clyde River prospect in Eastern Ontario; Grant 336. In *Geoscience Research Grant Program, Summary of Research, 1988-1989*, Ontario Geological Survey, Miscellaneous Paper 143, pp. 160-185.

Larocque, A., and Shilts, W.W. 1986. Seeing through the bottom of our lakes. In *GEOS*, v. 15, no. 3, pp. 22-25.

THESES

Larocque, A.C.L. 1993. 'The Controls of Gold Distribution in the Moberly Volcanic-Associated Massive Sulphide Deposit, Rouyn-Noranda, Quebec,' Ph.D. thesis, Queen's University, Kingston, Ontario, Canada. 232 p.

Larocque, A.C.L. 1989. 'Trace Element Behaviour during Weathering of Till from Eastern Ontario, with Implications for Geochemical Exploration,' M.Sc. Thesis, University of Western Ontario, London, Ontario, Canada. 201 p.

Larocque, A.C.L. 1987. 'Subbottom Acoustic Profiling of Lake Doré, Ontario: Implications for Sedimentation,' B.Sc. Thesis, Carleton University, Ottawa, Ontario, Canada. 54 p.

**THE HAWLEY MEDAL FOR 2001
TO
ADRIENNE C.L. LAROCQUE, JAMES A. STIMAC, JEFFREY D. KEITH
AND MICHELLE A.E. HUMINICKI**

The Hawley Medal is awarded for the best paper to appear in *The Canadian Mineralogist* in 2000. The selection this year was, as usual, especially difficult because there were a large number of excellent papers. The Hawley committee, consisting of Penny King, Maya Kopylova and Tony Peterson, had a difficult time selecting among a short list of eight papers. After several e-mail discussions, they reached a consensus. The best paper this year is entitled "Evidence for open-system behavior in immiscible Fe-S-O liquids in silicate magmas: implications for contributions of metals and sulfur to ore-forming fluids", published in *The Canadian Mineralogist*, volume 38, pages 1233-1249 (2000). The authors are Adrienne C.L. Larocque, James A. Stimac, Jeffrey D. Keith and Michelle A.E. Huminicki. Two of the authors are in the Philippines, and could not make the journey to St. John's for this ceremony. Jeff Keith and Michelle Huminicki were present to accept the awards.

The paper is based on extensive study of sulfide inclusions from a variety of volcanic rocks from several localities. The rock types range from rhyolite to basalts, and the localities include active, dormant, and extinct volcanoes, as well as rocks from porphyry copper districts. Samples were examined with an SEM, and phases in the rocks were analyzed with the electron microprobe. Concentrations of Au in sulfide and Fe-oxide were established with an ion microprobe.

The paper is extremely well illustrated, meticulously organized, and clearly written. The authors based their interpretations on close observations of textures and a thermodynamic approach. This led to a clear exposition of the criteria that can be used to determine the origin of sulfides in volcanic rocks. This paper also has implications for ore formation and exploration.

Fellow mineralogists, it gives me great pleasure to introduce Jeffrey Keith and Michelle Huminicki, co-authors of the Hawley Medal winning paper for 2000.

Brian Fryer, President

Mr. President, Fellow Members of the Mineralogical Association of Canada, and Guests,

In addition to being my research colleague and co-recipient of the Hawley Medal, Jim Stimac is also my

husband. Shortly before our son was born in 1998, Jim's company posted him to work in the Philippines. Since his birth, Cameron and I have commuted regularly between Winnipeg and Metro Manila. It has been difficult and draining, and many times I have wondered whether or not it is worth it. Being awarded the distinguished Hawley Medal is an incredible honor, and I mean that in the sense that I still cannot quite believe it, but it also represents an affirmation of some of the choices that I have asked my family to make, and for that I am deeply grateful. I have always thought that Jim deserves a medal for his unflinching support of my professional goals and aspirations, and now he has one!

When I recall the papers that have previously been awarded the Hawley Medal, I am humbled that our paper about funny little globules in volcanic rocks is to join their ranks. I came rather late to the study of these oxide-sulfide globules: Jim Stimac and Jeff Keith noticed them as early as the late 1980s. Jeff observed ragged remnants of magmatic sulfides in rocks from Bingham and Tintic districts in Utah, and interpreted them as products of oxidation, and later, degassing. More difficult to interpret are Fe-oxide globules in volcanic rocks from Clear Lake, California; Jim attributed their formation to immiscibility of an Fe-oxide liquid. When he started looking for them in other suites of rocks, Jim discovered that oxide and oxide-sulfide globules are anything but rare. When I undertook to characterize the globules, I was amazed at the wide variety of textures and compositions that they display. However, all of this variation appears to be controlled by a few fundamental processes – immiscibility, degassing, and oxidation – and their timing relative to crystallization of the host magma.

While the subjects of our study are perhaps humble, their economic and environmental implications are important. Magmatic sulfides play a critical role in storing and releasing metals and sulfur to a magmatic volatile phase. It is not a new idea, but we now have excellent evidence that the process occurs. The volatile phase may be entrained into a magmatic-hydrothermal ore-forming fluid, giving rise to porphyry-type and related mineralization. Alternatively, metals and sulfur may be emitted to the atmosphere through volcanic degassing. The destabilization of magmatic sulfides may explain, in part, the problem of excess sulfur degassing from volcanoes.

I was working on separate collaborative projects with Jim and Jeff when I became obsessed with the idea of writing this paper. My colleagues were very patient in allowing me to be sidetracked, and were always forthcoming with information, discussions, and samples. Michelle Huminicki worked for me as a summer student, and she was fearless in finding, documenting, and analyzing globules in samples from many locations worldwide. My intention in writing the paper was two-fold: (i) to encourage others to look for and document similar features in their rocks, and (ii) to inspire someone to do the necessary experiments to really understand the processes. I see our paper as the beginning, rather than the end, of a quest.

We are fortunate in Geological Sciences at the University of Manitoba to have a superior crew of support staff to assist us. In particular, I appreciate electron-microprobe technician Ron Chapman for always being willing to find a way to analyze phases that are too small or too "frothy" or non-stoichiometric. SEM technician Sergio Mejia has always gone above and beyond the call of duty in enthusiastically and capably helping me to obtain exactly the type of data that I need. I am grateful to my Department for supporting my decision to spend large amounts of time in the Philippines so that I could balance family and professional obligations. Similarly, I am grateful to NSERC for continuing to fund me in spite of my vagabond lifestyle. I could not begin to make the commute work without the assistance and tolerance of many people, but in particular, I wish to thank my mother, Judith Larocque, for looking after Cameron when I was in Winnipeg and looking after my house when I was not.

It has been said many times before, but at the risk of being redundant, I wish to thank Bob Martin for the outstanding job that he does as editor of *The Canadian Mineralogist*. The excellent quality and high degree of relevance of the papers that appear in the journal are a testament to his hard work, his broad geological knowledge, and his commitment to the mineralogical sciences and the MAC. I am grateful to the reviewers of our paper, especially the anonymous one, for making me work so hard to revise the manuscript. And finally, I wish to express my deep appreciation to the Hawley Medal Committee for their recognition of our work.

Adrienne Larocque

Mr. President, Ladies and Gentlemen,

Along with my coauthors, I am very happy to receive this honor. I think we are all surprised and humbled to be given this award. Iron-oxide globules first caught my eye while I was studying metal partitioning in immiscible sulfide globules in young volcanic rocks in the early 1990s. Some of this work was reported at a conference on giant ore deposits at Queen's University in 1995. I'm proud that, although that investigation involved recent analytical innovations, the basic observations and ideas all came from detailed petrography. I firmly believe that there is still an important place for basic, descriptive work in science, and I encourage young scientists to hone their skills in fundamental methods before moving on to the latest rage in analytical.

The paper describes research that was a team effort spanning nearly a decade. Each of us brought different perspectives and skills to the work that ultimately led to a more integrated understanding. Adrienne picked up work started by Jeff and me and extended it to new rock suites. She kept our interest up, as we drifted to other endeavors, and carried things further than we could have on our own. We eagerly await experimental evidence that will further our understanding of the sulfide – oxide – silicate system under open-system conditions.

I especially cherish this award because I share it with my best friend and partner.

Jim Stimac



ADRIENNE C.L. LAROCQUE AND JAMES A. STIMAC

Mr. President, Ladies and Gentlemen,

I wholeheartedly concur with Adrienne's and Jim's sentiments of gratitude and surprise at being awarded this honor; I also am deeply appreciative and honored by this award. Let me just add a few comments to theirs.

Jim notes that detailed petrography was and is the key to deciphering the origin and degassing history of magmatic sulfides. I can second that notion and reluctantly admit that my first discovery of magmatic sulfides in volcanic rocks happened quite by accident, while probing pyroxenes in a sample that had about 1000 ppm of magmatic sulfide globules. But, that was probably the last time I failed to do reflected light petrography prior to probe work.

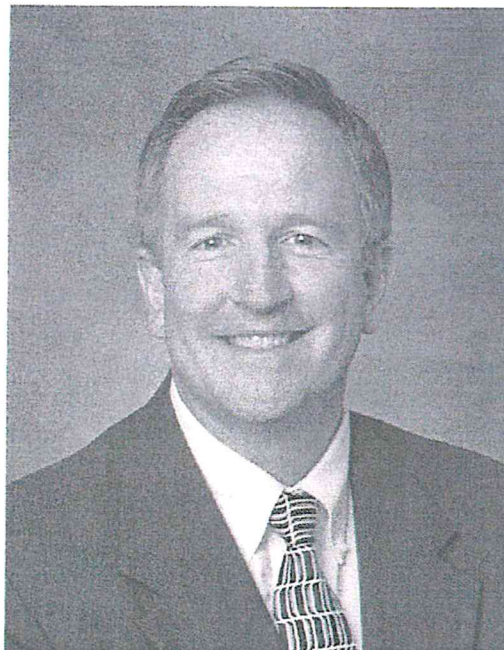
Among those I wish to acknowledge, first and foremost would be Jim Whitney, my department chair, mentor, and friend while I was at the University of Georgia in the late 1980s. His prior work with magmatic sulfides from the Fish Canyon Tuff and experimental work on sulfides reassured me that sulfide degassing was the correct interpretation for the textures that I observed.

Although I did not overlap with Jim and Adrienne in our time at Queen's University, the Queen's connection ultimately brought the three of us together, for which I am grateful. This is not the final chapter of this collaboration; our work in progress will more fully document how dramatically sulfide abundances may change depending upon the cooling and degassing history of the magma.

For me, the best part of this collaboration has been the opportunity to get to know and work with Adrienne

and Jim – they are both so capable, dedicated, and easy to work with! It has been very rewarding. Finally, there should be no mistake that it is largely Adrienne Larocque's hard work and perseverance that are at the heart of this paper. I salute her for this exceptional effort.

Jeff Keith



JEFFREY D. KEITH

Mr. President, Members of the Mineralogical Association of Canada, and Guests,

I would like to extend my thanks to my co-authors for allowing and trusting me to get involved in this research. Initially I was brought into this project as a summer student working on an NSERC study award. I was recruited by Adrienne to find and document these "funny little Fe-oxide and Fe-sulfide globules" that had a "frothy" appearance. I was intrigued that these textures might be an indication of S degassing of sulfides occurring prior to final crystallization of a magmatic system. After getting an eye for these textures came the hard part: trying to analyze these micrometer-sized globules with very irregular textures. As a result of the unusual characteristics of these oxides and sulfides, it made sense that atypical and variable micro-analytical results became one of the criteria for identifying them. Hopefully, others will undertake experimental work in order to document the range in conditions responsible for producing these degassed sulfides.

When I was first introduced to geology five years ago, I felt so lucky to have found my true calling, and my experience ever since has been phenomenal. It is the incredible scientists in this field who continue to do an excellent job teaching new students that are truly inspiring to me. I feel so lucky that I was given the opportunity to work in such a great research environment at the University of Manitoba, which allowed me to express my academic opinions and grow as a researcher. I hope in the future that I will be able to teach, assist, and pass on research experience and knowledge to my peers, colleagues, and those who follow, as my mentors have for me. In particular, Dr. Adrienne Larocque, in addition to being first author and introducing me to this work, was my undergraduate advisor, professor, em-

ployer, and mentor, but more importantly, she was an inspiration and a true friend.

I want to extend my warmest thanks to MAC for recognition of this paper and to Bob Martin who continues to do an excellent job as editor of *The Canadian Mineralogist*. I would also like to thank the Natural Sciences and Engineering Research Council of Canada for their support.

Michelle Huminicki



MICHELLE A.E. HUMINICKI

PRESENTATIONS AT PROFESSIONAL MEETINGS

Names of student co-authors from the University of Manitoba are underlined:

Stimac, J.A., Goff, F., Counce, D., **Larocque, A.C.L.**, Hilton, D., and Morgenstern, U. 2001. The crater and hydrothermal system of Mount Pinatubo, Philippines: Evolution in the decade after eruption. *Eos Trans. AGU*, v. 82, no. 47, p. 18.

Larocque, A.C.L., Stimac, J.A., Keith, J.D., & Huminicki, M.A.E. 2000. Destabilization of immiscible sulfides in silicate melts: Implications for the contribution of metals and sulfur to magmatic ore-forming fluids. IAVCEI General Assembly 2000, Bali, Indonesia, Abst. Vol., p. 120.

Redmond, P.B., Einaudi, M.T., & **Larocque, A.C.L.** 2000. The Relationship Between Copper and Gold in the High-Grade Porphyry Ore at Bingham Canyon, Utah. Geological Society of Nevada Meeting.

Larocque, A.C.L., Stimac, J.A., Siebe, C., Greengrass, K., Chapman, R., and Mejia, S. 1999. Partitioning of Au and base metals into a magmatic volatile phase at Volcán Popocatepetl, Mexico. Proceedings of University of the Philippines National Institute of Geological Sciences Research Symposium, Nov. 25-26, 1999, Quezon City, Philippines.

Ramnath, S.M., **Larocque, A.C.L.**, Bezys, R.K., Bamburak, J.D., & Fedikow, M.A.F. 1999. Base- and precious-metal mineralization hosted in Devonian carbonates near Swan River, Manitoba. Manitoba Industry, Trade and Mines, Manitoba Mining and Minerals Convention '99, Prog. Abstr. p. 36.

Marshall, B., **Larocque, A.C.L.**, and Vokes, F.M. 1999. Extensive remobilization in massive sulfide deposits: A fluid affair! 5th Biennial Meeting of the Society for Geology Applied to Mineral Deposits.

Larocque, A.C.L., Stimac, J.A., Keith, J.D., and Huminicki, M.A.E. 1999. Textural and chemical evidence for the degassing of magmatic sulfides. *Geological Association of Canada - Mineralogical Association of Canada Joint Annual Meeting*, Sudbury, Ont., Prog. Abstr. 24, A67-68.

Larocque, A.C.L., and Cabri, L.J. 1999. Microbeam methods of determining Au concentrations in sulfide minerals. *Baguio Symposium on Tectonics, Magmatism and Mineralization*, Extended Abstracts and Proceedings, pp. 39-43, Baguio City, Philippines, March 26-27, 1999.

Marshall, B., **Larocque, A.C.L.**, and Vokes, F.M. 1998. Remobilization structures in massive sulfide deposits: The fluid connection. *Evolution of Structures in Deforming Rocks*: Proceedings of 18th Annual Geological Association of Canada NUNA Research Conference, Canmore, September 26-28, 1998, Abstracts Volume, p.51.

Marshall, B., Vokes, F.M., and **Larocque, A.C.L.** 1998. Formation and upgrading of ore deposits by regional metamorphic remobilization. 14th Australian Geological Convention, Townsville, July 6-10, Geological Society of Australia Abstracts, No. 49, p. 290.

Layton-Matthews, D., **Larocque, A.C.L.**, and Biczok, J. 1998. A petrographic and alteration study of the Agate Zone, Mallery Lake epithermal system, NWT. *Geological Association of Canada - Mineralogical Association of Canada Joint Annual Meeting*, Quebec City, QC, Prog. Abstr. 23:A105.

Larocque, A.C.L., and Boulet, M.P. 1998. Applications of microbeam analysis of sulfides to the discrimination of ore types at Inco's Birchtree deposit, Thompson Nickel Belt, Manitoba (*invited*). *Geological Association of Canada - Mineralogical Association of Canada Joint Annual Meeting*, Quebec City, Prog. Abstr. 23:A103.

Larocque, A.C.L., Goff, F., Stimac, J.A., and Rasmussen, P.E. 1998. Quantification of volcanic emissions of metals to the atmosphere: more than a pipe dream? *Geological Association of Canada - Mineralogical Association*

of Canada Joint Annual Meeting, Quebec City, Prog. Abstr. 23:A102.

Boulet, M.P., and Larocque, A.C.L. 1997. Use of texture and mineral chemistry in the discrimination of barren sulfide and ore types at Inco's Birchtree Mine, Thompson Nickel Belt, Manitoba. *Manitoba Mining and Minerals Convention*, Winnipeg, MB, Nov. 1997.

Larocque, A.C.L., Stimac, J.A., and Siebe, C. 1997. An epithermal-like vapor-phase assemblage in pumice from Volcán Popocatepetl, Mexico. *Geological Society of America Program with Abstracts* 29, A360.

Boulet, M.P., and Larocque, A.C.L. 1997. Geochemistry of tailings, pore waters and acidic drainage at the Cleveland Mine Superfund Site in New Mexico, USA. *Geological Society of America Program with Abstracts* 29, A175.

C.J. Hodgson, A.C. Tessier, and A.C.L. Larocque. 1997. Syn- to post-tectonic mineralization formed by deposit-scale metamorphic remobilization in metamorphosed greenstone belt gold deposits. *Gordon Research Conference on Inorganic Geochemistry of Metal Ore-forming Systems*, Henniker, NH, August 1997.

Larocque, A.C.L., Nesbitt, H.W., and DiLabio, R.N.W. 1997. Fixation of Zn by vermiculite and Fe oxide in weathered glacial sediments. *11th International Clay Conference*, Ottawa, ON, June 1997.

Larocque, A.C.L., Tessier, A.C., and Roney, C. 1997. Chemical and mechanical remobilization of ore at the Photo Lake Cu-Zn-Au deposit, Snow Lake, Manitoba. *Geological Association of Canada - Mineralogical Association of Canada Joint Annual Meeting*, Ottawa, ON, Prog. Abstr. 22, p. A84.

Larocque, A.C.L., and Stimac, J.A. 1997. Controls on the distribution of base and precious metals in lavas and tuffs from Volcán Popocatepetl, Mexico: Pre-, syn- and post-eruptive processes. *Geological Association of Canada - Mineralogical Association of Canada Joint Annual Meeting*, Ottawa, ON, Prog. Abstr. 22, p. A84.

Boulet, M. P., and Larocque, A.C.L. 1997. Mineralogy and texture of barren sulfide and sulfide ore from the Birchtree mine, Thompson Nickel Belt, Manitoba. *Geological Association of Canada - Mineralogical Association of Canada Joint Annual Meeting*, Ottawa, ON, Prog. Abstr. 22, p. A15.

Larocque, A.C.L., and Stimac, J.A. 1997. Segregation and vapour-phase crystallization of base-metal phases in lava and pumice flows from Volcan Popocatepetl, Mexico: Implications for metal budgets of calc-alkaline volcanoes. *IAGCEI General Assembly*, Puerto Vallarta, Mexico, p. 62.

Athanasopoulos, P., Larocque, A.C.L., Stimac, J.A., and Siebe, C. 1996. Recent eruptions from Volcán Popocatepetl in context of past eruptive history. *Eos* v. 77, no. 46.

Boulet, M.P., and Larocque, A.C.L. 1996. A mineralogical and geochemical study of the Cleveland mine tailings in New Mexico, USA. *Geological Society of America Annual Meeting*, Denver, CO, Prog. Abstr. 28, A518.

Stimac, J.A., Hickmott, D., and Larocque, A.C.L. 1996. Partitioning of Cu and Mo in silicic volcanic rocks: Results of PIXE analysis of oxides, sulfides and glass. *Fifth International Conference on Nuclear Microprobe Technology and Applications*, Santa Fe, NM, Prog. Abstr., p. 109.

Larocque, A.C.L. 1996. Trace metals in the environment: From mobilization to remediation. *Geological Association of Canada - Mineralogical Association of Canada Joint Annual Meeting*, Winnipeg, MB, Prog. Abstr. 21, p. A53.

Larocque, A.C.L., and Cabri, L.J. 1996. Applications of SIMS analysis of sulfide minerals to the discovery and recovery of gold: A review. *Geological Association of Canada - Mineralogical Association of Canada Joint Annual Meeting*, Winnipeg, MB, Prog. Abstr. 21, p. A54.

Larocque, A.C.L., McMahon, G., Jackman, J.A., and Stimac, J.A. 1996. SIMS analysis of magnetite and ilmenite: Optimization for the determination of gold. *Geological Association of Canada - Mineralogical Association of Canada Joint Annual Meeting*, Winnipeg, MB, Prog. Abstr. 21, p. A54.

Boulet, M.P., and **Larocque, A.C.L.** 1996. A comparative mineralogical and geochemical study of sulfide mine-tailings at two sites in New Mexico, USA. *Geological Association of Canada - Mineralogical Association of Canada Joint Annual Meeting*, Winnipeg, MB, Prog. Abstr. 21, p. A11.

Stimac, J.A., **Larocque, A.C.L.**, Abell, R., Hickmott, D., Broxton, D., Wolf, J., and Gauerke, E. 1996. Redistribution of Pb during eruption, devitrification and vapour-phase crystallization of the Bandelier Tuff, New Mexico. *Geological Association of Canada - Mineralogical Association of Canada Joint Annual Meeting*, Winnipeg, MB, Prog. Abstr. 21, p.A91.

Larocque, A.C.L., Laughlin, A.W., Hickmott, D., and Chapin, C.E. 1995. Metal-residence sites in weathered sulfide-rich tailings and sediments, Kelly Mining Camp, Magdalena District, New Mexico. *Geological Society of America Annual Meeting*, New Orleans, LA, Prog. Abstr. 27, p. A192.

Goff, F., Stimac, J.A., Murrell, M.T., **Larocque, A.**, Hulen, J.B., and McMurtry, G.M. 1995. Episodic gold deposition at Galeras Volcano, Colombia. *Geological Society of America Annual Meeting*, New Orleans, LA, Prog. Abstr. 27, p. A327.

Larocque, A.C.L., Chapin, C.E., Laughlin, A.W., and Hickmott, D. 1995. Metal-residence sites in mine tailings in the Magdalena District, New Mexico, USA. In *Mineral Deposits*. Edited by J. Pašava, B. Kříbek and K. Zak. Proceedings of 3rd Biennial SGA Biennial Meeting, Prague, Czech Republic, August 1995, p. 661-664.

Larocque, A.C.L., Hodgson, C.J., Cabri, L.J., and Jackman, J.A. 1995. Metamorphic remobilization of gold: Evidence from an ion-microprobe study of sulfide minerals in an Archean VMS deposit. In *Mineral Deposits*. Edited by J. Pašava, B. Kříbek and K. Zak. Proceedings of 3rd Biennial SGA Biennial Meeting, Prague, Czech Republic, August 1995, p. 889-892.

Hickmott, D.D., Gauerke, E., Maggiore, C., **Larocque, A.**, and Layne, G.D. 1995. Ion implantation of Sr, REE, and Pb for SIMS analysis of geological materials. *12th International Conference on Ion Beam Analysis*, Tempe, AZ, Prog. Abstr.

Larocque, A.C.L., Laughlin, A.W., Chapin, C.E., and Hickmott, D. 1995. Mineralogy and geochemistry of mine tailings in the Kelly Mining Camp, Magdalena District, New Mexico. *Geological Association of Canada - Mineralogical Association of Canada Joint Annual Meeting*, Victoria, BC, Prog. Abstr. 20, p. A56.

Larocque, A.C.L., Hodgson, C.J., Cabri, L.J., and Jackman, J.A. 1995. Implications of SIMS analysis of sulfide minerals for the deposition, remobilization, and recovery of gold. Invited presentation, *124th TMS-AIME Meeting*, Las Vegas, Prog. Abstr., p. 188.

Larocque, A.C.L., and Hodgson, C.J. 1994. Implications of ion-microprobe analysis of sulfide minerals for the genesis of gold deposits in the Abitibi Greenstone Belt, Canada. *Geological Society of America Annual Meeting*, Seattle, WA, Prog. Abstr. 26, p. A83.

Goff, F., Stimac, J.A., **Larocque, A.C.L.**, Hulen, J.B., and McMurtry, G.M. 1994. Gold degassing and deposition at Galeras Volcano, Columbia. *Geological Society of America Annual Meeting*, Seattle, WA, Prog. Abstr. 26, p. A518.

Stimac, J.A., Abell, R., Hickmott, D., Gauerke, E., Broxton, D., and **Larocque, A.** 1994. Pb mobility during devitrification and vapour-phase alteration of the Upper Bandelier Tuff, New Mexico. *Geological Society of America Annual Meeting*, Seattle, WA, Prog. Abstr. 26, p. A438.

Larocque, A.C.L. 1994. Petrographic and chemical characteristics of vitrified natural materials (poster). *Geological*

Association of Canada - Mineralogical Association of Canada Joint Annual Meeting, Waterloo, Ontario, Prog. Abstr. 19, p. A62.

Larocque, A.C.L., and Hodgson, C.J. 1993. Effects of metamorphism on the Moberly VMS deposit, eastern Abitibi Greenstone Belt, Quebec, Canada. *Geological Society of America Annual Meeting*, Boston, Massachusetts, Prog. Abstr. 25, p. A79.

Larocque, A.C.L., Nesbitt, H.W., DiLabio, R.N.W., and Guthrie, G.D. 1993. Fixation of Zn by vermiculite in weathered glacial sediments. *Geological Society of America Annual Meeting*, Boston, Massachusetts, Prog. Abstr. 25, p. A234.

Cabri, L.J., Czamanske, G.K., **Larocque, A.C.L.**, and Neumayr, P. 1993. Recent studies involving microbeam methods for precious metals (*invited*). *5th International Congress on Applied Mineralogy '93*, Perth, Australia, May/June 1993.

Larocque, A.C.L., Hodgson, C.J., Cabri, L.J., and Jackman, J.A. 1993. Ion-microprobe study of sulfide minerals from the Moberly VMS deposit in northwestern Quebec: Evidence for metamorphic remobilization of Au (*invited*). *Geological Association of Canada - Mineralogical Association of Canada Joint Annual Meeting*, Edmonton, AB, Prog. Abstr. 18, p. A56.

Larocque, A.C.L., Cabri, L.J., Jackman, J.A., and Hodgson, C.J. 1993. SIMS analysis of Ag in pyrite: Experimental parameters and preliminary results (*invited*). *Geological Association of Canada - Mineralogical Association of Canada Joint Annual Meeting*, Edmonton, AB, Prog. Abstr. 18, p. A56.

Larocque, A.C.L. 1993. Challenges and rewards of graduate studies in the geosciences: A woman's perspective (*invited*). *Geological Association of Canada - Mineralogical Association of Canada Joint Annual Meeting*, Edmonton, AB, Prog. Abstr. 18, p. A56.

Larocque, A.C.L., Hodgson, C.J., Cabri, L.J., and Jackman, J.A. 1992. Application of SIMS analysis of pyrite to the study of metamorphic remobilization of Au in the Moberly VMS deposit, Rouyn-Noranda, Quebec. *Geological Association of Canada - Mineralogical Association of Canada Joint Annual Meeting*, Wolfville, NS, Prog. Abstr. 17, p. A63.

Larocque, A.C.L., Lafleur, P.-J., and Hodgson, C.J. 1992. Gold distribution in the Moberly VMS deposit, Noranda, Quebec: A preliminary evaluation of the role of metamorphic remobilization in the formation of gold orebodies in VMS deposits (*invited*). *Canadian Institute of Mining and Metallurgy Annual Meeting*, Montreal, Quebec, Prog. Abstr. 85, p. 80.

Larocque, A.C.L., and Hodgson, C.J. 1991. Remobilization of ore constituents at the Moberly Cu-Zn-Au mine in northwestern Quebec: Preliminary observations from the Main and Satellite lenses (poster). *Geological Association of Canada - Mineralogical Association of Canada Joint Annual Meeting*, Toronto, ON, Prog. Abstr. 16, p. A71.

Larocque, A.C.L., Nesbitt, H.W., and DiLabio, R.N.W. 1990. Mobility and residence sites of zinc in weathered till (abstract). *Geological Association of Canada - Mineralogical Association of Canada Joint Annual Meeting*, Vancouver, BC, Prog. Abstr. 17, p. A73.

Larocque, A.C.L., and Nesbitt, H.W. 1989. Residence sites of zinc in weathered till from the Clyde River prospect, Eastern Ontario. *Ontario Mines and Minerals Symposium*, Toronto, ON, Prog. Abstr. p.16.

Larocque, A.C.L., and Nesbitt, H.W. 1988. Zinc residence sites in till from Hopetown, Ontario (poster). *Ontario Mines and Minerals Symposium*, Toronto, ON, Prog. Abstr..

PRESENTATIONS IN SHORT COURSES

Ion-Microprobe Quantification of Precious Metals in Sulfide Minerals. Invited contribution for short course entitled *Applications of Microanalytical Techniques to Understanding Processes of Mineralization* held at Geological Society of America Annual Meeting in Denver, CO, October 1996.

Applications of SIMS Analysis to Exploration. Invited contribution for short course entitled *Microbeam Analytical Techniques: Applications to Exploration and Metallurgy* held at University of British Columbia, Mineral Deposits Research Unit, Vancouver, B.C., January 1993.

SYMPOSIA, SPECIAL SESSIONS AND WORKSHOPS

Presenter at MEND Workshop on Acid Mine Drainage Technologies, Winnipeg, MB, March 12-13, 1996.

Organizer and co-chair of symposium entitled *Trace Metals in the Environment: Mobilization to Remediation* held at Geological Association of Canada - Mineralogical Association of Canada Joint Annual Meeting in Winnipeg, Manitoba, 1996.

Organizer and co-chair of special session entitled *Gold in the 21st Century: Exploration, Analysis and Exploitation* held at Geological Association of Canada - Mineralogical Association of Canada Joint Annual Meeting in Winnipeg, Manitoba, 1996.

Invited co-chair of session on *Metamorphism and Mineralization*, held at SGA Biennial Meeting, Prague, Czech Republic, August 1995.

Co-organizer, facilitator, and keynote speaker for workshop entitled *Women in Geoscience: Strategies for Success*, held at Geological Association of Canada - Mineralogical Association of Canada Joint Annual Meeting, Waterloo, Ontario, 1994.

Invited participant in symposium entitled *Women in Geoscience: The Next Decade* and associated panel discussion, Geological Association of Canada - Mineralogical Association of Canada Joint Annual Meeting, Edmonton, Alberta, 1993.

INVITED SEMINARS AND GUEST LECTURES

Invited presentations are those for which travel and accommodation costs for Dr. Larocque were covered by the inviting department.

Volcanic Degassing at Popocatepetl, Mexico: Conquistadors, Micro-Minerals, and Environmental Impacts. **Invited presentation** to Manitoba Minerals Society, Winnipeg, MB, May 7, 1998.

The Discovery and Recovery of Gold: Practical Applications of SIMS Analysis of Sulfide Minerals. Presentation at Sonoma State University, Rohnert Park, CA, April 22, 1998.

Mobility of "Heavy" Metals in Sulfide-Rich Mine Tailings and Waste Dumps in New Mexico, USA. Presentation at Sonoma State University, Rohnert Park, CA, December 11, 1997.

Applications of SIMS analysis of Sulfide Minerals to the Discovery and Recovery of Gold. **Invited presentation** at Brigham Young University, Provo, UT, October 17, 1997.

Mobility of "Heavy" Metals in Sulfide-Rich Mine Tailings and Waste Dumps in New Mexico, USA. **Invited presentation** at University of Saskatchewan, Saskatoon, SK, September 12, 1997.

The Discovery and Recovery of Gold: Practical Applications of Sims Analysis of Sulfide Minerals. **Invited presentation** to local chapter of CIM, Saskatoon, SK, September 12, 1997.

Ion-Microprobe Quantification of Precious Metals in Sulfide Minerals. **Invited presentation** at University of California at Davis, CA, April 18, 1997.

Metamorphic Remobilization of Gold: Evidence from an Ion-Microprobe Study of Sulfide Minerals in an Archean VMS Deposit. Presented at Manitoba Mining and Minerals Convention '95, Winnipeg, MB, November 21, 1995.

Metamorphic Remobilization of Gold: Evidence from an Ion-Microprobe Study of Sulfide Minerals in an Archean VMS Deposit. **Invited presentation**, Louisiana State University, Baton Rouge, LA, November 3, 1995.

Metal-Residence Sites in Weathered Till and Mine Tailings. **Phillips - AWG Distinguished Lecture**, Iowa State University, Ames, IA, March 24, 1995.

Ion-Microprobe Analysis of Sulfides from the Moberly Cu-Zn deposit, Quebec: Evidence for the Metamorphic Remobilization of Gold. **Phillips - AWG Distinguished Lecture**, Iowa State University, Ames, IA, March 23, 1995.

Fluid Transport of Metals in Various Environments. Presented at New Mexico Bureau of Mines, Socorro, NM, October 11, 1994.

Strategies for Success in Graduate School and Beyond. Presented at Los Alamos National Lab, Los Alamos, NM, July 19, 1994.

Fluid Transport of Metals in Various Environments. Presented at University of Manitoba Department of Geological Sciences, Winnipeg, MB, June 21, 1994.

Determination of Au and Ag in Sulfide Minerals by SIMS: Implications for Deposition, Remobilization, and Recovery of Precious Metals. **Invited presentation**, Canada Centre for Mineral and Energy Technology (CANMET), Ottawa, ON, May 24, 1994.

Women in Geoscience: Strategies for Success in Graduate School and Beyond. **Invited presentation**, Geological Survey of Canada, Ottawa, ON, May 20, 1994.

Ion-Microprobe Analysis of Sulfides from an Archean Massive Sulfide Deposit: Evidence for the Metamorphic Remobilization of Gold. Presented at New Mexico Institute of Technology as part of a graduate course on gold deposits taught by D. R. Norman, Socorro, NM, March 7, 1994.

Metamorphic Remobilization of Au in the Moberly VMS Deposit, NW Quebec: Evidence from an Ion-Microprobe Study of Sulfide Minerals. **Invited presentation**, University of New Mexico Department of Earth and Planetary Sciences and Institute of Meteoritics, Albuquerque, NM, May 3, 1993.

Relationship Between Gold Content and Texture of Pyrite in the Moberly VMS Deposit, Noranda, Quebec: Implications for the Formation of Bousquet-Type Deposits. **Invited presentation**, Toronto Discussion Group, Toronto, ON, March 9, 1992.

RESEARCH FUNDING RECEIVED

FROM GOVERNMENT SOURCES:

- 2000-2004: NSERC Operating Grant: Mineral-Fluid Partitioning of Metals in Magmatic, Hydrothermal, and Weathering Environments (\$24,000/year). Extended to 2005 because of leave of absence.
- 1996-2000: NSERC Operating Grant: Mineral-Fluid Partitioning of Ore Metals in Melts and Aqueous Fluids (originally \$25,000/yr, before increases)
- 1996-1997: NSERC: Equipment Grant: Computer upgrade for Cameca SX-50 electron microprobe (\$53,123). Co-applicant with Petr Cerny, Frank Hawthorne, and Norman Halden,
- 1996: NSERC Minor Equipment Grant: Fluid-inclusion stage and microscope (\$42,000).

FROM INDUSTRY SOURCES:

- 1997-2001: CAMIRO (\$165,700) and NSERC (\$136,300): Thompson Nickel Belt (co-applicant)

FROM UNIVERSITY OF MANITOBA:

- 1996: University of Manitoba Research Grants Program (URGP): Geological Contributions to Mercury Content of Lake Waters (\$3,500)
- 1994-1995: University of Manitoba Start-Up Grant (\$75,000)

OTHER:

- 2001-2004: Metals in the Environment (MITE) Research Network: Metalliferous Black Shales in Manitoba (\$26,000/year) **DECLINED** due to resignation from University of Manitoba

March 21, 1991

University-Industry Cooperative Research and Development Program
National Sciences and Engineering Research Council of Canada
200 Kent St.
Ottawa, Canada
K1A 1H5

Attention Ms. Margaret Caughey, Program Officer

Re: Study of gold distribution in the Mobrun Mine, Rouyn-Noranda, Quebec

Dear Ms. Caughey,

This is to confirm the support of Ressources Audrey Inc. for the attached grant proposal for a study of gold distribution in our mine near Rouyn. We have agreed to make a cash contribution to this project, to be shared equally with our joint-venture partner, Minnova, of \$16,600, and an "in-kind" contribution of services and work time of our employees of \$13,284. The "in-kind" contribution detailed in this proposal is very much a minimal estimate, since a study of this type inevitably requires the time contributions from many individuals in the operation, including engineering staff, miners (whose work may be held up while the geologist maps and collects samples at working faces), surface workers, etc.

I will be the company officer who will liaise with the applicant doing the research. My experience with the applicant, and the student who is doing the field work, has been entirely satisfactory during the preliminary orientation study that they carried out in 1990. The student has shown herself as a highly competent individual both in her technical work, and in her day to day personal interactions with our employees. This latter ability will greatly increase the effectiveness of the transfer of technical knowledge which is an important part of this project, from our point of view.

The research program is of vital interest to us, since the recoverable metal content of the new 1100 massive sulfide lens is barely sufficient to support economic mining. A very large part of the value of this mineralization is in the gold, and gold recovery is low, as it is in most deposits of this type. This means that our decision to proceed with mining, with all this will mean for the economic well-being of the Noranda-Rouyn area, will depend critically on our developing efficient methods for grade control. We have high hopes that this study will result in the development of geological criteria which will help us with grade control. In addition, both Audrey, and even more so our partner in this venture, Minnova, are actively involved in exploration for new gold-rich massive sulfide deposits. We consider that the insights into the geological controls on this valuable type of deposit that we expect to come out of this study will be of considerable help to us in exploration both in the immediate vicinity of the mine, and elsewhere in the Abitibi belt.

Sincerely,

Michel Bouchard
Vice-President



**NSERC
CRSNG**

*Investing in people, discovery and innovation
Investir dans les gens, la découverte et l'innovation*

APR 06 2009

MESSAGE TO APPLICANT

MESSAGE AU CANDIDAT

INSTRUCTIONS TO COMMITTEES

INSTRUCTIONS AUX COMITÉS

Only one communication form per applicant should be submitted to NSERC. Please note that **comments will be sent verbatim to the applicant.**

Prière de ne soumettre qu'une seule formule de communication par candidat. Veuillez noter que les **commentaires seront transmis tels quels au candidat.**

Family Name, Initials, and University of Applicant Nom de famille, initiales et université du candidat	Type of Grant / Genre de subvention
Larocque, A UMAN 169997-2000	Research Grant - Individual / Subvention de recherche - individuelle
Committee / Comité	
Solid Earth Sciences / Sciences de la terre solide	
<p>Although the NSERC research grants budget has been increased by a total of 15% since 1998, funds available for the present competition were insufficient to maintain all renewing applicants at their present level. As a consequence of this and the need to fund new applicants at an appropriate level, GSC 08 has had to impose an average 13% tax on its renewal applicants. Therefore, the renewal of a grant at the same level corresponds to a very positive review. A reduction of up to 13% reflects the budget constraints of the competition rather than weaknesses in the proposal.</p>	

1/1

Personal Information Bank Numbers: SERP/P-PU-005 and 010
Nos de fichiers de renseignements personnels : RSG/P-PU-005 et 010

Continue overleaf if necessary
Continuer au verso si nécessaire

Form / Formule 141 (1995)

Canada

350 Albert Street, Ottawa, Canada K1A 1H5
Fax: (613) 992-5337
www.nserc.ca

350, rue Albert, Ottawa, Canada K1A 1H5
Téléc. : (613) 992-5337
www.crsng.ca



**NSERC
CRSNG**

*Investing in people, discovery and innovation
Investir dans les gens, la découverte et l'innovation*

522-12-1

November 18, 1999

Dr. Adrienne Larocque
Department of Geological Sciences
University of Manitoba
66 CHANCELLORS CIR
WINNIPEG MB R3T 2N2

Dear Dr. Larocque:

On behalf of NSERC (the Natural Sciences and Engineering Research Council), I am writing to thank you most sincerely for your many contributions and dedicated work as a member of the Committee on Research Partnerships (CRP) during the past few years.

The excellent reputation of the NSERC research partnerships programs is due in large part to the hard work of respected members of the research community who provide thoughtful advice to Council on program and policy development.

My colleagues join me in this expression of appreciation and we hope to have the opportunity of working with you again.

Yours sincerely,

Isabelle Blain
Corporate Secretary

Canada

350 Albert Street, Ottawa, Canada K1A 1H5
Fax: (613) 992-5337
www.nserc.ca

350, rue Albert, Ottawa, Canada K1A 1H5
Téléc. : (613) 992-5337
www.crsng.ca

REVIEWS

The following is a list of reviews that were solicited from Dr. Larocque by international journals and granting organizations.

- 2003: Proposal to study genetic relationship of rocks spatially associated with Broken Hill-type Pb-Zn-Ag deposits, submitted to NSF*
- 2002: Proposal to study remote sensing of volcanic gases, submitted to NSERC** Committee on Strategic Projects
- 2002: Paper on SIMS analysis of epithermal gold mineralization for *Economic Geology*
- 2001: Paper on metamorphosed porphyry-epithermal mineralization for *Economic Geology*
- 2000: Proposal to study Sudbury Igneous Complex submitted to NSERC Committee on Research Partnerships
- 1999: Proposal to study intrusion-related gold deposits submitted to NSERC Committee on Research Partnerships
- 1999: Paper on Australian VMS deposit for *Economic Geology*.
- 1998: Paper on metamorphosed ore deposits for *SEG Reviews in Economic Geology*.
- 1998: Paper on seafloor mineralization for *Economic Geology*
- 1997: Paper on invisible gold in sulfides for *Canadian Mineralogist*.
- 1996: Two papers for proceedings of *5th International Conference on Nuclear Microprobe Technology and Applications '96*
- 1996: Chapter on accelerator mass-spectrometry for *SEG Reviews in Economic Geology*
- 1996: Paper on geochemistry of sediment-hosted Pb-Zn deposits for *Society of Economic Geologists Special Publication* entitled *Lead-zinc Deposits in Carbonate Rocks*.
- 1995: Paper on origin of barite veins for *Mineralium Deposita*
- 1995: Paper on silver in seafloor hydrothermal chimneys for *Canadian Mineralogist*
- 1995: Paper on experiments on partitioning of gold for *Magma, Fluids and Ore Deposits, Mineralogical Association of Canada Short Course Volume 23*.
- 1994: Two-part paper for *Economic Geology* on Australian VMS deposits.

Between 1996 and 1998, Dr. Larocque was guest editor of a special issue of *Environmental Geology* arising from the symposium on Trace Metals in the Environment that she organized for GAC-MAC in Winnipeg. In that role, she assigned submitted manuscripts to reviewers, managed revisions, and organized the entire special issue for publication.

*NSF = United States National Science Foundation

**NSERC = Natural Sciences and Engineering Research Council of Canada

ECONOMIC GEOLOGY

ROBERT A. ZIERENBERG
DEPARTMENT OF GEOLOGY
UNIVERSITY OF CALIFORNIA
DAVIS, CALIFORNIA 95616-8605

OFFICE (530) 752-1863
FACSIMILE (530) 752-0951
E-MAIL Z@GEOLOGY.UCDAVIS.EDU

June 25, 1999

Dr. Adrienne Larocque
Dept. of Geological Sciences
125 Dysart Rd.
University of Manitoba
Winnipeg, MB
Canada R3T 2N2

Adrienne,

Thank you for taking the time to review the paper by Steven R. Hunns and Bruce R. Anderson titled "A Model for the Origin of Hydrothermal Dolomite at the Mount Chalmers Volcanic-hosted Massive Sulfide Deposit, Queensland, Australia". A review sheet is provided for your convenience; more extensive comments can be included on a separate sheet of paper. Feel free to mark suggested changes on the manuscript as well. The Editorial Review Board for Economic Geology strives to provide rapid reviews to the authors and we ask our reviewers to return the paper within three weeks of receipt of the manuscript. Both the Society of Economic Geologists and I personally thank you for taking the effort to review manuscripts thereby ensuring the continued quality of the journal.

Sincerely,



Robert A. Zierenberg

~~1999-06-25~~