Appendix B
Samples of Supporting Documentation

Employer Recommendation

State Of California
Commission On Teacher Credentialing
Certification, Assignment and Waivers Division
1900 Capitol Avenue
Sacramento, CA 95811-4213

Email: credentials@ctc.ca.gov
Website: www.ctc.ca.gov

RECOMMENDATION FOR A PERSON OF EMINENCE

The governing board of the Santa Rosa City School

school district, by resolution adopted on October 22, 2014 (*Date*), in accordance with

California Education Code, Section 44262, recommends the issuance of a credential based on eminence to Adrienne Larocque (*Candidate's Name*)

in the subject of Academic Earth Science

Eminence was determined on the basis of:

Ms. Larocque was a volunteer and guest lecture at Maria Carrillo High School during the 2013-2014 school year. In addition, she gave several guest lectures. A review of her Eminence application letter, letters or recomendation, and interview by a committee of teachers and the principal, indicate Ms. Larocque clearly has excellent teaching capabilities and a vast amount of real world experiences to bring into the classroom. Attached to this application are numerous letters attesting to Ms. Larocque's abilities inside the classroom and in the field of Geology.

The above named applicant will be employed in this school district to serve as a Science Teacher (*Teacher (include subject), Administrator, Other*) at the Secondary (*Elementary or Secondary*) level.

Signature of District Superintendent:

Date: 10/24/14 Telephone Number: (707) 528-5181

Email Address: SShiels@srcs.k12.ca.us

The individual is recognized as eminent beyond the boundaries of his or her community, has demonstrably advanced his or her field, and has been acknowledged by his or her peers beyond the norm for others in the specific endeavor.

1. The following affirmations of eminence are attached:
   See the attached letter outlining her experiences. For a summary of items contained in the letter, see the chart at the end.

2. The following documentation of achievement (advanced degrees, distinguished employment, publications, other) are attached:
   Transcripts showing BSc, MSc, and PhD attainment.
   Time as an Assistant Professor and then promotion to Associate Professor at University of Manitoba
   Various publication in international journals

3. Please provide an explanation of the individual's effectiveness as a teacher:
   Ms. Larocque has taught in a number of different settings including high school aged students
   Excerts from her letters of recomendation speak to her high level of rigor and her ability to mover her students forward in the understanding of science concepts. More importantly is her infectious love of science and sharing that with students.

4. Attached are the following miscellaneous items the district feels support eminence:
   See the attached letter outlining her experiences.

5. Attached is a letter from the applicant describing his or her accomplishments that support a claim of eminence.

Maria Carrillo High School

Rand K Van Dyke Principal
Vicki Zands Vice Principal
Randy Burbank Assistant Principal
Shauna Ferdinandson Assistant Principal

October 27, 2014

We at Maria Carrillo High School are excited about having Dr. Adrienne Larocque join our Science faculty. We look forward to having her share her considerable practical experience and knowledge of Earth Science with both our students and our staff.

As a teacher, Dr. Larocque has interacted with students of all ages. First in the Department of Geological Sciences at the University of Manitoba, then at several international schools in Jakarta, Indonesia, and finally as a volunteer with schoolchildren in Santa Rosa. In Jakarta, she taught Science to middle- and high-school students from all over the world. Dr. Larocque has worked with learners of widely varying cultural backgrounds and different levels of education, cognitive development, and social maturity. Her overseas background allows her to embrace cultural diversity and sharing her experiences will inspire our high school students. This is essential for freshman classes because of the wide range in developmental and emotional progress among students particularly at this age.

In addition to teaching students in settings ranging from kindergarten to college, Dr. Larocque has worked as a research scientist in government, industry, and academia. As such, she has a wealth of real-world work experience that can benefit both students and fellow teachers. For students who are starting to think about future careers, she can provide first-hand accounts of the types of work done in various employment settings and the educational preparation that is required for them. Sharing her research experiences will help Dr. Larocque's students be inspired and better understand the nature of scientific inquiry. Her familiarity with publication of research results will allow her to assist students with improving their technical writing skills, one of the focal points of the new Common Core State Standards and the Next Generation Science Standards.

In addition to her great depth and breadth of scientific knowledge, Dr. Larocque brings with her a variety of Earth materials and data for students to examine. In her classes, students get hands-on experience studying rocks collected from all over the world. They see photos taken by Dr. Larocque herself of geological features in remote locations worldwide, and hear about her experiences doing field work in those places. They learn about an array of sampling, sample preparation, and analytical techniques and see the specific data sets (images and analyses) that are produced. Students will get to see and interact with first hand material and the question "Why is this important" will be answered before it is asked.

With Dr. Larocque's contributions and guidance, the Science Department at Maria Carrillo will be able to build an impressive permanent collection of rocks, minerals, data, and tools for Earth Science study. Her presence also will benefit Science staff members as she can assist them in upgrading their skills in Earth Science and keep them abreast of the latest developments in the field.

In summary, having Dr. Larocque as a staff member at Maria Carrillo will enhance both the richness of learning in Earth Sciences and the preparation of students for future scientific education. She has already established herself as a resource for her fellow teachers.

Rand K Van Dyke
Principal

Jason Lea
Assistant Superintendent, Human Resources

Applicant Letter and Qualifications Summary

August 30, 2014

California Commission on Teacher Credentialing
1900 Capitol Ave.
Sacramento, CA 95811

Re: Application for an Eminence Teaching Credential

To Whom It May Concern,

I knew as a very young child that I loved Earth Science, and I believe that gave me an advantage during my school years. When I started my undergraduate degree at the Ottawa-Carleton Geoscience Centre, I already had a solid foundation of courses in Science and Math from high school. I was fortunate enough be employed by the Geological Survey of Canada (Canadian equivalent of the US Geological Survey) immediately after my first year of university, and again after my second year. Because of my aptitude for the work I was doing, my supervisor asked if I would take time out of my studies to continue managing the field project I had taken over. I agreed, and for 3 years I was in charge of a program of geophysical studies of lake sediments, even though I did not yet have my degree. I published my first scientific paper when I was 21, even before doing my undergraduate thesis. This stoked my love of research, and set me on my way.

I returned to school to complete my BSc, then moved to the University of Western Ontario for graduate work. My MSc research involved both field and a variety of lab analytical methods to determine the mineralogical residence sites of metals that were mobilized during chemical weathering. It was this work that fueled my passion for geochemistry. During the summer, I continued to work at the Geological Survey of Canada but in a different division where I was exposed to geological problems related to seafloor hydrothermal vents (aka, "black smokers"). This led me to pursue studies in a new field for my PhD research, on the remobilization of gold in a seafloor massive-sulfide deposit. Obtaining a PhD usually entails a high degree of specialization. However, early during my career I researched geological materials and processes ranging in age from Archean (very oldest) to Quaternary (very youngest), collected from the tops of mountains to the bottoms of the oceans. My areas of interest were broadened even further when I took up a prestigious postdoctoral fellowship at a US government lab. After only 1 year into my postdoc, I was offered a faculty position at the University of Manitoba. There, I taught undergraduate and graduate courses, supervised student theses, and conducted research in new areas.

The criteria for awarding the Eminence Credential include evidence of advancement of one's field. It is not unusual for someone who has spent their entire career working in one field to advance scientific understanding in that area; however, working in different sub-disciplines can be a disadvantage in this respect. It takes time to acquire new geological knowledge and become competent in new field and analytical techniques before advances can be made. In spite of this, as explained in letters of recommendation supporting my application, I made advances in disciplines as widely varied as Quaternary glaciolacustrine sedimentology and Archean ore-deposit geology using a broad array of techniques in sample collection and analysis. Specifically, I did the following:

- Identified and mapped subaqueous features related to melting of stagnant ice during deglaciation of the Canadian shield
- Discriminated between slump deposits in lake sediments caused by catastrophic draining vs. neo-tectonic seismicity
- Unequivocally established siting of metals mobilized during chemical weathering of mineralized soils developed on Quaternary-age glacial sediments
- Did detailed documentation and identification of clay-mineral assemblages from altered seafloor volcanic rocks
- Achieved lower (ppb-level) detection limits for gold and platinum-group elements in SIMS analysis of sulfide minerals than previous workers
- Developed new methods for quantification of silver in sulfide minerals
- Identified and proved a mechanism whereby refractory gold concentrated in pre-existing gold-rich massive-sulfide mineralization could be remobilized during metamorphism to form vein deposits containing easily-recoverable gold
- Developed a methodology for ion-implantation of iron-oxide minerals for standardization of SIMS analysis
- Quantified gold in iron oxides in magmatic rocks, establishing the importance of oxide minerals as hosts of precious metals in magmas
- Quantified (for the first time) gold in magmatic and hydrothermal sulfides in porphyry-copper systems
- Established a model and diagnostic criteria for degassing of immiscible sulfide liquids in silicate magmas (a process which was subsequently confirmed by other researchers' experiments)
- Established new methods for sampling and geochemical study of mine tailings and acid mine-drainage
- Made the first attempt to understand and quantify volcanic emissions of metals to the atmosphere and hydrosphere from all sources
- Provided first unambiguous evidence of vapor-phase transport of gold, silver and tellurium establishing that metals in epithermal deposits can be sourced directly from a silicate magma

Evidence that I am recognized beyond the boundaries of my community include:

- Willingness of scientists throughout Canada to pay for my time (under cost-recovery programs at the Geological Survey of Canada) to conduct high-resolution acoustic surveys of lake and ocean sediments
- Numerous invitations from university and government departments in the US and Canada to give talks at their institutions, with all expenses covered by them, on a variety of topics (e.g., environmental geology, economic geology, geochemistry, magmatic processes, women in Science)
- Invitations to present about applications and technical aspects of SIMS analysis in prestigious short courses in the US and Canada
- Obtaining a Director's postdoctoral fellowship at Los Alamos National Lab, for which I was chosen above American and foreign scientists in a wide variety of scientific fields
- Requests by numerous scientists worldwide to contribute my expertise to their research projects and publications (in environmental geology, economic geology, SIMS analysis, geochemistry of gold, remobilization of trace elements in various environments, etc.)

- Requests from nation-wide research consortia (MITE, CAMIRO) to participate in or lead their programs, which were successful in obtaining funding from government and industry
- Receiving the noteworthy Hawley Medal of the Mineralogical Association of Canada
- Being nominated for the Young Scientist of Canada award of the Mineralogical Association of Canada
- Being promoted from Assistant to Associate Professor at the University of Manitoba, even though my application was considered an early one because of my maternity leave and partial leave of absence
- Being asked to chair sessions in a variety of sub-disciplines (e.g., economic geology, mineralogy, environmental geology) at international meetings
- Being invited to contribute papers to special issues of reputed international journals and society publications (e.g., *Canadian Mineralogist, Journal of Volcanology and Geothermal Research, SEG Reviews in Economic Geology*)
- Renewal of funding for my research by NSERC (equivalent to NSF in the US) even though I was on partial leave of absence from the University of Manitoba
- Requests from NSF and NSERC to review grant proposals, including important strategic proposals
- Invitation to serve on NSERC's important Committee on Research Partnerships
- Requests from numerous international journals to review manuscripts submitted for publication
- Efforts from administrators at a US university and Canadian government lab to recruit me to apply to their institutions

People have asked me why I want to teach high school after years of doing high-level geological research and instructing undergraduate and graduate students at the University level. After the birth of my daughter in 2001, I left the University of Manitoba because I could no longer balance my duties as a professor with my responsibilities as a mother of 2 children and a wife whose husband had been posted overseas. However, becoming a "trailing spouse" in Asia opened up new opportunities in teaching for me. I worked at several international schools in Indonesia teaching Science to high-school and middle-school students. After having done research at a high level, it was fascinating – and educational for me – to revisit the essentials of Science in the classroom.

During my career, I've taught students from age 4 to 40, and every age has its own rewards and challenges. Teenagers are at a unique place in their academic development. Younger students may enjoy learning about the natural world, but few of them are already thinking about their future careers. In high school, students are starting to think about what they will do with the rest of their lives. It is the ideal time to educate them about Earth Science. A recent article in the Washington Post indicated that Geology is one of the 10 college majors ***least*** likely to lead to underemployment!

While I relish the possibility of inspiring students to do further studies in Earth Science, I recognize that it's not everybody's "cup of tea." My approach to teaching any subject in Science is to firmly establish fundamental understanding that can be applied to any topic. Thus, applying first scientific principles to the study of the Earth will also equip students to do well in subsequent Science courses – Biology, Chemistry, and Physics – in high school. Even more important, my ultimate goal is to empower all students to become competent and confident consumers of scientific information. These are critical skills for their future lives, regardless of what profession they choose to follow.

I have much to offer the students and staff of Maria Carrillo High School. I have experience in government and industry as well as academia. As such, I can give students insight into how science and scientific learning fit into the "real world." Sharing my experience in obtaining funding for, carrying out and publishing results of my own research can help students understand what it truly means when journalists report that "Scientists say…." In addition, I have worked on geological problems from around the world; I have photos, maps and samples of rocks and sediments that even many professional geologists would envy, but that the students of Maria Carrillo will have the opportunity to study hands-on.

My path has been a circuitous one. However, my experiences uniquely equip me to challenge and inspire students at the highest level, while still ensuring that they receive the skills they need to succeed in school and beyond. In addition to my accomplishments in Earth Science research, I have a proven track record teaching, inspiring, and mentoring young adults who are studying Science.

I hope that the Commission will look favorably upon my application for an Eminence Teaching Credential.

Yours truly,

A. Larocque

Adrienne Larocque, PhD

4210 Chaparral Rd

Santa Rosa, CA 95409

SUMMARY OF DOCUMENTATION ESTABLISHING EMINENCE

The table below summarizes evidence included in this application establishing Dr. Larocque's eminence. Documents pertaining to each item can be found in the appendix listed in the last column.

A. Evidence of recognition beyond the boundaries of her community
B. Evidence that she demonstrably advanced her field
C. Evidence that she is acknowledged by her peers beyond the norm for others in the specific endeavor

Document	A	B	C	App
Geological Research:				
Full-time employment at Geological Survey of Canada prior to completion of BSc			√	I,IV
Transcripts for MSc and PhD, formal evaluation of PhD (*advanced degrees*)		√		I
Director's postdoctoral fellow at Los Alamos National Laboratory (*distinguished employment*)	√	√	√	I
Assistant Professor at University of Manitoba (*distinguished employment*)	√	√	√	I
Promotion to Associate Professor at University of Manitoba (*extraordinary success in her field, as her application was considered an early one*)	√	√	√	I
Annual Reports from University of Manitoba	√	√	√	I
Research grants obtained from national granting agencies and corporations	√	√	√	II
Publications in international journals (*articles in professional journals*)	√	√	√	II,V
Invited presentations at national and international meetings	√	√	√	II
Presentations in short courses/symposia (*evidence of significant contribution made to her field*)	√	√	√	II
Invited presentations and guest lectures (*evidence of significant contribution made to her field*)	√	√	√	II
Professional and academic service (*indicating leadership in national/international professional organization*)including: • Short Course Coordinator for Mineralogical Association of Canada • Secretary for the Working Group on Ores and Metamorphism (WGOM) of the International Association on the Genesis of Ore Deposits (IAGOD) • Western Canada Representative for IAGOD	√	√		II
Requests for reviews of manuscripts from national and international journals	√		√	II
Requests for reviews of proposals from national and international granting agencies	√		√	II

Receipt of Hawley Medal of the Mineralogical Association of Canada (*award for contributions to her field; evidence of extraordinary ability worth of distinction*)	√	√	√	II
Nomination for Young Scientist Award of the Mineralogical Association of Canada (*honor for contributions to her field*)	√	√	√	
Letters written in support of application for Eminence Credential in California *(evidence of extraordinary ability worthy of distinction and significant contributions made to her field*)	√	√	√	IV
Letters (from former supervisors and professional colleagues) written in support of application for promotion at University of Manitoba (*evidence of significant contribution made to her field*)	√	√	√	IV
Letter from University of Indiana soliciting an application for a faculty position there	√	√	√	II
Teaching Science to Students and Adults:				
Student evaluations and comments (*evidence of unusually successful method of educating students*)		√		III
E-mail message from former student about the excellence of Dr. Larocque's course on Mineral Deposits and the continuing value of the course notes (*evidence of unusually successful method of educating students*)	√	√	√	III
Letters written by former students in support of application for Eminence Credential in California (*evidence of unusually successful method of educating students*)		√		IV
Letter written by former employers/supervisors regarding teaching at international schools (*evidence of unusually successful method of educating students*)		√	√	IV
Science articles written for Suite 101 (*evidence of unusually successful method of educating students*)	√	√		VI
Nutrition Education:				
Web articles for Nutrition and Metabolism Society and obgyn.net	√	√	√	
Recruitment to be Associate Director of Healthy Nation Coalition	√	√	√	
Wellness articles written for Suite 101	√	√		VI
Paper publications for lay audiences (Jakarta Post, High End Magazine)	√	√		VI

APPLICATION FOR EMINENCE CREDENTIAL FOR DR. ADRIENNE LAROCQUE

General Background

Adrienne Larocque obtained her BSc in Earth Sciences from the Ottawa - Carleton Geoscience Center in Ottawa, Canada [1]. For graduate studies, she attended the University of Western Ontario, where she obtained her MSc in Geology [2], and Queen's University, where she was awarded a PhD in Geological Sciences [3]. These schools are two of the most respected institutions in Canada for Earth Sciences. Both schools were also ranked in the top 200 universities worldwide in 2013 [4]. The Academic Credentials Report for Dr. Larocque's degree confirms that she has US equivalence of a BSc in Geology, MSc in Geology and PhD in Geological Sciences, with a GPA of 3.8 (A) at the graduate level [5].

While an undergraduate, Dr. Larocque worked as a summer student in the Terrain Sciences Division of the Geological Survey of Canada [6]. After her second year of studies, her supervisor at the GSC placed her in charge of a field program using geophysical equipment to study post-glacial sediments in Canadian lakes, an unusual responsibility for someone who had not yet completed her degree. Dr. Larocque soon published her first paper, about unusual features discovered in a lake in Quebec, at the age of 21 [Larocque 1985; 7].

Dr. Larocque's Master's research was a study of residence sites of trace metals in weathered, Quaternary-age glacial sediments in Ontario. Her study was funded by the Ontario Geological Survey (OGS) and was published by the OGS as an open file report [Larocque 1991; 7]. While on a summer break from her Master's program, Dr. Larocque worked in the Mineral Resources Division (MRD) of the Geological Survey of Canada. During her summer employment, Dr. Larocque participated in a scientific cruise on the Juan de Fuca Ridge to study seafloor hydrothermal chimneys, a unique opportunity for a student. Even though her position with MRD was unrelated to her MSc research (which grew out of her time working in Terrain Sciences), Dr. Larocque published a paper on an aspect of her summer work [Larocque *et al.* 1989; 7].

For her PhD thesis, Dr. Larocque chose to work in a completely different field. Her new thesis work addressed the metamorphic remobilization of gold in an Archean volcanogenic massive sulfide deposit. The work was supported by research grants from the National Science and Engineering Research Council of Canada (NSERC, equivalent to the US National Science Foundation) [6] and Audrey Resources Inc., the operator of the mine [8]. Doctoral students are encouraged to publish the results of their theses, although this doesn't always happen. However, Dr. Larocque published 5 papers relating to her PhD research [7]. In addition to her professional success, Dr. Larocque's research contributed to the decision by Audrey Resources to develop a new ore lens that had been discovered at depth. As a result, the miners who had assisted her with collecting samples for her PhD were ensured of employment for years to follow.

During their first year in the PhD degree program, students at Queen's are required to pass comprehensive exams to establish that they have an advanced knowledge of their subject area. Dr. Larocque easily passed her comprehensive exams, in spite of having made a significant change in her area of research after completing her MSc. According to Dr. James Franklin, former Chief Scientist of the Geological Survey of Canada and external referee for Dr. Larocque's doctoral defense, "Her doctoral work was in a completely different field, related to understanding the genetic processes attendant on the formation of

major mineral deposits. This required a totally different specialized knowledge base. Dr. Larocque demonstrated her ability to learn an entirely new field of geoscience at an advanced level in a very short time period." [9].

In 1993, Dr. Larocque was awarded a prestigious Director's Postdoctoral Fellowship [10, 11] at Los Alamos National Lab (administered by the University of California for the US Department of Energy). For that position, she was chosen above scientists in many different scientific fields. While working in the Geo-engineering Group of the Earth and Environmental Sciences Division, Dr. Larocque carried out research in a number of environmental disciplines. Her studies included work on the geochemistry and mineralogy of mine tailings and the characterization of vitrified natural materials. She also was involved in research programs studying the partitioning and redistribution of trace elements in volcanic rocks [7; 12].

In 1994, Dr. Larocque took up a faculty position at the University of Manitoba, one of the top institutions for mineralogical research worldwide [13]. In addition to carrying out research there, she developed and taught new courses for undergraduate and graduate students [14]. She also supervised undergraduate and graduate theses and was on advisory committees for students in several other departments [15]. Dr. Larocque served on a number of hiring and promotional committees at the University [16]. In 2001, she was promoted from Assistant to Associate Professor [17].

Because of her organizational skills, Dr. Larocque was recruited to become Short Course Coordinator for the Mineralogical Association of Canada. In this position, Dr. Larocque assisted scientists in preparing proposals for potential short courses and liaised with the MAC executive in approving their applications. She took on added responsibility for compiling important data for all previous short courses [18]. Dr. Larocque also was asked to be the Western Canada Representative for the Working Group on Ores and Metamorphism (WGOM), part of the International Association on the Genesis of Ore Deposits. She later was asked to serve as the Secretary of the WGOM [19; 20].

Dr. Larocque resigned from the University of Manitoba in 2001 for family reasons and followed her husband to the Philippines where he had been posted by his employer. However, she published several research papers and several non-refereed contributions even after her resignation [7]. While living in Indonesia, Dr. Larocque was employed teaching high school and middle school Science at several international schools [21].

Evidence of Advancement of the Field

During her summer employment after the second year of her undergraduate degree, Dr. Larocque was placed in charge of a program that involved sub-bottom geophysical profiling of lake sediments because she quickly demonstrated an aptitude for the work. The job involved mapping of sediment thicknesses and features formed during deglaciation of the Canadian Shield (Larocque and Shilts, 1986; 7). An important part of the studies included searching for evidence of post-glacial seismic stability. Dr. Larocque's first paper described never-before-seen subaqueous cliffs formed by stagnant ice trapped at the bottoms of lakes (Larocque, 1985). Her undergraduate thesis, also about results of lake-bottom studies, was thorough and detailed. In it, she documented the distribution of sediments and described their mechanism of deposition, confirmed by collection and logging of sediment cores. She also provided evidence for two episodes of slumping, one of which was caused by a neo-tectonic event [Larocque,

1987; 7)]. Dr. Ron DiLabio, former Chief of Quaternary Geology Subdivision in Terrain Sciences Division (now retired), and her MSc thesis co-supervisor in later years, stated that "Her work has allowed investigators to clearly see the stratigraphy of lake sediments and essential information such as sediment volume, texture, lake drying or drainage events, past earthquakes and subaqueous mudslides. This was a major advance in understanding that part of the landscape that is out of view, i.e. lake basins." [22].

Dr. Larocque's MSc research provided unequivocal evidence for the fixation of zinc by vermiculite formed by weathering of biotite (Larocque, 1989; 7). Previously, mineralogical siting of trace elements in clay-sized fractions of soils and sediments was usually inferred from sequential chemical extractions, results of which can be difficult to interpret with confidence. Dr. Larocque's work identified the fractions of soil and sediment samples that are most effective in geochemical exploration programs. Furthermore, her research has important implications for methods of immobilizing heavy metals that have been released into the environment [Larocque and Nesbitt 1989; 7; Larocque *et al.* 1993; 12].

During her summer employment in the Mineral Resources Division (MRD) of the Geological Survey, Dr. Larocque wrote a paper about clay-mineral speciation and composition in altered seafloor rocks from the Galapagos Rift [Larocque *et al.* 1989; 7]. The study required careful sampling of fine-scale zones defined by different mineral assemblages. It also involved complicated X-ray diffraction procedures to identify the species of clay minerals present. This type of detailed work had not been done before, and her data were used in several publications by senior scientists.

Although Dr. Larocque changed research areas from her MSc to her PhD, she quickly made significant contributions to her new field. It was her initiative to use secondary-ion mass spectrometry (SIMS) to solve the problem of the residence sites and fate of sulfide-hosted gold (Larocque, 1993; 7). At the time, SIMS was used mainly by physicists and materials scientists; applications in geological sciences were largely unrecognized. Dr. Larocque was trained in the operation of the ion microprobe by Dr. Jennifer Jackman, then a senior research scientist (physicist) and recently retired from her position as Director General of the Materials Technology Laboratory at the Canada Centre for Mineral and Energy Technology (CANMET), a Canadian government department. Dr. Larocque quickly became adept at the work. According to Dr. Jackman, "Dr. Larocque worked on geological samples which is the most difficult class of materials to analyze by SIMS. She was able to master this technique and produce original, advanced research despite the fact that her own formal training was in a very different field. My own expertise is in the analysis of metallurgical samples, which present entirely different problems, therefore Dr. Larocque, even as a PhD student, was required to resolve many difficult challenges through her own initiative. She was able to develop and advance novel methodologies for analyzing geological materials by SIMS, making her one of only a few researchers in Canada able to utilize this tool effectively for geological research. Her research increased our knowledge and understanding of the mobilization of elements in geological formations … [Dr. Larocque] showed consistent scientific integrity in her research work." [23].

Dr. Jay Hodgson was Dr. Larocque's doctoral thesis supervisor at Queen's University. Dr. Hodgson has an international reputation in mineral-deposits research and retired from Queen's to become Chief Geologist for Barrick Gold Corporation before becoming an independent consultant. He said "During her doctoral studies, Adrienne also became expert in secondary ion mass spectrometry (SIMS). She has no fear of high-tech instruments and quickly and efficiently gets right on with using them for her work.

Personally, I think this is an extremely important attribute in a researcher, since too much current research is controlled by the familiarity of the researcher with certain types of data and data gathering techniques. Geologists who know how to deal with fluid inclusions try to solve all problems with fluid inclusion studies, and isotope geologists do the same with isotope studies. With Adrienne, research is controlled by the problems that she needs to solve, not the techniques that she is familiar with, *because* she is so quick and competent at learning new techniques." [24].

Dr. Larocque's technique development [Larocque *et al.* 1995b; 7] and applied research [Larocque *et al.* 1995a; 7] paved the way for the use of SIMS, and similar techniques like laser-ablation ICP mass spectrometry, in geological studies. The work also has important implications for the formation of shear-hosted gold deposits in greenstone belts [Larocque and Hodgson 1994; 12]. Dr. James Franklin, who at the time was Chief Scientist of the Geological Survey of Canada, was the external referee for Dr. Larocque's PhD thesis defense. He stated at her defense that she had set a new standard for ore deposits research. Dr. Paul Spry, an internationally-recognized mineralogist and Professor of Economic Geology at Iowa State University, declared that "Her work on the mobilization of precious metals during metamorphism is exceptional." [20].

While at Los Alamos National Lab, Dr. Larocque was invited to participate in several research projects because of her expertise in those areas. Dr. Fraser Goff sought her input into work on degassing and deposition of gold at a volcano in Columbia [Goff *et al.* 1994; 7]. Dr. Donald Hickmott invited her collaboration on several studies. One project involved proton-induced X-ray emission (PIXE) analysis to quantify trace elements in sulfides and other minerals [Hickmott *et al.* 2003; 7; Stimac *et al.* 1996; 12]. Another study looked at the redistribution of lead in the Bandelier Tuff via eruptive and post-eruptive processes [Stimac *et al.* 1996; 7]. Dr. Larocque also became involved in ion implantation to create analytical standards for SIMS work [Hickmott *et al.* 1995; 12], and she initiated work on ion implantation of iron-oxide samples. Iron oxides had previously been unrecognized as an important sink for gold in igneous rocks; however, her subsequent analyses of oxide phases in volcanic rocks was important in establishing the roles of iron-oxide phenocrysts and degassed iron-sulfur-oxygen liquids in storing gold in magmas [Larocque *et al.* 2000; Larocque *et al.* 2002; 7].

Soon after arriving at the University of Manitoba, Dr. Larocque organized a special session entitled *Gold in the 21st Century: Exploration, Analysis and Exploitation.* It was held at the Geological Association of Canada – Mineralogical Association of Canada Joint Annual Meeting in Winnipeg [25]. As a young faculty member, Dr. Larocque explored new areas of research, including magmatic and magmatic-hydrothermal ore deposits. Her first work in economic geology (PhD thesis) was on seafloor hydrothermal deposits. It was her interest in gold-rich massive-sulfide deposits that led her to work on other gold-bearing systems. Dr. Larocque was invited to study magmatic-hydrothermal ore minerals from the Bingham Canyon porphyry-copper deposit in Utah by Dr. Marco Einaudi and his student at Stanford [Redmond *et al.* 2000; 12]. Dr. Einaudi is world-renowned for his work on the origin and environmental impacts of mineral deposits. Dr. Larocque also worked on characterization of magmatic sulfides in volcanic rocks around the Bingham Canyon deposit with Dr. Jeffrey Keith and his students at Brigham Young University [Stavast *et al.* 2006; 7]. Dr. Keith, a professor of Geology who is now Associate Academic Vice President at BYU said previously "Adrienne's work is at the forefront of the field... I am impressed that her knowledge of topics in environmental geology and volcanology as well as geochemistry, economic geology, and microanalysis are substantial and much better than most of her

colleagues at a comparable stage." [26]. Dr. Mark Hannington, formerly a research scientist at the Geological Survey of Canada and now the holder of a Research Chair in Economic Geology at the University of Ottawa stated that "As Professor of Geology at the University of Manitoba, Dr. Larocque made significant advances in the fields of economic geology, mineralogy, environmental geology, and volcanology both at the national and international levels." [27].

Because of her growing interest in metals in magmas, it was a natural progression for Dr. Larocque to apply her microbeam expertise to magmatic sulfide deposits in Manitoba that host nickel, copper and platinum-group elements [Larocque and Boulet 1998; 12]. She developed new methodologies for SIMS analysis of iron-titanium oxides to better understand gold partitioning in magmas [Larocque *et al.* 2002; 7]. She also became interested in the behavior of metals during volcanic degassing. Initially, this involved the study of metal-rich phases trapped in vesicles in unaltered volcanic rocks from Mexico. A few other scientists had observed similar occurrences, although mainly in seafloor rocks. However, Dr. Larocque's research established unequivocally that magma degassing can contribute metals to high-level epithermal gold and silver deposits [Larocque *et al.* 2008; 7]. Previously, it was unknown whether metals were sourced from fluids percolating through volcanic rocks or directly from magmatic gases; other studies were insufficient to distinguish the possible sources. According to Dr. Paul Spry, "Dr. Larocque's 2008 study on Volcan Popocatepetl in Mexico was particularly notable because it was one of the first papers that reported the presence of telluride minerals in vesicles that formed during an active volcanic eruption. This important observation relates to my own research on gold telluride deposits and minerals found in such deposits. Her work resolved the long standing question concerning whether the element tellurium was carried in the vapor or liquid phase. My recent experimental studies verified what she discovered in 2008, that tellurium is carried in the vapor phase under ore-forming conditions." [20]. Dr. Larocque's work is important for understanding the genesis of deposits like the McLaughlin mine, the largest gold discovery of the 20th century in California.

Realizing the importance of metal degassing from magmas in the formation of hydrothermal ore deposits, Dr. Larocque sought to understand the processes that governed how and where it happened. She studied suites of volcanic rocks from around the world, including samples from Clear Lake, California. Doing research on rocks with different compositions from a variety of geological settings was crucial to understanding the controls on degassing. Dr. Larocque and her colleagues discovered that destabilization of immiscible sulfide liquids in magmas could supply sulfur and metals to a magmatic volatile phase [Larocque *et al.* 2000; 7]. This has significant implications for understanding the formation of porphyry-copper and epithermal deposits. The research also has important consequences for understanding volcanic fluxes of sulfur and metals to the atmosphere [Larocque *et al.* 1998; 12] and to the hydrosphere [Stimac *et al.* 2004; 7].

While already known for her work on the genesis of ore deposits, Dr. Larocque extended her research into the area of environmental geochemistry of ore deposits. She initiated a research program on mineralogy and geochemistry of mine tailings (Larocque *et al.*, 1995; 12] and the chemistry of acid mine drainage [25]. In 1996, she organized and co-chaired a symposium entitled *Trace Metals in the Environment: From Mobilization to Remediation* with Dr. Pat Rasmussen of Health Canada. From 1996 to 1998, she served as a guest editor of a special issue of *Environmental Geology* arising from the symposium [7]. Dr. James Franklin said that her new line of research "combined her knowledge of these deposits with that gained during her MSc work in surficial geology to investigate aspects of potential environmental contamination

for acid mine drainage. This is a well-known issue in California, for example. This work enabled her to advance the public's awareness of how geological processes may affect everyday life, something that she has continued to emphasize throughout her career." [9].

While on maternity leave in the Philippines, Dr. Larocque became involved in work on the chemistry of the crater lake at Mt. Pinatubo. She and Dr. James Stimac climbed the volcano to collect water samples, analysis of which yielded information about the flux of magmatic gas into the lake [Stimac et al. 2004; 7]. This type of work had been done at other crater lakes to monitor volcanoes for signs of imminent eruption. During sampling of the lake, a potentially hazardous rise in lake level (that could result in catastrophic draining of the lake and the generation of mudflows down-slope) was noticed and reported to Philippine authorities [Stimac *et al.* 2002; 7].

To share the results of her research, Dr. Larocque gave 52 oral and poster presentations at international meetings over the years [12]. This exposure of her findings led to new collaborations with other scientists worldwide. She published 21 papers in international science journals, and wrote articles that appeared in non-refereed media [7]. Although Dr. Larocque only joined Research Gate (an on-line community for researchers in various fields) late last year, her publications have had over 900 views and have been downloaded well over 300 times [28].

Dr. Larocque has worked on a wide variety of geological problems in numerous settings. She has collected and analysed geological materials of every age for sedimentological, mineralogical and geochemical study. For her research projects, Dr. Larocque employed whatever technique allowed her to collect the data needed to solve the problem. As a result, she has experience in all of the following field and analytical methods: collection of sub-bottom and side-scan sonar data from small water craft; mapping of surficial sediments and rocks; collection of sediments (sub-aerial and sub-aqueous), rocks (at surface and underground), and surface waters; sediment-sample preparation (separation of sediments into size fractions by sieving and centrifugation; heavy-mineral separations; grinding); rock-sample preparation (cutting using diamond saws; grinding/pulverizing); X-raying and logging of sediment and rock cores; epoxy-impregnation of unconsolidated samples; thin-section preparation; petrographic analysis in transmitted and reflected light; sample preparation and analysis for scanning-electron microscopy, electron-probe microanalysis, X-ray fluorescence, powder X-ray diffraction, atomic-absorption spectroscopy and secondary-ion mass spectrometry.

Evidence of National and International Recognition of Eminence by Peers

Dr. Larocque carried out field work and data interpretation for her own research program at the Geological Survey of Canada. However, her lake-bottom profiling services also were requested by researchers from federal and provincial government organizations and academia. As a result, Dr. Larocque consulted with other scientists to study lakes and waterways in Ontario, Quebec, British Columbia, Manitoba, Labrador, the St. Lawrence Seaway and the Arctic Archipelago. Because of her expertise, Dr. Larocque was tasked by managers at the Geological Survey to purchase an expensive side-scan sonar system to complement her studies of instability in lake sediments. Dr. Ron DiLabio stated that "Dr. Larocque's work as an undergraduate student on geophysical techniques for 3D mapping of the sediment in the bottom of lakes is still cited today and her methods of compiling and interpreting the seismic records are widely used." [22].

Dr. Larocque became widely recognized for her analytical abilities even before graduating from Queen's University. Dr. Louis Cabri, then a senior research scientist in materials science at CANMET and recipient of numerous awards [29], was external supervisor for Dr. Larocque's PhD research. While still a graduate student, she was invited along with Dr. Cabri to give a short course at the Mineral Deposits Research Unit (MDRU) at the University of British Columbia because of her expertise in SIMS [30]. Shortly afterwards, she alone was invited to present applications of SIMS as part of a short course sponsored by US Society of Economic Geologists [20; 31]. The session chair at one geological conference introduced Dr. Larocque as the "heir apparent to Louis Cabri." Dr. James Franklin stated that "Her doctoral work stands today as preeminent in understanding the processes of gold enrichment in mineral deposits. This work has had wide-ranging economic benefits to the exploration and mining industry." [9].

Because of her expertise with SIMS, Dr. Larocque was recruited to do research on seafloor mineralization with Dr. Mark Hannington [Hannington *et al.* 1995; 7]. According to Dr. Hannington, "In a short time after her Ph.D., Dr. Larocque achieved a remarkable level of distinction for her work, far beyond her immediate peers... Dr. Larocque quickly made significant, internationally recognized advances in each of the diverse fields in which she has worked. This includes acclaimed published works in the areas of geology, mineralogy, and geochemistry... A hallmark of Dr. Larocque's research was mastering and significantly advancing the use of sophisticated instrumental approaches to analysis of geological materials, including then state-of-the art SIMS ion probe techniques (CANMET and Los Alamos). Dr. Larocque's research using these tools contributed directly to fundamental advances in our understanding of the distribution trace metals in the crust and in the environment in general, including in lakes, streams, weathered rocks, mine tailings, volcanic systems and ore deposits. The quality of her research is evidenced by the fact that so many leaders in these fields, from Canada, the U.S. and overseas, have chosen to work with Dr. Larocque and co-author papers with her. Dr. Larocque's work on the mineralogical siting of platinum group elements in ores and rocks is a singular achievement that captured the attention of the international mining industry and presented rare opportunities to combine industry-funded and government-funded research on a topic of critical importance to the Canadian economy. She was rewarded for these achievements by successfully obtaining highly competitive research funding from the Natural Sciences and Engineering Research Council (NSERC, or Canada's equivalent of NSF) while professor at the University of Manitoba." [27].

Dr. Larocque's research on metamorphic remobilization prompted Dr. Paul Spry to seek her input into an important review paper on metamorphosed ore deposits [Marshall *et al.* 1999; 7]. According to Dr. Spry, "In the late 1990s, I was asked to put together a prestigious volume for the Society of Economic Geologists (the world's leading society on the study of ore deposits) entitled 'Metamorphosed and Metamorphogenic Ore Deposits.' This volume appeared as a 'Reviews in Economic Geology' and was co-organized and edited by me, Brian Marshall and Frank Vokes. I asked Adrienne to co-author a paper with my two co-editors, who were regarded as the two leading researchers on the discipline of 'metamorphosed ore deposits' at the time. This speaks volumes to her outstanding reputation in this field at such a young age." [20]. Drs. Marshall and Vokes [31] also sought Dr. Larocque's input into presentations about metamorphosed ore deposits that were given at international meetings [Marshall *et al.* 1998; Marshall *et al.* 1999; 12].

According to Dr. Jeffrey Keith, "I have known Adrienne for most of her career and have watched with admiration both the unselfish service she has given to those around her and the professional recognition that she has developed and maintained. She has distinguished herself broadly during these years... In my current position as Associate Academic Vice President, I see many portfolios of faculty work and applications for university awards – some by very distinguished faculty members. In comparison, Dr. Larocque has distinguished herself on a similar level." [32]. Dr. Keith and Dr. Marco Einaudi, both of whom enlisted Dr. Larocque's input into research on different aspects of magmatic and hydrothermal mineralization at Bingham Canyon, "concur that her work is excellent; there are very few people that have the expertise with SIMS analysis and the specific background with Au analysis to do the type of work that she does." [26].

Although already known for her work on ore deposits, Dr. Larocque quickly established her reputation in environmental geochemistry. Dr. Pat Rasmussen, who co-chaired the symposium on Metals in the Environment in 1996, recounted that "Adrienne was recruited by the Metals in the Environment (MITE) Research Network to be the leader of the Sources Domain in their application for funding to NSERC." The application was successful. According to Dr. Rasmussen, "Adrienne is widely respected by her academic and government colleagues for excellence in research." [33].

Dr. Dan Layton-Matthews stated that "Adrienne broadened her research scope, quickly becoming interested in a diversity of ore deposit types, magmatic processes, environmental remediation, and micro-analytical techniques for chemical and isotopic analysis of minerals. She has made a long-lasting contribution to these fields as evidenced by her current citation indices." [34]. According to Dr. Mark Hannington, "It is common practice in the Earth sciences for researchers to publish in only a few journals close to their interests. Dr. Larocque has published in at least 10 different research journals in widely varying fields from environmental geology, to volcanology to mineralogy; only the most accomplished researchers are able to publish their research across a spectrum of journals with such wide audiences... Dr. Larocque has given more than 50 conference presentations, including invited presentations at widely attended international conferences." [27]. Dr. Larocque also was invited to give many presentations at universities and in government agencies all over Canada and the US, at the expense of the inviting departments [35]. In 1995, Dr. Larocque was a Distinguished Lecturer for the Association of Women Geoscientists, sponsored at that time by Phillips Petroleum [20, 36].

Obtaining research funding is a highly competitive endeavor. Grant proposals are sent to experts in the field for review. While at the University of Manitoba, Dr. Larocque was successful in supporting her research and equipment acquisitions through grants obtained from university, government and industry sources. Some grants were applied for independently; others were sought as part of research consortia [37]. In 2000, Dr. Larocque's operating grant from the National Science and Engineering Research Council of Canada (NSERC) was renewed at the same level, even though she had been on maternity leave, then a reduced appointment (60%), since 1998. This continuing support of a researcher on a near half-time appointment indicates the high regard officials at NSERC had for the quality of her work [38].

Reviewing manuscripts submitted to science journals is an important part of the peer review process. Journal editors solicit reviews from known experts in the field. Between 1994 and 2002, professional journals in North America and Europe solicited reviews for more than 14 manuscripts from Dr. Larocque [39, 40]. Between 1999 and 2003, she reviewed 4 grant proposals submitted to national granting agencies

in the US (National Science Foundation) and Canada (NSERC) [39]. Dr. Mark Hannington said "Dr. Larocque is also acknowledged by her peers to be an expert evaluator of her field, serving as a scientific reviewer for journals and a reviewer of grant applications for NSF and NSERC." [27]. Dr. Larocque also was recruited to serve on NSERC's Committee on Research Partnerships. According to Isabelle Blain, then Corporate Secretary of the CRP, "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." [41].

In academic settings, the decision to award promotion is based on a candidate's research, teaching and service contributions. In addition to her research accomplishments, Dr. Larocque had excellent student evaluations and letters of support for the courses she taught [42, 43]. Dr. James Franklin said "She paid particular attention to ensuring that her students understood some of the more complex geological interactions that attended various geological processes. Introductory – level courses are particularly challenging to develop, as most university students have no background in the Earth Sciences in Canada. Her dedication to the quality of her teaching became well known nationally." [9]. Dr. Larocque also was active in professional societies [44] and provided service to the profession, the university and her department [16]. Her application for promotion from Assistant to Associate Professor was considered an early one because of her maternity leave and partial leave of absence. Nonetheless, Dr. Larocque's contributions in research, teaching and service [45] led to her being promoted to Associate Professor in 2001 [17].

Dr. Jeff Keith of Brigham Young University stated that "the volume and quality of her work and service (and teaching) would certainly qualify her for promotion at our university." [26]. His evaluation was based on Dr. Larocque's work on mineral deposits. In 2000, Drs. James Brophy and Bruce Douglas of the Department of Geological Sciences at Indiana University wrote to Dr. Larocque to encourage her to apply for a faculty position in environmental geology [46]. Dr. Jennifer Jackman attempted on several occasions to recruit Dr. Larocque to take over the SIMS lab at CANMET. Dr. Paul Spry describes her as a "world-class mineralogist." [20]. These examples illustrate the high regard senior researchers had for Dr. Larocque's work, all in different fields.

Dr. Larocque is acknowledged by her peers to be knowledgeable or expert in the fields of Quaternary sedimentology (particularly in glaciolacustrine and glaciomarine environments), till geochemistry, ore mineral identification and characterization, clay-mineral identification and analysis, mineralogy and geochemistry of hydrothermal and magmatic-segregation ore deposits, metals in magmas, exploration geochemistry, environmental geochemistry and secondary-ion mass spectrometry. Perhaps the most exciting evidence of recognition of Dr. Larocque's scholarly achievements came when she and her colleagues were awarded the Hawley Medal by the Mineralogical Association of Canada for the best paper to appear in *Canadian Mineralogist* in 2000 [47]. Furthermore, in 2002 Dr. Larocque was nominated for the Young Scientist Award of the Mineralogical Association of Canada [48]. It is given to a young scientist who has made a significant international research contribution in a promising start to a scientific career. According to a committee member, she placed in the top three.

Other Activities in Science and Education

While a postdoctoral fellow at Los Alamos National Lab, Dr. Larocque initiated a survey to explore the experiences of women who had done graduate studies in geosciences. Her interest was an outgrowth of

her participation in a conference session on Women in Geoscience at the Geological Association of Canada – Mineralogical Association of Canada joint annual meeting [24]. Respondents mainly were from the US and Canada, although some lived overseas. The purpose in doing the survey was to understand better the cause of the "leaking pipeline" in which fewer female students go on to graduate studies in geoscience relative to male students. Specifically, Dr. Larocque wanted to learn what strategies successful women had used to overcome the obstacles they faced. She received many responses, and published the results of the survey in *Gaea* (the Newsletter of the Association for Women Geoscientists) and in *Geoscience Canada* [49].

While at the University of Manitoba, Dr. Larocque worked diligently to inspire and educate students in and out of the classroom. Her teaching evaluations [50] demonstrate her capability as a teacher at the post-secondary level. Letters of recommendation also confirm her commitment to her students' professional and personal development. Ms. Michelle Nicolas, a former graduate student supervised by Dr. Larocque, stated that Dr. Larocque "demands excellence from her students, and instills a sense of pride in each student as they learn from her. She encourages each student and helps them when needed, all the while giving them the room they need to learn and grow at their own pace… every student who has benefited from taking one of Dr. Larocque's classes leaves with a sense of accomplishment and true understanding of the concepts taught. Dr. Larocque knows that all students, regardless of their previous academic performance, are capable of learning, it [is] just a matter of finding what learning method works best for them, in order to assure academic success." [51].

Dr. Daniel Layton-Matthews said that "Her teaching style was very organized, concise and taught with enthusiasm. If questioned during lecture, Adrienne would spend the time during class to explain the theory until the student clearly understood the answer. If this was not enough, or the student did not feel comfortable asking questions in class, Adrienne was always willing to spend time out of class talking about her lectures. Her office door was always open, and many students (including myself) would often approach her with questions on other classes or career advice." [34]. Ms. Shastri Ramnath was instructed and supervised by Dr. Larocque and is now President and Principal Geologist for Orix Geoscience. Describing Dr. Larocque, she said "I have never seen someone get so excited about learning new things and teaching them to others… She really made science so interesting and exciting! I found that she did the same in class as well… I appreciated the simplicity to which she could explain very complex theories as I was able to understand the concepts with context in the bigger picture. I finally was able to learn about geochemistry, a topic that had intimidated me before I took Dr. Larocque's class." [52].

Dr. Michelle Huminicki, a faculty member at Brandon University who was taught and supervised at the undergraduate level by Dr. Larocque said "I first knew Dr. Larocque when she was teaching an advanced second year Geochemistry course at the University of Manitoba, Canada. Not only was the course material well researched, prepared, and presented but both lab work and class lectures provided practical as well as theoretical aspects vital to the background of any beginning (or advanced) earth scientist. Her knowledge and excellent ability to teach made for a very interesting and valuable course. In January 2000, Dr. Larocque also taught a third and fourth year Mineral Deposits course covering a diverse range of deposit types, mineralization, and processes. While covering such a large number of deposits, the thoroughness and attention to detail was always there. As a professor, Dr. Larocque encouraged group interaction and class presentations, which are essential to the learning process. She was an asset to the Department of Geological Sciences at the University of Manitoba and was more than well respected and

appreciated by her students… I personally would not have the confidence and knowledge to be the geologist I am today if it weren't for Dr. Larocque. Not only did she help with academics and research, but she would also help her students gain contacts and refer them only to the best places." [53]. While pursuing her MSC degree, Dr. Huminicki sent Dr. Larocque an e-mail message in which she stated "I wanted to thank you for the ore deposits course you taught… You covered everything and summarized it beautifully (I was letting people in industry copy your notes to help them out). From the hydrothermal fluids to ore deposits in space and time to VMS, MVT, Sedex, Porphyry, etc., it became a review for me because you did such a good job at teaching it." [54].

Ms. Sarah Mearon, a licensed Professional Geologist and environmental consultant in the State of California, did her undergraduate degree at the University of Manitoba and graduate studies at Stanford. She said "Dr. Larocque is an outstanding educator, scientist, and mentor who stands out as one of the most effective and memorable teachers in my educational history. Her class was intensive and academically challenging, but it was clear that she really went the extra mile to ensure her students fully understood the material and would be able to use it as a building block for other courses in the curriculum. Dr. Larocque's teaching style was informative, interactive, and always exciting. Her influence extended well beyond the duration of that class. She continued to occupy a prominent position as a well-known and well-respected mentor within the department throughout my time there. Although my undergraduate thesis project was on a different topic (petroleum exploration), I took such an interest in her class that I was appointed the teaching assistant (TA) for the class in my fourth year of study." [55]. Mr. Brian Skanderbeg, another graduate of the University of Manitoba, said "Her very approachable nature and genuine interest in a student's well-being resulted in my seeking her for advice. She posed key questions and eventually led me to make the decision to pursue geology as a degree and career. As a lecturer, Dr. Larocque taught me more in any single course than any of my other professors and more importantly provided a framework for learning that I still follow today. Her lecturing style and preparation allowed students to focus on the important concepts. The courses she led were extremely challenging and required much time and effort, however in the end prepared us for the future. In summary, she is an exceptionally qualified educator. Later during my undergraduate years, summer jobs became a necessity in terms of geological experience and finance. Adrienne went beyond her call as a professor in an attempt to guide me in finding employment… Adrienne played a very significant role in my success as a geologist and professional… She has a passion and talent for teaching and I would recommend her for all roles that are aligned with this." [56].

Even students not enrolled in Geological Sciences at the University of Manitoba valued Dr. Larocque's teaching. Dr. Lisa Friedrich, who took Dr. Larocque's Principles of Geochemistry class in her second year, shared the following anecdote: "A friend of mine that I haven't seen in at least 4 years and I were talking and when I told him that I was back at U of M doing a PhD in geology, he asked if you were still teaching! I had forgotten that he took a first year class with you. He said that in his 5 years at university, you were 'by far the best prof' he had… He said he really enjoyed how excited you were about the subject you were teaching and that it rubbed off on the students. I told him I thought the same thing!" [57].

Ironically, Dr. Larocque experienced some of the challenges that respondents to her survey spoke of when circumstances forced her to choose between her career and her family's wellbeing. After the birth of her second child, and seeing that there was a low probability that a faculty position would become available

for her husband (who also has a PhD in Geology) in her department, she left the University of Manitoba and followed her husband to the Philippines where he had been posted by his employer.

While in the Philippines, Dr. Larocque gave many science presentations at her children's school and pre-school. When her family relocated to Indonesia, Dr. Larocque began teaching Science at several international schools, on a part-time or substitute basis [21]. Initially, she taught at the secondary level at New Zealand International School [58]. Ms. Maureen Phillips, Head of Secondary and her immediate supervisor, said of Dr. Larocque "Her teaching in the Sciences resulted in a demonstrable flurry of excitement and interest from students, many of whom had previously struggled with the subjects she was teaching… she undoubtedly raised the standard of teaching and learning at the school, resulting in the best results the school had ever enjoyed in her teaching subjects. Dr. Larocque set high standards for her students and we had the pleasure of seeing students attain those standards and love what they were learning as well. It was encouraging to see them go to great lengths to deliver work of the highest quality for her." [59].

Dr. Larocque was later offered a full-time position at Jakarta International School [60], but declined because she already had accepted a part-time position at ACG International School [61]; however, she taught as a substitute teacher at JIS throughout her time in Indonesia. Senior students at both ACGIS and New Zealand International School take the University of Cambridge International Exams. Jakarta International School offers both Advanced Placement and International Baccalaureate programs. As a result, Dr. Larocque is familiar with the standards of IGCSE, IB and AP Science curricula.

Mrs. Jude Soper was Principal at ACG International School and Dr. Larocque's supervisor when she taught there. She said "Addie [as Dr. Larocque is known to some] has a passion for teaching Science. She engages students through the use of humour and storytelling, and always strives to make material relevant. Addie's animated personality helps students get excited about the topics she teaches. Her obvious concern for all of her students allowed her to develop close relationships with them. Addie encouraged independent learning, particularly with senior students. In all of her classes, she adjusted her approach when necessary to cater for individual student's needs… Addie demonstrated her commitment to professional development by attending a Chemistry Teacher's course sponsored by IGCSE and participating positively in yearly, in-class appraisals of her teaching. In addition to her official teaching duties, Addie identified and ordered necessary equipment and sketched out a plan for our new Science laboratory. She routinely volunteered in Primary classes to share her expertise in and enthusiasm for Science with the students and support her colleagues at all levels… Addie was active in volunteer work in Jakarta, and she was responsible for developing a relationship between students and staff of ACGIS and members of Yayasan Kampung Kids. Addie organized field trips and tutoring sessions for our students at the Kampung Kids community center… Beyond her official duties, she never hesitated to help out in any way that might benefit the students, staff or parents at ACG International School." [62].

While only a substitute teacher at Jakarta International School, Dr. Larocque had a positive impact on students there. Mr. Greg Spechalske, a former Science teacher for whom Dr. Larocque substituted most often, said "Addie has come to my rescue on numerous occasions as a substitute teacher for my high school science classes. In this capacity I have found her to be extremely dependable, creative, versatile, knowledgeable and enthusiastic; to name a few of her vast range of professionally valuable qualities… More specifically, this past school year, I was to be gone during a critical unit in my AP Environmental

Science class. Having arranged Addie well in advance, we coordinated the week of lessons. The feedback from the students was very positive and supportive of Addie's competence and confidence in the classroom. Additionally, the students benefited from Addie's advanced knowledge and ability to communicate these concepts to a high school level. They also commented positively on her great classroom personality and energy. They had obviously had a very positive learning experience." [63]. Mrs. Rohini Moghe, who was Substitute Coordinator at JIS, said that "She is a conscientious teacher, is very organized and has always been eager to work. Adrienne has shown professional attitude towards her work and I find her extremely dependable and competent in conducting activities in the classes… I am happy to note the positive feedback I have received about her work from various members of faculty, students and parents." [64].

In 2005, Dr. Larocque began researching the connection between diet and health, to improve her own wellness. Her experiences have been published on the website of the Nutrition and Metabolism Society [65]. Dr. Richard Feinman, a professor of biochemistry at SUNY Downstate Medical Center, expressed interest in having her do a postdoctoral fellowship in Biochemistry; unfortunately, this was not feasible because she was living overseas at the time. However, in 2009 Dr. Larocque was recruited to become the Associate Director of the Healthy Nation Coalition, a not-for-profit group of scientists, dietitians and medical professionals dedicated to having dietary guidelines in the US based on sound science [66].

Dr. Larocque has devoted considerable effort to educating lay people about the importance of proper diet in achieving and maintaining good health. She wrote many articles for Suite101.com about wellness (as well as articles about Science to support high-school student learning) [67]. She also had several articles published in the Jakarta Post in Indonesia. While still living in Jakarta, Dr. Larocque was invited to write monthly health-related articles for High End Magazine, an upscale English-language magazine there [67]. She arranged for all proceeds from her articles to be donated to the feeding program for poor children at Yayasan Kampung Kids [68], a charity that she volunteered with when living in Indonesia. Dr. Larocque continues to write for High End and to donate the proceeds to Kampung Kids.

Since her family's repatriation, Dr. Larocque has been active volunteering in schools in Santa Rosa where she has given many presentations about science to children of all ages. "Dr. Addie," as she is known to the students, has talked about volcanoes, earthquakes and fossils at Madrone Elementary School. She also did weekly presentations about all aspects of Science in the Kindergarten class at Madrone. At Rincon Valley Middle School, Dr. Addie taught classes about atoms, elements, the Periodic Table and chemical bonding. She also gave a Career Day presentation there. Dr. Larocque has given many presentations in Earth Science classes at Maria Carrillo High School, in addition to sharing her overseas experiences with freshman Humanities classes.

Mrs. Gayle Turner, the Kindy teacher at Madrone, said the following about Dr. Larocque: "Although she came into my room as a science teacher, she always been much more than that and was an integral part of our class. She has not only made it possible for these students to learn hands on science from an expert who has lived it, but she did it in a manner that made it accessible to every student, no matter what their abilities... For her, working with kids is not a job, it is life… Addie has the instinct for knowing exactly what each and every student needs… She is keenly devoted to our class and our students and is an absolute delight to be around… she understood what being in a classroom and working with children was all about. Always the needs of the child came first. She is well organized, compassionate, understanding

and knows exactly what to do to help each student reach their goals and achieve their full potential… She is a hard worker, instinctively knows what to do and always brings out the best in those fortunate enough to work with her." [69].

Dr. James Franklin said "I know of no other person who has such a rich background in earth science, and who is so able to communicate the excitement and value of knowing about our earth to students of all ages. Hers' is a rare talent amongst scientific researchers…to be able to excite students about the basic earth processes operating around us, while at the same time remaining a world-class expert in so many aspects of geoscience." [9].

List of Supporting Documents and Links:

Copies of all of the documents listed below are located in the appendices, as indicated. Originals are available for viewing upon request.

[1] http://www.earthsci.carleton.ca/future-students/graduate/ottawa-carleton-geoscience-centre

[2] Transcript from University of Western Ontario (Appendix I).

[3] Transcript from Queen's University (Appendix I).

[4] http://www.topuniversities.com/where-to-study/north-america/canada/top-universities-canada-province-20132014

[5] Academic Credentials Report from Foreign Credentials Service of America (Appendix I).

[6] Educational and Work Experience in Earth Science (Appendix I).

[7] List of Earth Science publications (Appendix II).

[8] Letter from Michel Bouchard of Audrey Resources in support of grant application to NSERC (Appendix II).

[9] Letter from Dr. James Franklin, former Chief Scientist of the Geological Survey of Canada, in support of Dr. Larocque's application for Eminence Credential (Appendix IV).

[10] http://www.lanl.gov/careers/career-options/postdoctoral-research/postdoc-program/postdoc-appointment-types.php

[11] Letter of verification of employment at Los Alamos National Laboratory.

[12] List of presentations at professional meetings (Appendix II).

[13] http://www.prnewswire.co.uk/news-releases/thomson-scientific-analyzes-10-years-of-geology-research-to-rank-the-most-cited-published-papers-153465745.html

[14] List of courses taught at University of Manitoba. This includes undergraduate and graduate courses (Appendix III).

[15] List of students supervised at University of Manitoba (Appendix III).

[16] List of professional committees and university service (Appendix II).

[17] Letter from President Szathmáry of the University of Manitoba announcing Dr. Larocque's promotion from Assistant to Associate Professor (Appendix I).

[18] Letter from Dr. Roger Mitchell, President of Mineralogical Association of Canada, thanking Dr. Larocque for agreeing to become MAC Short Course Coordinator (Appendix II).

[19] http://www.iagod.org/node/17#wgom

[20] Letter from Dr. Paul Spry of Iowa State University written in support of Dr. Larocque's application for Eminence Credential (Appendix IV).

[21] List of courses taught at international schools (Appendix III).

[22] Letter from Dr. Ron DiLabio, former Chief of Quaternary Geology Subdivision (retired) in Terrain Science Division and Dr. Larocque's MSc thesis co-supervisor (Appendix IV).

[23] Letter from Dr. Jennifer Jackman, formerly of the Canada Center for Mineral and Energy Technology, written in support of Dr. Larocque's application for Eminence Credential (Appendix IV).

[24] Letter from Dr. Jay Hodgson in support of Dr. Larocque's application for Eminence Credential (Appendix IV). Dr. Hodgson was Dr. Larocque's PhD supervisor at Queen's University. He took early retirement from Queen's to become Chief Geologist at Barrick Gold Corporation. He now is an independent consultant to mineral exploration and mining companies worldwide.

[25] List of presentations in short courses, symposia and special sessions (Appendix II).

[26] Letter from Dr. Jeffrey Keith, Professor of Geology at Brigham Young University in Utah, in support of Dr. Larocque's application for promotion at the University of Manitoba (Appendix IV).

[27] Letter from Dr. Mark Hannington, formerly a research scientist at the Geological Survey of Canada and currently the holder of a research chair in Economic Geology endowed by Goldcorp at the University of Ottawa (Appendix IV).

[28] https://www.researchgate.net/profile/Adrienne_Larocque

[29] http://en.wikipedia.org/wiki/Louis_J._Cabri

[30] List of participants at Mineral Deposits Research Unit Short Course.

[31] http://www.segweb.org/store_info/REV/REV-11-Additional-Product-Info.pdf (scroll down for biographies of contributors).

[32] Letter from Dr. Jeffrey Keith, Associate Academic Vice President at Brigham Young University, in support of Dr. Larocque's application for Eminence Credential (Appendix IV).

[33] Letter from Dr. Pat Rasmussen of Health Canada in support of Dr. Larocque's application for promotion at the University of Manitoba (Appendix IV).

[34] Letter of recommendation from Dr. Dan Layton-Matthews written in support of Dr. Larocque's application for Eminence Credential (Appendix IV).

[35] List of invited seminars and guest lectures (Appendix II).

[36] Letter of thanks from President of Association of Women Geoscientists for serving as Phillips-AWG Distinguished Lecturer (Appendix II).

[37] List of research grants obtained (Appendix II).

[38] Memo from NSERC regarding renewal of operating grant (Appendix II).

[39] List of reviews solicited by international professional journals and granting agencies (Appendix II).

[40] Letter from Dr. Robert Zierenberg of UC Davis requesting Dr. Larocque to review a paper for *Economic Geology* (Appendix II).

[41] Letter of thanks from Isabelle Blain, Corporate Secretary of NSERC Committee on Research Partnerships (Appendix II).

[42] Sample student evaluations from University of Manitoba, including analysis, raw data and student comments (Appendix III).

[43] Letters of recommendation from former students written in support of Dr. Larocque's application for Eminence Credential and for promotion at the University of Manitoba (Appendix IV).

[44] List of professional affiliations and professional courses attended (Appendix II).

[45] Annual Reports from University of Manitoba (Appendix I).

[46] Letter from Dr. James Brophy and Dr. Bruce Douglas of the Department of Geological Sciences at Indiana University encouraging Dr. Larocque to apply for a faculty position there in environmental geology (Appendix II).

[47] Hawley Medal Citation (Appendix II).

[48] http://www.mineralogicalassociation.ca/index.php?p=54

[49] Women in Geoscience articles from *Gaea* and *Geoscience Canada* (Appendix V).

[50] Student evaluations for courses taught by Dr. Larocque at the University of Manitoba (Appendix III).

[51] Letter of recommendation from Ms. Michelle Nicolas in support of Dr. Larocque's application for Eminence Credential (Appendix IV).

[52] Letter of recommendation from Ms. Shastri Ramnath in support of Dr. Larocque's application for Eminence Credential (Appendix IV).

[53] Letter of recommendation from Michelle Huminicki in support of Dr. Larocque's application for Eminence Credential (Appendix IV).

[54] E-mail message from Dr. Michelle Huminicki regarding the value of the senior undergraduate course in mineral deposits that Dr. Larocque taught.

[55] Letter from Ms. Sarah Mearon (MSc, P Geo in the state of California) in support of Dr. Larocque's application for Eminence Credential. Ms. Mearon was an undergraduate student at the University of Manitoba who later completed her MSc at Stanford.

[56] Letter from Mr. Brian Skanderbeg, MSc, in support of Dr. Larocque's application for Eminence Credential.

[57] E-mail message from Dr. Lisa Friedrich recounting a friend's positive experience in one of Dr. Larocque's introductory geology classes.

[58] http://nzis.school.nz/what/secondary-school/

[59] Letter from Mrs. Maureen Phillips, former Head of Secondary at New Zealand International School in Jakarta, and Dr. Larocque's immediate supervisor.

[60] http://www.jisedu.or.id/learning/highschool/index.aspx

[61] http://www.acgedu.com/ind/about-us/curriculum-overview

[62] Letter from Mrs. Jude Soper, former Principal at ACG International School in Jakarta (Appendix VI).

[63] Letter from Mr. Greg Spechalske who formerly taught at Jakarta International School and now teaches at an international school in Japan. He frequently requested Dr. Larocque to substitute for him.

[64] Letter from Mrs. Rohini Moghe, former Substitute Coordinator at Jakarta International School. Mrs. Moghe now lives in India.

[65] http://www.nmsociety.org/docs/RealPeople/How_I_Got_Skinny_Eating_Fat.pdf : This article was previously posted on www.obgyn.net, a website with health articles typically authored by health and medical professionals (doctors, nurses, etc.).

[66] http://www.forahealthynation.org/p/who-we-are.html

[67] List of articles in newspapers and magazines (Appendix VI).

[68] www.kampungkids.org

[69] Letter from Mrs. Gayle Turner, Kindergarten teacher at Madrone Elementary School in Santa Rosa, regarding Dr. Larocque's volunteering in her classroom.

APPENDICES

I. Educational and Employment History in Earth Science

a. MSc transcript
b. PhD transcript
c. Copy of Academic Credentials Report from Foreign Credentials Services of America. The original report has already been reviewed by the Commission on Teacher Credentialing as part of Dr. Larocque's application for an Emergency 30 Day Substitute Teaching Permit.
d. List of Educational and Work Experience in Earth Science
e. Letter of verification of employment at Los Alamos National Laboratory
f. Annual Reports from the University of Manitoba (see comments by department head)
g. Letter from President Szathmáry of the University of Manitoba confirming Dr. Larocque's promotion to Associate Professor

II. Research and Service Accomplishments

a. List of publications in refereed journals
b. Hawley Medal Citation
c. List of presentations at professional meetings
d. List of presentations in short courses and symposia
e. List of participants at Mineral Deposits Research Unit Short Course
f. List of invited seminars and guest lectures
g. Letter of thanks from President of Association of Women Geoscientists for serving as Phillips-AWG Distinguished Lecturer
h. List of research grants obtained
i. Letter from Michel Bouchard regarding company support for NSERC grant application
j. Memo from NSERC regarding renewal of operating grant
k. Letter from NSERC regarding membership on Committee on Research Partnerships
l. Professional and academic service
m. Letter from MAC president to Dr. Larocque regarding her acceptance of position as Short Course Coordinator
n. Professional affiliations, Professional courses attended, Professional development
o. List of reviews of grant proposals and manuscripts submitted to journals
p. Letter from Dr. Robert Zierenberg regarding review of paper
q. Letter from University of Indiana soliciting an application from Dr. Larocque for a faculty position there

III. Teaching Accomplishments

a. List of courses taught at University of Manitoba
b. List of student theses supervised: This includes undergraduate and graduate students whose thesis research Dr. Larocque supervised. During the period when she was on maternity leave, it was required for students to have a co-supervisor on campus. However, Dr. Larocque was the primary supervisor in these cases.

c. U of M course syllabi:
   i. Earth and Planetary Science (7.124)
   ii. Earth and the Environment (7.132)
   iii. Principles of Inorganic Geochemistry (7.277)
   iv. Mineral Deposits (7.430)
d. Analysis of teaching evaluations: At the University of Manitoba, students are requested (but not compelled) to complete anonymous evaluations of their instructors at the end of each course. Two examples are included. The first is for Earth and the Environment (7.132). The second is for Principles in Inorganic Geochemistry (7.277), a demanding course required by all students in Geological Sciences.
e. Written comments from student evaluations for 7.277
f. Raw teaching evaluations
g. E-mail from former student Dr. Michelle Huminicki regarding teaching excellence in Mineral Deposits course and value of course notes for graduate study
h. E-mail from former student Dr. Lisa Friedrich describing conversation with another former student who was not in Geological Sciences program

IV. Letters of Recommendation

a. Letters written specifically in support of Dr. Larocque's application for an Eminence Credential:

i. Dr. Jennifer Jackman was a senior research scientist (physicist) and recently retired as Director General of the Materials Technology Laboratory at the Canada Centre for Mineral and Energy Technology (CANMET), a Canadian government department. She instructed Dr. Larocque in the operation of the ion microprobe (SIMS).

ii. Dr. James Franklin, formerly Chief Scientist of the Geological Survey of Canada, was Dr. Larocque's co-supervisor during her summer employment in Mineral Resources Division at the GSC and external referee for her doctoral defense. He world-renowned for his work on mineral deposits.

iii. Dr. Paul Spry is a Professor of Economic Geology and former Chairman of the Department of Geological and Atmospheric Sciences at Iowa State University. He is the author of countless articles and books about mineralogy and ore deposits and was the Thayer Lindsley Distinguished Lecturer for the Society of Economic Geologists in 2013. Dr. Spry has been on many editorial boards for scientific journals and is the Chairman of the Working Group on Ores and Metamorphism, part of the International Association on the Genesis of Ore Deposits.

iv. Dr. Mark Hannington was formerly a research scientist at the Geological Survey of Canada and is currently the holder of a research chair in Economic Geology endowed by Goldcorp at the University of Ottawa.

v. Dr. Jay Hodgson was Dr. Larocque's PhD supervisor at Queen's University. He took early retirement from Queen's to become Chief Geologist for Barrick Gold Corporation, and is now an independent consultant to mining and mineral exploration companies worldwide.

vi. Dr. Jeffrey Keith is Associate Academic Vice President of Brigham Young University. He was Dr. Larocque's research colleague and co-recipient of the Hawley Medal of the Mineralogical Association of Canada.

vii. Dr. Ron DiLabio is the former Chief of the Quaternary Geology Subdivision (now retired) in Terrain Sciences Division of the Geological Survey of Canada. He served as Dr. Larocque's MSc thesis co-supervisor.

viii. Ms. Michelle (Boulet) Nicolas (MSc) was one of Dr. Larocque's graduate students and is now Chief Geologist for Sedimentary Geoscience at the Manitoba Geological Survey (http://ca.linkedin.com/pub/michelle-nicolas/5b/188/824).

ix. Ms. Shastri Ramnath (MSc, MBA) was an undergraduate student who took Dr. Larocque's 2nd-year Geochemistry course and did her senior thesis under Dr. Larocque's supervision. She is President and Principal Geoscientist at Orix Geoscience Inc. (http://ca.linkedin.com/pub/shastri-ramnath-msc-mba-p-geo/29/484/252).

x. Dr. Daniel Layton-Matthews was an undergraduate who took Dr. Larocque's 2nd-year Geochemistry course and did his senior thesis under her supervision. He is now an Associate Professor at Queen's University in Canada (http://ca.linkedin.com/pub/dan-layton-matthews/44/b82/9b7).

xi. Dr. Michelle Huminicki was an undergraduate who took 2nd-year Geochemistry and 4th-year Mineral Deposits courses with Dr. Larocque. She also worked for Dr. Larocque for one summer and did her senior thesis under Dr. Larocque's supervision. She is currently an Instructional Associate at Brandon University in Canada (http://www.brandonu.ca/geology/faculty-staff/m-huminicki/).

xii. Ms. Sarah Mearon was an undergraduate student at the University of Manitoba who later completed her MSc at Stanford. She is a licensed Professional Geologist and environmental consultant in the state of California.

xiii. Mr. Brian Skanderbeg was an undergraduate student at the University of Manitoba who went on to complete his MSc at Rhodes University in Grahamstown, South Africa. He is now Senior Vice President and Chief Operating Officer for Claude Resources Inc., a mining company in Canada.

b. Letters regarding teaching at international schools:

i. Mrs. Maureen Phillips was Head of Secondary at New Zealand International School in Jakarta, and Dr. Larocque's immediate supervisor there.

ii. Mrs. Jude Soper was the Principal of ACG International School in Jakarta, and the person who recruited Dr. Larocque to teach at the high school there. Ms. Soper has left Indonesia. Her current e-mail address is judesoper1@gmail.com and her cell number is +64279655281.

iii. Mrs. Rohini Moghe was the Substitute Coordinator at Jakarta International School (effectively the American school in Jakarta) who organized all substitute teaching assignments for this very large school. Ms. Moghe has left Indonesia; her current e-mail address is rcmoghe@gmail.com.

iv. Mr. Greg Spechalske was the teacher for whom Dr. Larocque substituted most often. He now teaches in Japan; he can be reached at gspechalske@asij.ac.jp or spechalske@mac.com.

c. **Letters that were written in support of Dr. Larocque's postdoctoral application to Los Alamos National Lab and application for promotion at the University of Manitoba.**
   i. Dr. Pat Rasmussen of Health Canada was Dr. Larocque's research colleague in the area of metals in the environment.
   ii. Major Paul Keddy was an undergraduate student (not in the Geological Sciences program) who took Dr. Larocque's introductory Earth and Planetary Science course. He is now a Colonel.

V. Sample Research Publications

Papers marked by an asterisk in the List of Publications are included in this section.

VI. Contributions Since Leaving Active Research

a. List of courses taught at international schools
b. Other Publications - List of articles by Dr. Larocque that appeared in newspapers, magazines and on websites
c. Sample articles from High End Magazine

Publications, Awards, and Accomplishments in the Field of Geology

LIST OF PUBLICATIONS IN EARTH SCIENCES

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 Popocatépetl, Mexico. **Invited** for special issue of in *Journal of Volcanology and Geothermal Research* on Popocatépetl 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 Popocatépetl, 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 Mobrun 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 Mobrun 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 Mobrun 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 Mobrun 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 Mobrun 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.

***Larocque, A.C.L.** 1994. Challenges and rewards of graduate studies in the geosciences: A woman's perspective. *Geoscience Canada*, v. 21, no. 3, 129-132.

***Larocque, A.** 1994. Lack of confidence is our most common problem. *Gaea*, v. 17, no. 4, p. 9.

***Larocque, A.** 1994. More results from the geoscience questionnaire. *Gaea*, v. 17, no. 5, p. 6.

***Larocque, A.** 1994. How to survive grad school. *Gaea*, v. 17, no. 6, p. 10.

***Larocque, A.** 1994. Success strategies in graduate school and beyond. Fourth Annual Women's Supplement to *The Manitoban*, v. 82, no. 18, pp. 16-17.

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 Mobrun 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 twofold: (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 Gentlement,

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 analytica.

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

PRESENTATIONS AT PROFESSIONAL MEETINGS

Names of student co-authors 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.

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 Popocatépetl, Mexico. Submitted for 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 Popocatépetl, 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 a 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 Popocatépetl, 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 Popocatépetl, Mexico: Implications for metal budgets of calc-alkaline volcanoes. *IAVCEI* General Assembly, Puerto Vallarta, Mexico, p. 62.

Athanasopoulos, P., **Larocque, A.C.L.**, Stimac, J.A., and Siebe, C. 1996. Recent eruptions from Volcán Popocatépetl 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. Kríbek 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. Kríbek 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 Mobrun 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 Mobrun 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 Mobrun 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 Mobrun 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 Mobrun 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 Popocatépetl, 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. Presention 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 presention** 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 Mobrun 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 Mobrun 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 Mobrun VMS Deposit, Noranda, Quebec: Implications for the Formation of Bousquet-Type Deposits. **Invited presentation**, Toronto Discussion Group, Toronto, ON, March 9, 1992.

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May 30, 1995

Dr. Adrienne C. L. Larocque
Department of Geological Sciences
University of Manitoba
Winnipeg, Manitoba R3T 2N2
Canada

Dear Dr. Larocque:

On behalf of the AWG Foundation and Phillips Petroleum Company I would like to thank you for your contribution as a Phillips-AWG Distinguished Lecturer for 1994-1995. Your March lectures for the students and faculty in the Geological Sciences Department at Iowa State University have fulfilled two AWG goals, to encourage the participation of women in the geosciences and to exchange educational, technical, and professional information. We hope that the experience was a positive one for you, in keeping with AWG's third goal to enhance the professional growth and advancement of women in the geosciences.

The Speakers Bureau and the Phillips-AWG Distinguished Lectures would not be possible without the dedication of professional women geoscientists like you.

Sincerely,

Lois

Lois K. Ongley
President,
AWG Foundation

lko/shc

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

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APR 07 2000

MESSAGE TO APPLICANT

MESSAGE AU CANDIDAT

INSTRUCTIONS TO COMMITTEES

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

INSTRUCTIONS AUX COMITÉS

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	

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.

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

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Continuer au verso si nécessaire

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350 Albert Street, Ottawa, Canada K1A 1H5
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Natural Sciences and Engineering Research Council of Canada • Conseil de recherches en sciences naturelles et en génie du Canada

NSERC
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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

Isabelle Blain
Corporate Secretary

Canada

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SERVICE

PROFESSIONAL SERVICE:

2002-2004: Secretary for IAGOD's Working Group on Ores and Metamorphism

1997-2000: One of two departmental representatives on Mineral Exploration Liason Committee.

1997-1999: NSERC Research Partnerships Committee.

1996-2001: Regional Councillor, Earth and Environmental Science Division of Geological Association of Canada

1995-1998: Short-Course Coordinator, Mineralogical Association of Canada.

1994-2001: Scientific correspondent, *Chronique de la Recherche Minère*.

1994-2001: Western Canada Representative, IAGOD Working Group on Ores and Metamorphism.

UNIVERSITY SERVICE:

1997/98: Promotions committee in Faculty of Engineering

1996: Advisory committee on appointment of faculty member in Department of Electrical and Computer Engineering

1996: Participated in University of Manitoba Evening of Excellence (part of Information Days)

1996-98: Environmental Science Program committee and subcommittee on introductory courses

1995/96: Advisory committee on appointment of head of Department of Civil and Geological Engineering

DEPARTMENTAL SERVICE:

2000: Introduction of new half-year course, 7.136 *Environmental Earth Science*

2000: Chair for Hard Rock session of WIUGC hosted by U of M grad students

1997/98: Advisory committee on selection of Head for Geological Sciences

1997/98: Introduction of new full-year course, 7.132 *Earth and the Environment*

1997/98: Organized and oversaw Graduate Seminar Series

1996: Committee on First-Year Courses

1995/96: Initiated Geocolloquium (undergraduate seminar series)

1995: Applied for/hosted SEG Thayer Lindslay Distinquished Lecturer Dr. Robert Bodnar, Virginia Tech

Mineralogical Association of Canada
L'association minéralogique du Canada

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Dr. Adrienne Laroque,
Dept. of Geological Sciences,
University of Manitoba,
Winnipeg, Manitoba
R3T 2N2

11 July 1996

Dear Adrienne,

I would like, on the behalf of the *Mineralogical Association of Canada* to thank you formally for agreeing to be our short course coordinator. It is only with the help of volunteers such as yourself that the society can successfully transact its business. Your assistance is much appreciated.

Since becoming President I have become concerned that there does not seem to have been in the past much communication between the various committees and council. In particular, as President I would like to be aware of the actions taken by various committees, especially with regard to the financial implications of their activities.

In the case of the short courses I think that the MAC executive, at least, should have on hand a historical summary of short course activity. This would be of great use in deciding what type of short courses have attracted the most attention and which resulted in the most post-course sales of the short course volumes.

As we discussed at the MAC Council meeting in Winnipeg we need to be more systematic in the record keeping of our various activities. Thus, as a part of your duties I would like to ask you to compile for each previous short course the following information:

1. Number of Registrants (Professional + students)
2. Copy of the Final Budget statement
3. Income and Number of volumes of Short Course Notes sold Post conference.
4. Number of volumes remaining to be sold. (The Pinards should have the information for 3& 4)

This information could be updated annually and the historical record could pass from president to president, something which has not been past practice.

With these data we might be able to determine: trends in attendance; which type of courses are successful, and which short course notes we might reprint or sell off at cut price rates at Ottawa '97.

I realise my request might involve a lot of work, especially with regard to some of the less recent courses. However, I think that unless we have some idea of the success of the short courses we cannot satisfactorily plan our future activities.

Please phone me (807-343-8287; 807-622-8466) if you have any questions regarding this project.

With best regards,

Roger

Roger H. Mitchell
President

cc: Gina LeCheminant

PAST PROFESSIONAL AFFILIATIONS:

- Association of Professional Engineers and Geoscientists in the Province of Manitoba
- IAGOD Working Group on Ores and Metamorphism
- Society of Economic Geologists
- Geological Society of America
- Geological Association of Canada
- CIM Winnipeg Chapter
- Mineralogical Association of Canada
- Canadian Institute of Mining and Metallurgy
- Association for Women Geoscientists
- Geological Society of the Philippines

CURRENT PROFESSIONAL AFFILIATIONS:

- Nutrition and Metabolism Society
- Healthy Nation Coalition

TEACHING DEVELOPMENT:

- Participated in Stage 1 Introductory Course in **Cambridge IGCSE Chemistry (0620)** conducted by University of Cambridge International Examinations, 2007
- University of Manitoba, University Teaching Services Courses on Teaching and Learning Styles, Motivating Students, New Course Development, 1994-1998
- National Association of Geoscience Teachers workshop on *Effective and Innovative Teaching Techniques,* GSA Annual Meeting, New Orleans, LA, 1995

PROFESSIONAL COURSES ATTENDED:

- GAC Short Course on *Dynamic Processes in Magmatic Ore Deposits*, GAC-MAC Annual Meeting, Sudbury, ON, May 1999
- MAC Short Course on *Mineralized Skarn Systems*, GAC-MAC Annual Meeting, Quebec City, QC, May 1998
- SEG/GAC/MDD Short Course on *Volcanogenic Massive Sulfide Deposits*, GAC-MAC annual meeting, Ottawa, ON, May 1997
- MAC Short Course on *Magmas, Fluids and Ore Deposits*, GAC-MAC Annual Meeting, Victoria, B.C., May 1995
- MAC Short Course on *Environmental Geochemistry of Sulfide Minewastes*, GAC-MAC Annual Meeting, Waterloo, ON, May 1994
- SEG Short Course on *Environmental Geochemistry of Mineral Deposits*, Denver, CO, April 1993
- *Giant Ore Deposits* workshop, Queen's University, Kingston, ON, May 1992
- *Precious Metals* Short Course, University of Ottawa, Ottawa, ON, March 1992

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 *Magmas, 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

Letters in Support of Eminence

Cornell University

Dept. of Earth and Atmospheric Sciences
4164 Snee Hall
Cornell University
Ithaca, NY 14853

State of California
Commission on Teacher Credentialing
1900 Capitol Avenue
Sacramento, CA 95811-4213

December 31, 2014

Re: Dr. Adrienne Larocque: Application for Eminence Credential in California

To whom it may concern,

It is a pleasure to provide a reference in support of Dr. Adrienne Larocque's application for an Eminence Credential from the Commission on Teacher Credentialing in the State of California.

I have known Dr. Larocque for over 20 years. As Director of the Mineral Deposits Research Unit at the University of British Columbia, I invited her to present at a short course in 1993. At the time, she was completing her graduate studies at Queens University. The course involved several professionals and established experts in microbeam analytical techniques but Dr. Larocque was the most passionate and effective speaker and teacher, even though she did not yet have her PhD in hand. She also stood out as a female role model that inspired other graduate students, an aspect of her early career that she took seriously.

I understand that others have documented many of the outstanding aspects of Dr. Larocque's career, her skill sets, and her character. In this letter, therefore, I will focus on the specific significance of some of her work in the context of the Eminence Credential. Before doing this, however, I wish to provide some important context. In terms of her science, Dr. Larocque has demonstrated unusual breadth. She has tackled a range of problems requiring different research approaches and analytical techniques, and has consistently excelled. This is beyond the norm in a world that tends to value specialization above flexibility. She has also managed to balance career and family, a challenge for all professionals and a particular issue for female academics. In spite of this, Dr. Larocque has a publication and professional record that demonstrates world class expertise, a breadth of geoscience topics, publications in high caliber journals representing different specialties, and international credentials based on work in different parts of the globe.

Given this eclectic mix, it is perhaps surprising that Dr. Larocque has also managed to produce landmark contributions. That is the case, however, with at least two of her publications. The publication on sulfide immiscibility (Larocque et al., 2000) is a highly regarded and frequently used paper that was recognized by a prestigious award – the Hawley Medal. The more recent paper on significant mineral assemblages found in pumice Popocatépetl Volcano (Larocque *et al.* 2008) is equally important. In addition, her early papers on the use of the SIMS microbeam analytical technique were highly significant at the time. Microbeam techniques were developing rapidly through the nineties and Dr. Larocque was one of the leaders both in the

Health Canada Santé Canada

Canada

State of California
Commission on Teacher Credentialing
1900 Capitol Avenue
Sacramento, CA 95811

January 5, 2015

Re: Application for Eminence Credential by Dr. Adrienne Larocque

To whom it may concern,

I am pleased to write this letter in support of the application by Dr. Adrienne Larocque for an Eminence Teaching Credential in the state of California. As a senior Research Scientist with Health Canada, I am the leader of the Metals and Airborne Particulate Laboratory in the Healthy Environments and Consumer Safety Branch. My areas of specialization are: indoor environmental health, analytical trace metal chemistry, and exposure science, with focus on airborne nanoparticles. I also have laboratory facilities at University of Ottawa, where I am an Adjunct Professor and supervise MSc and PhD graduate students under a formal "Earth and Health" collaboration between Health Canada and U of Ottawa.

Dr. Larocque and I came to know each other in the 1990s through colleagues at the Geological Survey of Canada because of our mutual interest in metals in the environment. In 1996, we co-organized and co-chaired a symposium at the joint annual meeting of the Geological and Mineralogical Associations of Canada (GAC-MAC). It was entitled "Metals in the Environment: from Mobilization to Remediation" and hosted presenters from academia, government departments, and industry who shared research and case studies from both Canada and the United States. Dr. Larocque and I co-authored the preface paper for a special issue of *Environmental Geology* containing the proceedings of the symposium; *Environmental Geology* (renamed *Environmental Earth Sciences* a few years ago) is an international journal. In addition to contributing papers about her own research, Dr. Larocque served as guest editor for the issue arising from the conference.

In 1997, Dr. Larocque was recruited by the Metals in the Environment (MITE) Research Network to be the leader of the Sources Domain in their (successful) application to NSERC (Natural Sciences and Engineering Research Council of Canada) for funding. NSERC is equivalent to the National Science Foundation in the United States. The MITE Network was a nation-wide system of researchers that brought together government, university, and industry investigators to better understand how metals affect the environment, to assess the risks posed by metals, and to propose management strategies to ensure that findings reach key policy makers in government. This bold multidisciplinary initiative involved dozens of researchers across Canada studying metals in the environment on a scale previously unheard of.

Research within the network was structured along 3 interacting domains: 1) sources of metals in the environment, 2) processes by which metals move and transform within the environment, and 3) impacts of metals on ecosystems. The fact that Dr. Larocque was chosen as leader for the Sources Domain at such an early stage in her career is evidence of recognition on a national scale of her expertise in environmental geochemistry. In her role as Domain leader, she was responsible for coordinating research scientists and engineers (many of whom were much more established investigators) from a variety of disciplines studying both natural and anthropogenic sources of hazardous metals in the environment. Only someone with her extraordinary breadth of knowledge could have done this successfully.

In addition to having a wide-reaching reputation as an outstanding researcher, Dr. Larocque also is a gifted educator for audiences at several levels. She is an accomplished lecturer and presenter in meetings, short courses, and symposia, yet she also has a talent for inspiring and instructing younger learners. I met some of her students while we were co-chairing the environmental symposium (the GAC-MAC meeting was hosted by the University of Manitoba that year) and I can confirm that she was known as a keen and energetic teacher and mentor to her undergraduate and graduate students during her time there. The students of California would be incredibly fortunate to have a teacher with her rare scientific ability as well as her enthusiasm for communicating about science in their classroom.

Without hesitation I strongly recommend Dr. Laroque for the Eminence Teaching Credential.

Sincerely,

Pat Rasmussen, PhD

Leader of Metals and Airborne PM Laboratory
Exposure and Biomonitoring Division
Environmental Health Science and Research Bureau
Healthy Environments and Consumer Safety Branch
Health Canada, Ottawa, Ontario, Canada K1A 0K9

Adjunct Professor, University of Ottawa
Tel: 613-941-9868
Email: pat.rasmussen@hc-sc.gc.ca

THE UNIVERSITY of ADELAIDE

Adelaide, South Australia, 12th January 2015

To whom it may concern

Re: Dr. Adrienne Larocque

With this letter, I wish to express my very strong support for Dr. Adrienne Larocque in pursuit of her application to the California Commission on Teacher Credentialing Board.

Adrienne has made a number of extremely valuable contributions to Earth Science and her published work remains highly regarded by those of us working in the field. Her research, showing the connection between concentrations of gold in common sulphides and ore-forming processes was fundamental at the time, remains fully valid, and is widely applied today. Without her high-quality contribution, carried out at a time when accurate analysis was nowhere as easy as it is today, many of the models for trace element behaviour in sulphide systems would not be possible. The implications which her work had for the economic viability of gold resources are profound. As a matter of routine, my PhD students are asked to read and understand the significance of Adrienne's academic output.

Adrienne is very well regarded in the ore geology research community and by her peers at large as a skilled researcher and highly efficient communicator. Her decision to move into high school teaching is very much to the benefit of the students fortunate enough to learn from her in the future.

In summary, having studied the requirements for the Eminence Credential, Adrienne comprehensively fulfils the criteria requested by the CCTC. Specifically, her research, providing unequivocal evidence for metamorphic remobilization of gold and the development of new methodologies for the quantification of gold in sulphides, represents a "unique or significant discovery or authorship in the field of geology" and is recognised as such by her peers nationally and internationally.

Yours sincerely

A/Prof Nigel J. Cook

Research Professor (Geometallurgy), School of Chemical Engineering and Institute of Mineral and Energy Resources, University of Adelaide
Past-President, International Association on the genesis of Ore Deposits (IAGOD)
Chairman (2014-2018), International Mineralogical Association Commission on Ore Mineralogy

nigel.cook@adelaide.edu.au; Tel (office): 08 8313 1096

The University of New Mexico

Department of Earth & Planetary Sciences
Northrop Hall
Albuquerque, NM 87131-1116 U.S.A.

State of California
Commission on Teacher Credentialing
1900 Capitol Avenue
Sacramento, CA 95811

January 6, 2014

To Whom It May Concern:

I'm writing this letter of recommendation of behalf of Dr. Adrienne Larocque who is applying for an Eminence Credential from the California Commission on Teacher Credentialing. I have known Dr. Larocque for nearly 20 years having first met her when she joined Los Alamos National Laboratory (LANL), New Mexico, as a Director's funded postdoctoral fellow. Most of Dr. Larocque's original training is in economic geology and ore deposits. Because LANL is the "birthplace of the bomb," please allow me to explain how she arrived at "the Lab."

The mission of LANL is to solve **national security challenges through scientific excellence.** At the present time, LANL priorities are: protection against nuclear threats, emerging threats and opportunities, nuclear deterrence and stockpile stewardship, goals and strategies, and energy security solutions. These priorities change depending on political administrations and the needs of the times. While I was employed at LANL, most of my projects revolved around energy security, particularly geothermal energy and volcanic hazards.

Many post-doc appointments are awarded each year by LANL science and research divisions, paid for by division project money. These are chosen at the Division level and the post-docs are called Research Associates on two-year appointments. However, there is an elite group of post-doc fellows chosen by a Post-doc committee consisting of about 12 internationally recognized LANL scientists. This committee meets four times per year. These Fellow appointments are highly prized because they are funded out of discretionary funds by the ***Laboratory Director.*** More information on the LANL post-doc program can be found at http://www.lanl.gov/careers/career-options/postdoctoral-research/postdoc-program/postdoc-appointment-types.php.

Director's Fellows collaborate with LANL scientists and engineers on staff-initiated research. Fellows are selected based on academic and research accomplishments and the strength and potential impact of the proposed research. Sponsored candidate packages are reviewed during each of the quarterly meetings. The candidate packages, consisting of grades, other scholastic achievements, publication history and/or quality of PhD dissertation, three recommendations from advisors and mentors, and a project proposal, are stellar – each candidate literally "walks on water." About 75 packages are submitted per quarter but only 7 to 8 postdoctoral fellows are awarded each quarter (approximately 30 Postdoctoral Fellow appointments per year.) The laboratory accepts the best possible candidates from the USA and many different countries. Clearly, the competition is incredibly intense, made more so for any candidate who is not in the disciplines of physics, chemistry, nuclear chemistry/physics, math, and computer science.

Successful candidates in earth science (geology, geochemistry, petrology, geophysics, etc.) are rare. During my 26-year career with LANL, I was fortunate to sponsor three successful candidates for Director's post-doctoral fellow in earth science. Two of my successful candidates came from Switzerland and Ethiopia. The third was from the USA.

Dr. Larocque received a Director's funded Postdoctoral Fellow appointment from LANL in 1993. Although I was not her sponsor, I can only assume that her candidate package was exceptionally strong to receive this remarkable award. Her Canadian background made absolutely no difference to the Laboratory Director or the Post-doc Committee because (how else can I say it) LANL wants the very best. Dr. Larocque joined a team of scientists working on a novel project to develop a rock-melting drill hole system. Her task was to study the before and after petrology/mineralogy of rock substrates to be melted by this unique device and evaluate the chemical stability of the vitrified materials. Although the concept is not classified, the uses of such a device are assuredly so.

Because Dr. Larocque worked on a project that *could not* result in publications, I successfully lured her into working on one of my projects for a time, a study of the chemical and isotopic composition of volcanic and geothermal emissions. She contributed to a rather sensational paper we published entitled "Gold degassing and deposition at Galeras Volcano, Colombia" (GSA Today, v. 4, p. 241). Because of her strength in ore deposits, she did much of the work on the gold and associated petrology. Soon after this work was published, Dr. Larocque was hired by the geology department at the University of Manitoba, Canada to teach and do research in economic and environmental geology. Nonetheless, we stayed in touch and worked on a few more collaborations over the next few years. In addition her work with me, Dr. Larocque broadened her scope of research into new areas of environmental geochemistry, microbeam analysis, and materials science with other scientists at LANL.

Dr. Larocque sent me a link to the requirements for the Eminence Credential on the California Commission on Teacher Credentialing website, which I have read. Based on my observations and her accomplishments at LANL, and her work after leaving the Lab, it would be difficult for me to imagine another person more qualified to receive such a credential. Her achievements in a single discipline in earth science would easily qualify her. The fact that she has attained wide recognition in diverse fields is extraordinary.

If you need additional information, please contact me at: candf@swcp.com.

Yours truly,

Fraser Goff

Dr. Fraser Goff

Adjunct Professor, Earth & Planetary Sciences, University of New Mexico, 1992 – present
Adjunct Professor, Earth and Environmental Science, New Mexico Institute of Mining and Technology, 2013 – present
Staff Scientist, Los Alamos National Laboratory, 1978 – 2004

212 Carmel Road, Castleton
Ontario, Canada K0K 1M0
2014 August 22

State of California
Commission on Teacher Credentialing
1900 Capitol Ave.
Sacramento, CA
95811

Regarding: the application of **Dr. Adrienne Larocque** for an Eminence Credential with the State of California education system.

I have recently retired as the Director General of the CanmetMATERIALS laboratory, which is a federal research centre in the Government of Canada (Department of Natural Resources). I first met Dr. Larocque in 1994 and worked with her closely throughout the period of her PhD research at Queen's University in Kingston, Ontario, and subsequently. At that time I was a senior scientist in the area of Secondary Ion Mass Spectrometry (SIMS), which is a particularly sensitive but difficult technique (since it requires advanced understanding of ion-solid interactions, ionizing processes and mass spectrometry) to measure the quantity and distribution of trace elements in a range of materials. Dr. Larocque worked on geological samples which is the most difficult class of materials to analyze by SIMS. She was able to master this technique and produce original, advanced research despite the fact that her own formal training was in a very different field. My own expertise is in the analysis of metallurgical samples, which present entirely different problems, therefore Dr. Larocque, even as a PhD student, was required to resolve many difficult challenges through her own initiative. She was able to develop and advance novel methodologies for analyzing geological materials by SIMS, making her one of only a few researchers in Canada able to utilize this tool effectively for geological research. Her research increased our knowledge and understanding of the mobilization of elements in geological formations; which can be used for different applications including assessing the potential value for mining and understanding the geological history of a region. Secondary Ion Mass Spectrometry was only one of the areas she mastered in order to further her research; despite this she was invited to give presentations and teaching lectures on the subject, and was well recognized for her scientific contributions in the field. She was one of the most talented graduate students I have worked with, definitely within the top 10% of students.

Furthermore, Dr. Larocque demonstrated other characteristics that made working with her a very positive experience. In addition to the initiative and work ethic mentioned above, she always exhibited a very positive and cheerful attitude and was an excellent team member. Dr. Larocque was encouraging and supportive to others, modest in her claims of success and showed consistent scientific integrity in her research work. She is an excellent two-way communicator and enjoys sharing her knowledge with others. I have no doubt Dr. Larocque would be an asset to a teaching organization.

Jackman

Sincerely, Dr. Jennifer Jackman

Retired: Director General, CanmetMATERIALS, Natural Resources Canada

Current e-mail address:
jackmanj222@gmail.com

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To whom it may concern, August 30, 2014

Dr Adrienne Larocque has asked that I write a letter of recommendation on her behalf, as part of her application to obtain an "Eminence Credential" in the State of California. I have known Dr Larocque for about 27 years, when she first joined the Geological Survey of Canada as a summer research assistant. She worked with me as a research assistant as part of the Seafloor Minerals Program of the Geological Survey of Canada, and went on to complete her MSc in the study of surficial materials, and her PhD on hydrothermal geochemistry. In addition to being her supervisor, I was the external examiner for her doctoral dissertation.

Adrienne is one of the most energetic, highly motivated and adaptable people I have met. Her undergraduate and MSc work looked at issues related to lake bottom stability, which is controlled by present day crustal activity, related to post-glacial rebound and tectonic activity. Understanding the recent history of change in the upper crust plays a key role in understanding limitations on potential long term radioactive waste disposal sites. Her doctoral work was in a completely different field, related to understanding the genetic processes attendant on the formation of major mineral deposits. This required a totally different specialized knowledge base. Dr. Larocque demonstrated her ability to learn an entirely new field of geoscience at an advanced level in a very short time period. Her doctoral work stands today as preeminent in understanding the processes of gold enrichment in mineral deposits. This work has had wide-ranging economic benefits to the exploration and mining industry. She continued with post-doctoral work at Los Alamos lab, where she applied new micro-analysis technology to understanding how gold and other elements are transported in vapour-phase fluids.

After joining the University of Manitoba's Dept. of Geological Sciences, Dr. Larocque began her career as an educator and at the same time broadened her research focus. She expanded her work in ore deposits geology to cover a wider range of deposit types, but also began a new line of research, which combined her knowledge of these deposits with that gained during her MSc work in surficial geology to investigate aspects of potential environmental contamination for acid mine drainage. This is a well-known issue in California, for example. This work enabled her to advance the public's awareness of how geological processes may affect everyday life, something that she has continued to emphasize throughout her career.

She taught several courses at U of M, and was well known as an outstanding teacher. She paid particular attention to ensuring that her students understood some of the more complex geological interactions that attended various geological processes. Introductory – level courses are particularly challenging to develop, as most university students have no background in the Earth Sciences in Canada. Her dedication to the quality of her teaching became well known nationally.

Her move to the Philippines for family reasons started a new phase of her career. Gases emitted from major volcanic eruptions are a major environmental concern, and have historically been the cause of significant loss of life. The secondary consequence of the gas is to create explosive volcanism, again a major hazard. By understanding the role that gases play in several environmentally-related aspects of volcanism, she raised awareness of the need for monitoring of these gases as a predictor for potential disasters.

Since returning to the US she has focussed her efforts on elementary and middle school education in the earth science. I know of no other person who has such a rich background in earth science, and who is so able to communicate the excitement and value of knowing about our earth to students of all ages. Hers' is a rare talent amongst scientific researchers…to be able to excite students about the basic earth processes operating around us, while at the same time remaining a world-class expert in so many aspects of geoscience. She is indeed an 'eminent person'. I highly recommend that she be awarded the credentials necessary to allow her to formally become an educator in the California school system.

I would be pleased to answer any questions that you might have about Dr. Larocque's abilities.

Yours sincerely

James M Franklin PhD FRSC P Geo
President, Franklin Geosciences Ltd
Retired Chief Geoscientist, Geological Survey of Canada

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Geological Sciences
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August 19, 2014

California Commission on Teacher Credentialing (CTC)
1900 Capitol Ave.
Sacramento, CA 95811-4213

Dear Sir/Madam:

I am writing this letter in support of Adrienne Larocque's application to obtain her Eminence Credential, which is required for her to teach in California. I have known Dr. Larocque for over 20 years, starting when she had just finished her Ph.D. at Queen's University (Canada). Right after that she became an Assistant Professor of geology at the University of Manitoba, where she was subsequently promoted to Associate Professor.

My involvement with Dr. Larocque was mainly when she worked in Canada but we have been in touch ever since. Adrienne and I have both worked on the geology, mineralogy, and chemistry of various mineral deposits, although she has conducted research on various other geological problems as well (including glacial landforms, trace element studies of glacial sediments and volcanic rocks, and the geochemistry and mineralogy of mine tailings). She has published numerous papers on these studies. Her work on the effects of metamorphism on ore deposits, which began during her Ph.D. studies, is particularly noteworthy as it represents quite a change in directions from her previous work on low-temperature geochemistry. Her work on the mobilization of precious metals during metamorphism is exceptional.

In the late 1990s, I was asked to put together a prestigious volume for the Society of Economic Geologists (the world's leading society on the study of ore deposits) entitled "Metamorphosed and Metamorphogenic Ore Deposits." This volume appeared as a "Reviews in Economic Geology" and was co-organized and edited by me, Brian Marshall and Frank Vokes. I asked Adrienne to co-author a paper with my two co-editors, who were regarded as the two leading researchers on the discipline of "metamorphosed ore deposits" at the time. This speaks volumes to her outstanding reputation in this field at such a young age.

In addition to being an economic geologist and low-temperature geochemist, Adrienne is also a world-class mineralogist. She has considerable expertise on the characterization of minerals with complicated analytical instrumentation such as SIMS (secondary ion mass spectrometry). This prompted me to seek her advice about using SIMS analysis for my own research. Dr. Larocque's 2008 study on Volcan Popacatepetl in Mexico was particularly notable because it was one of the first papers that reported the presence of telluride minerals in vesicles that formed during an

active volcanic eruption. This important observation relates to my own research on gold telluride deposits and minerals found in such deposits. Her work resolved the long standing question concerning whether the element tellurium was carried in the vapor or liquid phase. My recent experimental studies verified what she discovered in 2008, that tellurium is carried in the vapor phase under ore-forming conditions.

Her research has been widely cited in the scientific literature, with one of her papers being awarded the Hawley Medal by the Mineralogical Association of Canada for the best paper to appear in Canadian Mineralogist in 2000. During her time in academia, Dr. Larocque was widely sought after to give invited lectures about her research at various universities. She gave two presentations in my own department in her role as AWG-Phillips Distinguished Lecturer, where I saw her interact with and inspire female students as well as male students.

Adrienne has reviewed grant applications and scientific articles for leading international journals, and served on various scientific committees related in her profession. I asked her to be the Western Canada Representative for the Working Group on Ores and Metamorphism (WGOM), part of the International Association on the Genesis of Ore Deposits. She did such a great job that, in my capacity as Chair of WGOM, I asked her to serve as its Secretary. Furthermore, as associate editor of four different scientific journals, I also asked Adrienne to review several papers. She always did these reviews in a timely fashion, and did an excellent job, providing constructive comments to the authors to help them improve their papers.

Adrienne is a very charismatic and dedicated person. She is extraordinarily bright and is also enthusiastic and professional. I know that other teachers and her students will find her to be just as delightful as everyone else who knows her. She is reliable and hard-working and she would be ideally suited to teach at ALL levels in the California education system. I strongly recommend that you provide Dr. Larocque with her Eminence Credential and that she be allowed to serve the state of California as a teacher. She is a very talented individual. If you have any questions or concerns, please do not hesitate to contact me.

Sincerely,

Paul Spry

Paul G. Spry
Professor of Economic Geology
pgspry@iastate.edu

uOttawa

Université d'Ottawa | University of Ottawa

Department of Earth Sciences / Département des Sciences de la Terre
Complèxe de recherche avancée / Advanced Research Complex
Ottawa ON Canada K1N 6N5

State of California
Commission On Teacher Credentialing
1900 Capitol Avenue
Sacramento, CA 95811-4213

Re: Eminence Credentials of Adrienne Larocque, PhD

I am pleased to provide the following comments regarding the professional credentials of Dr. Adrienne Larocque in the field of geosciences. As Professor of Geology at the University of Manitoba, Dr. Larocque made significant advances in the fields of economic geology, mineralogy, environmental geology, and volcanology both at the national and international levels.

International Recognition and Level of Distinction

In a short time after her Ph.D., Dr. Larocque achieved a remarkable level of distinction for her work, far beyond her immediate peers. After graduation from two of the most respected universities in Canada, she was appointed to progressively advanced positions in two of the top research institutions in the Earth Sciences, the Ontario Geological Survey and the Geological Survey of Canada. Both organizations recognized and encouraged the publication of her work under their banner. In the Department of Natural Resources in Canada she led projects by 3 separate divisions, including in the Terrain Sciences Division, the Mineral Resources Division, and the Canadian Center for Materials Science (CANMET). She was also recruited by the National Metals in the Environment (MITE) Research Network to lead part of their application for strategic national funding. Dr. Larocque's professional reputation, expertise, and influence followed her to the University of Manitoba, where she was promoted to tenured Associate Professor in 2001.

Scientific Advances

Dr. Larocque quickly made significant, internationally recognized advances in each of the diverse fields in which she has worked. This includes acclaimed published works in the areas of geology, mineralogy, and geochemistry related to the glaciation of the Canadian Shield, metals in the environment, including important implications for immobilizing potentially toxic heavy metals released to lakes and rivers, mineral deposits, and the effects of water-rock interaction in large-scale hydrothermal systems. A hallmark of Dr. Larocque's research was mastering and significantly advancing the use of sophisticated instrumental approaches to analysis of geological materials, including then state-of-the art SIMS ion probe techniques (CANMET and Los Alamos). Dr. Larocque's research using these tools contributed directly to fundamental advances in our understanding of the distribution trace metals in the crust and in the environment in general, including in lakes, streams, weathered rocks, mine tailings, volcanic systems and ore deposits. The quality of her research is evidenced by the fact that so many leaders in these fields, from Canada, the U.S. and overseas, have chosen to work with Dr. Larocque and co-author papers with her. Dr. Larocque's work on the mineralogical siting of platinum group elements in ores and rocks is a singular achievement that captured the attention of the international mining industry and presented rare opportunities to combine industry-funded

and government-funded research on a topic of critical importance to the Canadian economy. She was rewarded for these achievements by successfully obtaining highly competitive research funding from the Natural Sciences and Engineering Research Council (NSERC, or Canada's equivalent of NSF) while professor at the University of Manitoba.

Published Recognition

Dr. Larocque published 5 papers from her PhD research, which is a remarkable record for most people in her field. She has more than 20 peer-reviewed publications in the top international journals of the science, including multiple publications in two of the most widely read and cited international scientific journals in her field (Economic Geology and Canadian Mineralogist). It is common practice in the Earth sciences for researchers to publish in only a few journals close to their interests. Dr. Larocque has published in at least 10 different research journals in widely varying fields from environmental geology, to volcanology to mineralogy; only the most accomplished researchers are able to publish their research across a spectrum of journals with such wide audiences. Several publications, as well as numerous government reports have had a wide readership in industry (e.g., Canadian Institute of Mining and Metallurgy). Dr. Larocque has given more than 50 conference presentations, including invited presentations at widely attended international conferences.

Awards and Service

Dr. Larocque has received nationally and internationally recognized awards for scientific achievement. These include the Hawley Medal from the Mineralogical Association of Canada for the best paper to appear in *Canadian Mineralogist* in 2000. In 2002, she received a nomination for the Young Scientist's Award of the Mineralogical Association of Canada, and she was the Distinguished Lecturer for the International Association of Women Geoscientists. Prior to her professional awards, she had received a prestigious Director's Postdoctoral Fellowship at the Los Alamos National Laboratory. In addition to her service to the community with Women in Geoscience, she was the Short Course Coordinator for the Mineralogical Association of Canada and held related offices in both the Mineralogical Association of Canada and the International Association for the Geology of Ore Deposits (IAGOD). Dr. Larocque is also acknowledged by her peers to be an expert evaluator of her field, serving as a scientific reviewer for journals and a reviewer of grant applications for NSF and NSERC.

Sincerely,

Mark Hannington

Current e-mail address:
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Prof. Mark D. Hannington, FRSC
Department of earth Sciences
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August 29, 2014

California Commission on Teacher Credentialing
1900 Capitol Ave.
Sacramento, CA

August 28, 2014

To whom it may concern,

I am writing this letter in support of Dr. Adrienne Larocque's application for an Eminence Credential in the state of California. I am a former Professor in the Department of Geological Sciences at Queen's University in Kingston, Canada, and acquired my PhD degree at the University of California in Berkeley. At Queen's I supervised Adrienne during her doctoral studies there from 1989 to 1993. In the late 90s, I took early retirement from the university to work as Chief Geologist for Barrick Gold Corporation, the largest gold mining company in the world with world-wide exploration and mining interests. Currently I am a consultant to mineral exploration companies worldwide. Much of what I've written below was excerpted from letters that I wrote for Adrienne when she applied to be a postdoctoral fellow at Los Alamos National Lab in the US and when she applied for promotion at the University of Manitoba.

To put the comparisons that I will make between Adrienne and other students that I supervised in perspective, I'd like to emphasize that Geological Sciences at Queen's is considered one of the best hard-rock geoscience departments in Canada, and because of the importance of mineral resources in Canada, one of the best in the world in the field of economic geology. The department consistently attracted superior graduate students, as measured by proportion who held NSERC Graduate Fellowships (equivalent to NSF Graduate Fellowships in the US), and by the proportion of graduates on the staff of major Canadian research institutions such as the Geological Survey of Canada. Of the 40 Canadian graduate students that I supervised over a 20 year period, 25% held NSERC Fellowships. Queen's is one of the top ranked universities in the country and has the highest entrance requirements for incoming students of any university in Ontario.

Adrienne was among the top 5% of the graduate students that I had, in terms of her research ability, background knowledge and motivation. I can't think of another student who had more of an impact in her field in the short time that she worked on her PhD project. I'd like to comment on her strengths under six headings:

1. Drive and ability to get things done on time: Adrienne was a real mover and shaker who was never afraid to take on problems and get things done. She gave many talks at national and international meetings on her work. Mainly as a result of interest generated by her research using Secondary Ion Mass Spectrometry, the Mineral Deposits Research Unit at the University of British Columbia organized a short course on this analytical technique. Adrienne was invited to present her research results there, along with Louis Cabri who was co-supervisor for her PhD thesis and a senior research scientist with the Canada Center for Mineral and Energy Technology. I never had a graduate student who was so driven to promote her work, and who at the same time produced such high quality research.
2. A knack for instrumental analysis: Before arriving at Queen's, Adrienne was already competent using scanning electron microscopy, electron probe microanalysis, and X-ray diffraction. During her doctoral studies, Adrienne also became expert in secondary ion mass spectrometry (SIMS). She has no fear of high-tech instruments and quickly and efficiently gets right on with using

them for her work. Personally, I think this is an extremely important attribute in a researcher, since too much current research is controlled by the familiarity of the researcher with certain types of data and data gathering techniques. Geologists who know how to deal with fluid inclusions try to solve all problems with fluid inclusion studies, and isotope geologists do the same with isotope studies. With Adrienne, research is controlled by the problems that she needs to solve, not the techniques that she is familiar with, *because* she is so quick and competent at learning new techniques.

3. Exceptional skill with interpersonal relations: A large part of her success in getting things done is related to her ability to get on well with people so that they are happy and willing to help her achieve what she wants to get done. She is the type of person who it is a pleasure to be around – always upbeat, optimistic, exuding energy and vitality, and always interested in what is going on.
4. An exceptional ability to express herself clearly in writing: This skill is highly unusual among North American students, and makes life a pleasure for a supervisor. It contributed very substantially to her being so productive in her research. While it is an expectation that doctoral students will publish on their research, it doesn't always happen. Adrienne published five papers on her work, some before she even completed her degree.
5. An ability to learn quickly both new concepts and techniques in areas that she has not formal instruction: Before starting her project with me, Adrienne's background had been mainly in Quaternary geology and geochemistry, but she quickly became fully competent in the field of mineral deposits geology. She passed her PhD comprehensive exam with flying colours, no mean accomplishment as few students come through this exam without some remedial work being recommended to bring their background up to a satisfactory level.
6. A solid background in classical geology: She covered a wide range of sub-disciplines of geology in the course of her MSc and PhD research, and took a broad group of courses. The fact that she took her three degrees at three different universities greatly broadened her background through her being exposed to many different perspectives and approaches to research. In addition, she had unusually varied work experience during her summer employment with the Geological Survey of Canada.

When I originally wrote these words in support of Adrienne's application to be a postdoctoral fellow at Los Alamos, I concluded by saying that I fully expected that she would ultimately end up teaching in a major university geoscience department. This came to pass, of course, when she took up a faculty position at the University of Manitoba. During her time there, she amply fulfilled her early promise. She broadened her ore deposits research to include work on porphyry copper deposits, epithermal deposits, magmatic segregation nickel sulfide deposits and low temperature mineralization. She also branched out into environmental research related to ore deposits and volcanic emissions. In all of these diverse areas, she published important work and became widely known for her contributions. I also heard good reports about her teaching in Manitoba.

I have stayed in touch with Adrienne over the years, and I know what a difficult decision it was for her to leave the University of Manitoba for family reasons. Even though she was no longer employed there, she continued to do research and publish for several years. Then she began teaching science at the high school and middle school levels at international schools overseas. I'm sure that her passion for science and her ability to express herself clearly to any audience made her popular with her students there. I'm

also certain that she would be an asset to any teaching institution in California and I strongly support her application for an Eminence Credential.

Please don't hesitate to contact me at cjhodgson@outlook.com if you have any questions.

C. Jay Hodgson, Professor Emeritus, Queen's University, Canada

Currently Exploration Advisor to Kinross Gold, Waterton Global Resources and Sarama Resources, and Member of the Board of Directors of Belo Sun Mining Corp and Murgor Resources Ltd.

JEFFREY D. KEITH
Associate Academic Vice President

August 23, 2014

State of California
Commission on Teacher Credentialing
1900 Capitol Avenue
Sacramento, CA

To Whom It May Concern,

I am writing in support of Dr. Adrienne Larocque's application for an Eminence Teaching Credential in the State of California. I have known Adrienne for most of her career and have watched with admiration both the unselfish service she has given to those around her and the professional recognition that she has developed and maintained. She has distinguished herself broadly during these years. As I attend professional meetings internationally and mention the work that she and I collaborated on, everyone knows her personally or has heard of her work. As I reviewed portions of Adrienne's application for this credential, I was once again impressed with her organizational skills and clear writing style. She has few equals in this regard.

In my current position as Associate Academic Vice President, I see many portfolios of faculty work and applications for university awards – some by very distinguished faculty members. In comparison, Dr. Larocque has distinguished herself on a similar level. I still remember when we were working together, she joked that she was the "queen of SIMS analysis." I remembered that for all of these years because she was exactly right. Her expertise was that impressive!

Adrienne and I were co-recipients of the Hawley Medal of the Mineralogical Association of Canada in 2000. She was the driving force that wrote such a convincing, clear paper. It was outstanding work; her first-author contributions made it even better, a medal winner.

In summary, I think Dr. Larocque has distinguished herself as an eminent scholar. She is loved and respected by so many people around the world. Her students will undoubtedly love and respect her as well!

Best Regards,

current e-mail address:
jeff_keith@byu.edu

Jeffrey D. Keith
Associate Academic Vice President

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September 5, 2000

Committee on Promotions
University of Manitoba

Dear Committee Members:

I am delighted to write this letter of recommendation in support of Dr. Adrienne Larocque's consideration for promotion at the University of Manitoba. I have known Dr. Larocque for several years. I became acquainted with her work while she was working as a post-doc at Los Alamos National Laboratory. [I completed a post-doc with Adrienne's dissertation advisor Jay Hodgson at Queen's University, but that was in the early 80s prior to her arrival there.] We have collaborated on a few projects since that time; I have heard here speak at international conferences and as an invited lecturer here at Brigham Young University.

There are a number of reasons that I have found Adrienne's work outstanding and of the quality that would merit consideration for promotion at this stage of her career. First, as I discuss her work with colleagues in the discipline, I find that she is universally respected and her work is held in high regard. Two weeks ago, I hosted Marco Einaudi (from Stanford) and two of his students for a visit to examine the Bingham district volcanic rocks. We discussed Adrienne's work that she had recently completed on Bingham sulfides for Marco (and one his students) as well as the work that she had just completed on Bingham magmatic sulfides hosted by the volcanic rocks. We concur that her work is excellent; there are very few people that have the expertise with SIMS analysis and the specific background with Au analysis to do the type of work that she does. I think that her opportunities for collaborating on exciting projects will continue to expand because of this expertise.

With regard to the scientific content of her recent papers, I think that she has proposed some exciting new ideas with regards to magmatic sulfide formation and removal in volcanic systems that will become increasing well accepted. Right now Adrienne's work is at the forefront of the field. I am amazed how she has been in the right place at the right time to have access samples from ideal localities to document this process of sulfide formation and removal. I heard that her recent IAVCEI presentation was excellent. I expect that her acclaim for this work will continue to grow.

One of the reason's that Dr Larocque is poised to make excellent contributions in geochemistry and economic geology is because of her wide range of knowledge and expertise. I am impressed that her knowledge of topics in environmental geology and

volcanology as well as geochemistry, economic geology, and microanalysis are substantial and much better than most of her colleagues at a comparable stage.

I have only met and talked to a few of Dr. Larocque's students, but I suspect that there are a number of qualities that make her an excellent teacher. First, she is so enthusiastic and energized herself that I am sure that she passes this enthusiasm and love for the science on to her students. As a collaborator, I have found that she is very conscientious and timely in her correspondence – a trait that would serve her well with students also. She is an outstanding role model for female students (which is one of the reasons we wanted her to meet and speak with our undergraduate students). I think that this is a critical factor to be considered in efforts to retain someone of Dr. Larocque's quality and abilities.

In addition to her "international" family and work, Adrienne has also found time for significant service to the discipline. This will certainly help the discipline as well as the reputation of the department.

In conclusion, I think that Adrienne Larocque has all the characteristics needed to make her a leader in her discipline. Her research is outstanding and she is personable and well liked. I think that there are many departments (such as ours) that would love to have someone of her talents and abilities on their faculty. The volume and quality of her work and service (and teaching) would certainly qualify her for promotion at our university.

Please feel free to call me if you have any questions.

Sincerely,

Jeffrey D. Keith

Jeffrey D. Keith,
Professor of Geology

Ron DiLabio
629 Island Park Crescent
Ottawa, ON, K1Y 3P4 Canada
August 24, 2014

California Commission on Teacher Credentialing
Sacramento, CA
USA

Re: Candidacy of Dr. AC.L. Larocque for an Eminence Credential in California

I have known Dr. Larocque since she began work as a summer student for the Geological Survey of Canada in the early 1980s. Later, I was external advisor on her M.Sc. thesis project. We still maintain contact on scientific matters and as friends. I strongly support her candidacy.

Dr. Larocque's work as an undergraduate student on geophysical techniques for 3D mapping of the sediment in the bottom of lakes is still cited today and her methods of compiling and interpreting the seismic records are widely used. Her work has allowed investigators to clearly see the stratigraphy of lake sediments and essential information such as sediment volume, texture, lake drying or drainage events, past earthquakes and subaqueous mudslides. This was a major advance in understanding that part of the landscape that is out of our view, i.e. lake basins.

During her M.Sc. project, she identified how zinc is held on clay minerals after primary metallic minerals have broken down and released their heavy metals to the environment. The technique that she used has application both in environmental studies and in exploration for ore deposits.

In many parts of the world, gold ore has gone through stages of metamorphism that change the mineralogy from a rather simple mixture (think California hard-rock mining) to a complex assemblage in which the gold has been redistributed in other minerals. Dr. Larocque's work with ion-microprobe instruments mapped the location of gold and other metals in several complex ores. Her work has applications in gold exploration and in ore processing as it identifies which minerals are of value, but more importantly, it shows how the gold reached its final site.

Sincerely,

R. DiLabio

Ron DiLabio, Ph.D. (Geological Survey of Canada, Ret'd)

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Manitoba

Mineral Resources

Manitoba Geological Survey
360-1395 Ellice Ave, Winnipeg MB R3G 3P2
T 204-945-6500 F 204-945-1406
www.manitoba.ca/minerals

July 4, 2014

State of California Commission on Teacher Credentialing
1900 Capitol Avenue
Sacramento, CA 95811-4213

To Whom It May Concern,

I am writing this in support of Dr. Adrienne Larocque's application for Eminence Credential in the State of California. I know Dr. Larocque for 20 years; I first met her when she first arrived as a new professor at the University of Manitoba in the Department of Geological Sciences. Through the years, she has transitioned from being my teacher and research advisor, to my supervisor, to one of my most valued mentors.

During my graduate work at the University of Manitoba, Dr. Larocque was my Master's project advisor and graduate-level professor. Her passion and infectious love of geoscience made her stand out in the department as someone many people wanted to work with and benefit from her knowledge. A successful geoscientist must understand not only the complexities of earth science, but also have a good grasp of basic scientific principles, such as physics and chemistry. Her thorough and exceptional understanding of these basic scientific principles enhanced her teaching methods to bring geoscientific concepts to life in and out of the classroom. She demands excellence from her students, and instills a sense of pride in each student as they learn from her. She encourages each student and helps them when needed, all the while giving them the room they need to learn and grow at their own pace. Her teaching and evaluation methods require that the student understand the topic, and not simply be able to regurgitate it on test. As a result, every student who has benefited from taking one of Dr. Larocque's classes leaves with a sense of accomplishment and true understanding of the concepts taught. Dr. Larocque knows that all students, regardless of their previous academic performance, are capable of learning, it just a matter of finding what learning method works best for them, in order to assure academic success. Her exceptional skills as a speaker and presenter means she communicates effectively and innovatively in order to best deliver her message, whether that is to a room full of professional colleagues, or high school students, or little eager kindergarten students.

As a researcher, Dr. Larocque is well respected by her peers. This respect is shown by the network of professional colleagues she had grown during her career. She approaches her research with excitement and an open mind, and is not afraid to propose new theories and try new innovative ways to test them, all the while keeping true to following the scientific method. Dr. Larocque is herself a student of life, and will tackle any project that is of interest to her. Her ability to learn and quickly apply new knowledge is impressive, and envied by many.

At the time of her resignation from the University of Manitoba, I was sad at the thought that no other student would benefit from her infectious love of geoscience and have the positive learning experience I and so many others had with her. I was also sad that the geoscience community had lost a brilliant mind. Of course, her resignation did not mean she would be "lost", but would in fact open the doors to other opportunities for her that would make her an even better scientist.

Through the last decade, as she she was taking on other teaching opportunities, I was thrilled to learn that she would still be able to influence the young minds thirsty for knowledge, and inspire future generations about the fabulous wonders of the earth and the sciences.

The students in the State of California would be extremely fortunate to have a teacher as talented, passionate and caring as Dr. Larocque.

Should you have questions or would like further information, please don't hesitate to contact me at 204-945-6571 or by email at michelle.nicolas@gov.mb.ca.

Sincerely,

Michelle Nicolas

Michelle Nicolas, P.Geo.
A/Chief Geologist, Sedimentary Geoscience
Manitoba Geological Survey

State of California
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Daniel Layton-Matthews
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RE: EMINENCE CREDENTIAL

To whom it may concern,

I have known Dr. A.C.L. Larocque since she started as an assistant professor at the University of Manitoba in 1994. Even before I took classes with Adrienne, we came to know each other through our mutual interest in mineral deposits. In 1996, I had the honour of being in her first 7.277 Principles of Inorganic Geochemistry class. Many new professors show signs of insecurity when teaching a class for the first time. However, this was not the case with Adrienne. Her teaching style was very organized, concise and taught with enthusiasm. If questioned during lecture, Adrienne would spend the time during class to explain the theory until the student clearly understood the answer. If this was not enough, or the student did not feel comfortable asking questions in class, Adrienne was always willing to spend time out of class talking about her lectures. Her office door was always open, and many students (including myself) would often approach her with questions on other classes or career advice.

During the period of September 1996 thru April 1998, I worked for Adrienne during the academic year where she allowed me to help with her research. During this period, my future research plans were focused and I am very grateful for the opportunity that Adrienne gave me. During the summer of 1997, my work with the Phelps Dodge Corporation allowed the development of my B.Sc. thesis. I could have chosen any professor at the University of Manitoba to work with, but my choice to work with Adrienne was obvious. Her working knowledge of mineral deposits, zest for research, and the working relationship that we had developed, was invaluable.

After completion of my B.Sc. (Hons) at the University of Manitoba, I continued my education at Laurentian University, completing my M.Sc. in Geology and my PhD at the University of Toronto (the top PhD university in Canada). It was the recommendation by Adrienne that allowed my easy acceptance to Laurentian University and the University of Toronto. The scientific knowledge that I acquired from Adrienne and the work ethic that she taught me during my education at the University of Manitoba has allowed me to continue my education and research to new levels.

From 1994 to 2001, as a newly appointed faculty member at the University of Manitoba, Adrienne established herself as one of Canada's emerging geoscientists. She became an international recognized expert in ores and metamorphism; a field traditionally led by male researchers. She become a leader in many international societies and organized several short courses at international conferences. During this time she published 12 significant journal articles that have been heavily cited by research peers. As expected of young researchers, Adrienne broadened her research scope, quickly becoming interested in a diversity of ore deposit types, magmatic processes, environmental remediation, and

Queen's UNIVERSITY

micro-analytical techniques for chemical and isotopic analysis of minerals. She has made a long-lasting contribution to these fields as evidenced by her current citation indices.

Daniel Layton-Matthews
Associate Professor
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and
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Kingston, On., Canada,
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http://www.queensu.ca/geol/faculty/laytonmatthews.html

In 2001, after being promoted to Associate Professor, Adrienne made a very difficult decision to join her husband with their newly born child in Indonesia. Initially she took a leave of absence from the University of Manitoba, but after much consideration she left her faculty appointment. Since her departure, Adrienne has maintained her connection to geology publishing several journal articles in the premier journals of Volcanology and Economic Geology. Her passion for scientific learning has remained resolute. She will continue to influence geoscience as she has made a lasting and continuing contribution to our science.

It is without hesitance that I recommend Dr. A.C.L. Larocque as an "individual who is eminent in a specific endeavour and is recognized as such beyond the boundaries of his or her community, having demonstrably advanced his or her field, and has been acknowledged by her peers". If you require any additional information or recommendation, please feel free to contact me.

Regards,

Daniel Layton-Matthews

BRANDON
UNIVERSITY
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GEOLOGY
DEPARTMENT
Micro Analytical
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State of California
Commission on Teacher Credentialing
1900 Capitol Ave.
Sacramento, CA 95811

August 25, 2014

To Whom It May Concern,

This letter is in support of the application for an Eminence Teaching Credential by Dr. Adrienne Larocque. I am currently a Faculty member at a Canadian University for the last 5 years with my provincial professional development accreditation (P. Geo.). I have known Dr. Larocque since January 1998 in the capacity of professor, employer, and thesis advisor.

I first knew Dr. Larocque when she was teaching an advanced second year Geochemistry course at the University of Manitoba, Canada. Not only was the course material well researched, prepared, and presented but both lab work and class lectures provided practical as well as theoretical aspects vital to the background of any beginning (or advanced) earth scientist. Her knowledge and excellent ability to teach made for a very interesting and valuable course. In January 2000, Dr. Larocque also taught a third and fourth year Mineral Deposits course covering a diverse range of deposit types, mineralization, and processes. While covering such a large number of deposits, the thoroughness and attention to detail was always there. As a professor, Dr. Larocque encouraged group interaction and class presentations, which are essential to the learning process. She was an asset to the Department of Geological Sciences at the University of Manitoba and was more than well respected and appreciated by her students.

I also had the privilege of working with Dr. Larocque for two summers, one as a research assistant (1998) and one under and an NSERC research grant (1999) where she acted as my supervisor. In those two years I was given instruction, guidance, and knowledge of a well-respected researcher. Not only did she teach me the aspects of research that I never would have learned from regular school terms, she allowed me to follow my interests all the while encouraging new opinions and ideas. Eventually Adrienne wrote a paper that included some of the work that I did during my summer internship. Some professors might use a student's efforts and only give them an acknowledgment but Dr. Larocque included me as a co-author. That paper went on to win the national distinction of the Hawley Medal (2000), which recognizes the best manuscript published annually in the *Canadian Mineralogist.*

Dr. Larocque also acted as my thesis advisor where she provided a project that included all aspects of a great thesis including field mapping and sampling; analytical techniques and image analysis; and data interpretation and presentation where all purposes and goals were clearly defined. It was because of the time Adrienne dedicated to teaching me analytical techniques like scanning electron microscopy (SEM) and electron probe microanalysis (EPMA) that I was able to gain a full understanding of my undergraduate thesis. You could count on Dr. Larocque for a great project and a great learning experience. Multiple publications came out of this thesis as well.

On top of all the teaching, supervising, and advising Dr. Larocque was very active with many committees, contributions to meetings, posters, and presentations. Her interests and the research she did is very diverse and covers a broad range of topics as her geology career demonstrates ranging from quaternary geology to metal mobility , environmental issues, and economic sulfide deposits (and the list goes on). My own research has been in the area of mineral deposits and the papers she has written in this field are still widely cited to this day.

Along with her active involvement, encouragement, and ability to communicate with her students, Dr. Larocque was motivational, easy to get along with, very helpful, and has a strong work ethic proving her rightful position as a leader, a teacher, and a mentor.

Dr. Larocque, no matter what she had going on in her busy schedule, did not hesitate to drop anything and everything for a student in need whether it be school related or personal. She did anything in her power and went out of the way for students (and colleagues) in need and would selflessly offer her assistance in any way possible. While not in her job description or a requirement of her, she would never hesitate to give an extra hand. In the case of Dr. Larocque, "an open door is a used door".

Although my direct involvement with Adrienne was in my undergraduate degree, we have kept in touch through common interests and contacts over the years as I carried on to do an MSc and PhD in the Earth Sciences. As a faculty member at Brandon University, I now have the ability to reciprocate in teaching and training my own students and research assistants in the Earth Sciences in a University environment. On a personal note, while I was an undergraduate, Dr. Larocque had my deepest respect and admiration as a teacher, geologist, mentor, and friend. Now as a Faculty member myself in a Geology Department, she has my respect as a great scientist, a peer, a colleague, and a mother. I personally would not have the confidence and knowledge to be the geologist I am today if it weren't for Dr. Larocque. Not only did she help with academics and research, but she would also help her students gain contacts and refer them only to the best places. I hope you will not take these words lightly when considering granting Dr. Larocque an Eminence Credential, as I know I am not alone in these opinions.

If you have any questions or would like more specific details, please do not hesitate to contact me at huminickim@brandonu.ca.

Kind Regards,

Michelle A.E. Huminicki, BSc, MSc, PhD, PGeo
Facility Manager/Instructional Associate
Micro Analytical Facility
Department of Geology
Brandon University
270-18th Street
Brandon, Manitoba, Canada
R7A 6A9
phone: (204) 727-7499
cell: (204) 724-8500
e-mail: huminickim@brandonu.ca

Teaching Accomplishments

TEACHING AT INTERNATIONAL PRIVATE SCHOOLS

2006-2010: **Jakarta International School**, Indonesia. Substitute teacher for:

- High school:
  - Environmental Systems
  - Environmental Science
  - Combined Science
  - Applied Chemistry
  - College Prep Physics
  - Biology
  - French
  - Physical Education
- Middle school
  - Science
  - Algebra
  - Pre-algebra

2006-2007, 2009: **New Zealand International School**, Jakarta, Indonesia (short-term contract):

- Year 10 Coordinated Science (3 months)
- Year 8 English (4 months)
- Year 9 English (4 months)
- Year 8/9 Phys. Ed. (4 months)
- A/S level Physics
- Year 10 Geography (in 2009)

2007-2009: **ACG International School**, Jakarta, Indonesia. Part-time teacher:

- Year 7-9 Science
- Year 10-11 Science

2005: **Brent International School**, Manila, Philippines. Substitute teacher for:

- Grade 4 and 5 Science classes
- Grade 1 and 2 classes

Dr. Larocque was offered a job teaching Science at the high school at Brent International School, but she was required to turn it down when her husband's employer decided to relocate the family to Jakarta, Indonesia.

TEACHING RESPONSIBILITIES AT THE UNIVERSITY OF MANITOBA

I was on maternity leave from September 1998 until April 1999, and I had a reduced appointment (60%) from October 1999 to August 2001.

(i) Undergraduate Courses

2000/2001: 7.277 *Principles of Inorganic Geochemistry* - 3 credit hours
7.136 *Environmental Earth Science* - 3 credit hours

1999/2000: 7.277 *Principles of Inorganic Geochemistry* - 3 credit hours
7.430 *Mineral Deposits* - 3 credit hours

1997/1998: 7.132 *Earth and the Environment* - 6 credit hours
7.277 *Principles of Inorganic Geochemistry* - 3 credit hours

1996/1997: 7.124 *Earth and Planetary Science* - taught 3 of 6 credit hours
7.277 *Principles of Inorganic Geochemistry* - 3 credit hours

1995/1996: 7.124 *Earth and Planetary Science* - taught 3 of 6 credit hours
7.277 *Principles of Inorganic Geochemistry* - 3 credit hours

1994/1995: 7.124 *Earth and Planetary Science* - taught 3 of 6 credit hours, as my appointment started in November 1994

(ii) Graduate Courses

2000/2001: 7.774/775 *Workshop: Environmental Geochemistry* - 3 credit hours
1999/2000: 7.774/775 *Workshop: Environmental Geochemistry* - 3 credit hours

1996/1997: 7.774/775 *Workshop: Environmental Geochemistry and Geophysics* - 3 credit hours; co-taught with Ian Ferguson
7.774/775 *Workshop: Directed study on petrography and geochemistry of sulfide mineralization from the Birchtree Mine, Thompson, Manitoba* - 3 credit hours

1995/1996: 7.774 *Workshop I: Topics in Environmental Geochemistry* - 3 credit hours

STUDENT SUPERVISION

GRADUATE STUDENTS SUPERVISED:

1999-04: Karen Greengrass, M.Sc. (co-supervised by Norman Halden)
Thesis topic: Mobilization and attenuation of metals in black shale, Lake Winnipeg, MB.

1998-00: Janice Liwanag, M.Sc. (co-supervisor with Norman Halden)
Tentative thesis title: *A Microprobe Study of Magmatic and Sedimentary Sulfides from the Thompson Nickel Belt, Manitoba, Canada*

1996-98: Pamela Fulton, M.Sc. (co-supervisor with Norman Halden)
Thesis title: *The Gold Mineralization at the New Britannia Mine, Snow Lake, Manitoba*

1995-97: Michelle Boulet, M.Sc.
Thesis title: *A Comparative Mineralogical and Geochemical Study of Sulfide Mine-Tailings at Two Sites in New Mexico, USA*

ADVISORY COMMITTEE MEMBER FOR:

1999-02: Dawn Friesen, Ph.D. in Chemistry with Lisa Rosenberg
Thesis topic: Templating strategies in organophosphorus chemistry: the use of traditional and non-transition metal templates in the synthesis of P-containing macromolecules.

1999-01: George Golding, M.Sc. in Microbiology under Carol Kelly
Thesis topic: Development of anaerobic biosensors

1997-99: Karen Scott, Ph.D. in Microbiology under Carol Kelly
Tentative thesis title: *Factors Affecting Bioavailability of Hg*

1997-99: Hong-en Ma, Ph.D., supervised by Barbara Sherriff
Thesis topic: Bioleaching and bioaccumulation of metals by microalgae

1997-99: Christine McCracken, Ph.D., supervised by Frank Hawthorne
Thesis topic: Crystal chemistry of tourmalines

1996-99: Xianghong Wu, Ph.D., supervised by Ian Ferguson
Thesis topic: SNORCLE magnetotelluric studies of structures in the Northern Cordillera

1996-99: Andrea Bullinger, M.Sc. in Soil Science under Tee Boon Goh
Thesis topic: Innovative use of waste coal fly ash in reduction of greenhouse gas emissions from farmyard manure

1995-99: Ling-Xiu Jiao, Ph.D., supervised by Wooil Moon
Thesis topic: Development of imaging techniques for LITHOPROBE seismic data

UNDERGRADUATE STUDENTS SUPERVISED:

2001/02: Debbie Bray (co-supervised by Jeff Young)
Thesis title: The *Geology and Geochemistry of the South Main Rhyolite Complex, Flin Flon, Manitoba*

2000/01: Christine Lambert (co-supervised by Barbara Sherriff)
Thesis title: *Preliminary Study of the Mineralogy and Geochemistry of the Gunner Mine Tailings Pile, Nopiming Park, Manitoba, Canada*

2000/01: Mike Surka (co-supervised by George Clark)
Thesis title: *Metal Mobility During Silicification of the 1.89 Ga Welch Lake Primitive Arc Basalts, Snow Lake, Manitoba*

1999/00: Michelle Huminicki (co-supervised by Norman Halden)
Thesis title: *A Mineralogical, Petrological, and Geochemical Evaluation of the Cu-Ni-Platinum-Group Element Mineralization in the Marginal Zone of the Fox River Sill, Northeastern Manitoba*

1998/99: Shastri Ramnath (co-supervised by Norman Halden)
Thesis title: *Prairie-Type Mineralization: A Mineralogical and Geochemical Study of Solution Chimneys in the Mafeking Quarry, Manitoba, Canada*

1997/98: Daniel Layton-Mathews (CIM Undergraduate Award winner)
Thesis title: *The Agate Zone, Mallery Lake Epithermal System, District of Keewatin, NWT: A Petrographic, Lithogeochemical, and Alteration Study of the Pitz Formation*

1997/98: Richard Matthews, (co-supervised by Nancy Chow)
Thesis title: *Depositional Sequences, Erosional Surfaces, and Petroleum Potential of the Viking Formation, Ferrier, Alberta*

1996/97: Pat Athanasopoulos, (co-supervised by Jim Stimac)
Thesis title: *The Origin and Ascent History of the 1996 Dacite Dome, Volcán Popocatépetl, Mexico*

Analysis of Student Evaluations at University of Manitoba

The table below summarizes the percentage of students who responded "Agree" or "Strongly Agree" to the questions posed on sample student evaluations that were administered anonymously at the end of each course taught by Dr. Larocque. Course 7.132, Earth and Environment, was a full-year course that she developed specifically for first-year students. It served as a Science elective for non-Science students, or as an entry into the Geological Sciences program. Course 7.277, Principles of Inorganic Geochemistry, was substantially modified by Dr. Larocque when she took it over upon arrival at the University of Manitoba. It was a demanding second-year course that was required for students to move on in Geological Sciences. The evaluations are from 1998 and 2001 respectively.

The raw summaries of student responses can be found overleaf.

Question	7.132	7.277
	%	
1. I have found the course intellectually challenging and stimulating	95	100
2. I have learned something which I consider valuable	96	95
3. My interest in the subject has increased as a consequence of this course	77	78
4. I have learned and understood the subject materials of this course	78	61
5. Instructor was enthusiastic about teaching this course	86	100
6. Instructor was dynamic and energetic in conducting the course	86	100
7. Instructor enhanced presentations with the use of humour	86	100
8. Instructor's style of presentation held my interest during class	87	89
9. Instructor's explanations were clear	78	89
10. Instructor's materials were well prepared and carefully explained	90	89
11. Proposed objectives agreed with those actually taught so I knew where course was going	82	94
12. Instructor gave lectures that facilitated taking notes	77	72
13. Students were encouraged to participate in class discussions	95	100
14. Students were invited to share their ideas and knowledge	86	95
15. Students were encouraged to ask questions and were given meaningful answers	96	100
16. Students were encouraged to express their own ideas and/or question the instructor	95	100
17. Instructor was friendly towards individual students	100	100
18. Instructor made students feel welcome in seeking help/advice in or outside of class	96	100
19. Instructor had a genuine interest in individual students	73	100
20. Instructor was adequately accessible to students during office hours or after class	82	100
21. Instructor contrasted the implications of various theories	96	89
22. Instructor presented the background of origin of ideas/concepts developed in class	91	94
23. Instructor presented points of view other than his/her own when appropriate	86	94
24. Instructor adequately discussed current developments in the field	91	100
25. Feedback on examinations/graded materials was valuable	87	94
26. Methods of evaluating student work were fair and appropriate	96	89
27. Examinations/graded materials tested course content as emphasized by the instructor	87	100

ORIX
GEOSCIENCE INC.

California Commission on Teacher Credentialing
1900 Capitol Ave.
Sacramento, CA
August 28, 2014

Re: Letter of Recommendation in support of Dr. Adrienne Larocque

To whom it may concern,

I am writing this letter of recommendation in support of Dr. Adrienne Larocque. I graduated from the University of Manitoba Geological Sciences program in 1999 and during my undergraduate program Dr.Larocque instructed me in 2nd year geochemistry, became my undergraduate thesis co-supervisor in 4th year, and most importantly, mentored me throughout the degree.

Since my undergraduate program in Manitoba, I completed a Master's of Science in Exploration Geology at Rhodes University, South Africa in 2001 and graduated from an Executive MBA program at Athabasca University, Edmonton, Canada in 2013. I have worked the last 15 years as a geoscientist focused on exploration and have experience in geological compilation, interpretation and modelling as well as in resource and reserve estimation. The most significant highlights of my career involve the discovery of two ore bodies in Sudbury, becoming the CEO of a junior company and raising over $17 million in the capital markets, and most recently, founded and am the sole owner of a geological consulting firm with 15 full time employees based out of three offices located throughout Canada.

Dr. Larocque's research has been so important to her, as have her students. I have never seen someone get so excited about learning new things and teaching them to others. Often when I was a student she would tell me about what she was working on or who she was working with. She really made science so interesting and exciting! I found that she did the same in class as well. She explained ideas in a simple manner before developing them as complicated geochemical theories. For someone like myself, I appreciated the simplicity to which she could explain very complex theories as I was able to understand the concepts with context in the bigger picture. I finally was able to learn about geochemistry, a topic that had intimidated me before I took Dr. Larocque's class.

During my graduate studies, I looked back at Dr. Larocque's course and truly appreciated her efforts in teaching geochemistry. She made sure that the course content was appropriate and applicable. As an undergraduate, I often felt that other courses were too theoretical and inapplicable to my future work as a geologist. In contrast, the second year geochemistry course laid a good conceptual foundation while establishing the relevance of the ideas in the "real" world.

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Phone: 416.894.6676 • info@orixgeo.com • www.orixgeo.com

After my second year, I found that Dr. Larocque still had time for me. In fact, she did more for me than anyone else and became an important sounding board for me. Many young students/geologists find it very difficult to find a good mentor, a person who provides support and instills confidence in someone young and inexperienced. Dr. Larocque gave me confidence and was always interested in what I had to say about geological issues. As a female geologist, having a mentor was even more important because of the different struggles that many women encounter compared to men. After my first year as a student, I had a very bad field experience that almost made me quit geology completely. Dr. Larocque constantly encouraged me and inspired me to be strong. She urged me to continue in geology so that I could set an example for other women. Her impact on my life and career as a geoscientist has been invaluable. As a result of her mentorship, I have taken on the same responsibility for other women that Dr. Larocque did for me. Orix Geoscience has a female employment rate of 70% when majority of companies operating in the mining sector have a female rate of 10 to 20%. Much of who I am as a geologist and how I mentor and encourage young women has been shaped by my experience with Dr. Larocque.

Dr. Larocque committed to being my thesis supervisor half way through my 3rd year. As the time came for me to begin summer work on my thesis, she found that she was pregnant and would be on maternity leave while I was in 4th year. Amazingly, she was so worried about what I would do about my thesis that she insisted on helping me along as much as she could. Given that we both recognized the importance of her continuing with me, she appointed a co-supervisor in the department to be "on site," but Dr. Larocque went in the field with me to do sampling when she was 7 months pregnant! This reflects Dr. Larocque's commitment and concern towards her students and research. Throughout the remainder of her pregnancy and even after her son was born, she kept in full contact with me and guided me as much as she could. Very few professors would go to the extent that she has gone for me in my undergraduate research.

Overall, I feel that Dr. Larocque was an invaluable professor that only has the utmost concern and commitment for her students. She is one of the best professors and geoscientists that I have met as she is bright, caring and hardworking.

I strongly recommend Dr. Adrienne Larocque for an Eminence Teaching Credential and firmly believe that any organization that is fortunate enough to attract her will quickly recognize the value she adds both from a technical perspective and as a leader.

Sincerely,

Shastri Ramnath

Shastri Ramnath
President & Principal Geologist
Orix Geoscience Inc.

Sarah Mearon
3700 10th Ave #1K
San Diego, CA 92103

August 31, 2014

To Whom It May Concern:

I am writing this letter in support of an application for an Eminence Credential in the State of California for Adrienne Larocque. I have known Dr. Larocque since 1997 when I was in her Inorganic Geochemistry class as part of my Bachelor of Science (Honors) program in Geological Sciences at the University of Manitoba in Winnipeg, Canada. After obtaining my undergraduate degree I completed a Master of Science program in Geological and Environmental Sciences at Stanford University in Stanford, California. I am a licensed Professional Geologist in the State of California and currently work as an environmental consultant.

Dr. Larocque is an outstanding educator, scientist, and mentor who stands out as one of the most effective and memorable teachers in my educational history. Her class was intensive and academically challenging, but it was clear that she really went the extra mile to ensure her students fully understood the material and would be able to use it as a building block for other courses in the curriculum. Dr. Larocque's teaching style was informative, interactive, and always exciting. Her influence extended well beyond the duration of that class. She continued to occupy a prominent position as a well-known and well-respected mentor within the department throughout my time there. Although my undergraduate thesis project was on a different topic (petroleum exploration), I took such an interest in her class that I was appointed the teaching assistant (TA) for the class in my fourth year of study.

Dr. Larocque is exceptionally knowledgeable in her field and has continued to be an effective educator since leaving the University of Manitoba. I have no doubt that she is performing at the highest level of achievement in her current position, and is highly qualified to be granted an Eminence Credential.

If you require additional information, please feel free to contact me at 510.332.5660 or smearon@yahoo.com

Sincerely,

Sarah Mearon

Claude Resources Inc.
Discovering. Developing. Delivering.

200 – 224 4th Ave. South
Saskatoon, SK Canada S7K 5M5
Phone: (306)668-7505
Fax: (306)668-7500
Internet: www.clauderesources.com

State of California
Commission on Teacher Credentialing
1900 Capitol Ave.
Sacramento, CA 95811

August 31, 2014

To whom it may concern,

I am writing this letter in reference of Dr. Adrienne Larocque. She was my lecturer for Introduction to Geochemistry and a mentor for the remainder of my undergraduate degree.

During my third year within the environmental science program, I met Adrienne. Her very approachable nature and genuine interest in a student's well-being resulted in my seeking her for advice. She posed key questions and eventually led me to make the decision to pursue geology as a degree and career. As a lecturer, Dr. Larocque taught me more in any single course than any of my other professors and more importantly provided a framework for learning that I still follow today. Her lecturing style and preparation allowed students to focus on the important concepts. The courses she led were extremely challenging and required much time and effort, however in the end prepared us for the future. In summary, she is an exceptionally qualified educator.

Later during my undergraduate years, summer jobs became a necessity in terms of geological experience and finance. Adrienne went beyond her call as a professor in an attempt to guide me in finding employment. She showed the highest level of confidence in my geological abilities and relayed this confidence to potential employers.

After completing a B. Sc. at the University of Manitoba, I went on to pursue and complete an M.Sc. in Exploration Geology at Rhodes University in Grahamstown, South Africa. Subsequently, I have moved through progressive roles as a geologist, manager and now an Executive with a Canadian mining company. Adrienne played a very significant role in my success as a geologist and professional.

I feel Adrienne has done so much for me as a student, a geologist and a person. She has a passion and talent for teaching and I would recommend her for all roles that are aligned with this.

Respectfully yours,

B Skanderbeg

Brian Skanderbeg, M. Sc.
Senior VP, Chief Operating Officer - Claude Resources Inc.
Saskatoon, Saskatchewan
Canada

10 Dover Rise

Heritage View Tower B 06-09

Singapore 138680

24 July 2014

California Commission on Teacher Credentialing

Re: Document for Verifying Eminence – Dr. Adrienne Larocque

I feel privileged to have the opportunity to provide a letter of reference for Dr. Adrienne Larocque.

I served as Head of Upper School and Head of English at the New Zealand International School, Jakarta, Indonesia in 2005 and 2006. Subsequently, I served as Deputy Head of Upper School, Head of English and Sixth Form Tutor at the British International School, Lagos, Nigeria from 2007 to 2010. I am currently an independent contractor resident in Singapore.

Dr. Larocque was employed from 2006 - 2009 in a number of capacities at the New Zealand International School. The school follows the Cambridge International Curriculum which is internationally recognized and highly regarded, providing students with access to the world's top universities.

Dr. Larocque was employed on a part time basis to teach:

Year 10 Coordinated Science; Year 8 English; Years 8 and 9 Physical Education; AS Level Physics and Year 10 Geography

The wide range of teaching responsibilities entrusted to Dr. Larocque is testament to the level of faith she enjoyed at the school but also, of course, to her versatility and competence. Dr. Larocque opted to be employed in a part-time capacity as she had two young children but the school would have been eager and delighted to have her on board in a full-time capacity, had she been willing.

Dr. Larocque is very hard-working and efficient. She is superbly reliable. She is an excellent role model to fellow teachers and students alike. As an English Teacher, she is inspiring, competent and dedicated but her passion is in the Sciences, in particular, her specialised field of expertise, Earth Sciences, in which she is both eminently qualified and hugely knowledgeable. Her teaching in the Sciences resulted in a demonstrable flurry of excitement and interest from students, many of whom had previously struggled with the subjects she was teaching. In her term of duty at the New Zealand International School, she undoubtedly raised the standard of teaching and learning at the school,

skorokoro@hotmail.com +6593520010

resulting in the best results the school had ever enjoyed in her teaching subjects. Dr. Larocque set high standards for her students and we had the pleasure of seeing students attain those standards and love what they were learning as well. It was encouraging to see them go to great lengths to deliver work of the highest quality for her.

Dr. Larocque was an asset on other levels. She provided informal support and mentoring to fellow teachers who were aspiring to reach a little beyond their capabilities and she extended the same care and wisdom to students – a very important function in an International School where students often struggle with adaptation issues.

Dr. Larocque is well traveled and has worked on numerous international assignments. This suggests that she settles into new positions easily and with minimal adjustment time. She is also used to working with students from a very wide range of cultures and backgrounds.

I cannot recommend Dr. Larocque highly enough. She will be a huge asset to whichever institution is lucky enough to secure her services.

Sincerely

Maureen Phillips
Head of English, Deputy Head of Upper Secondary, Sixth Form Tutor – British International School, Lagos

Head of Secondary of the New Zealand International School, Jakarta

skarokoro@hotmail.com +6593520010

April 8, 2011

To Whom It May Concern,

Re: ADRIENNE LAROCQUE (Addie)

This is a letter of recommendation for Adrienne Larocque, known to students and colleagues at ACG International School, Jakarta, as Addie. ACGIS offers International Baccalaureate (IB) Primary Years Program, followed by the University of Cambridge International Lower Secondary Program (leading to Checkpoint assessment in Year 9) and University of Cambridge International Examinations (CIE) in Senior Secondary.

Because ACGIS is a small school, I had a more "hands on" role than in larger schools. I knew every student and family, and developed an intimate relationship with teachers and support staff. This gave me a unique awareness of what went on in and outside the classroom.

ACGIS is a relatively new international school in Jakarta. It experienced rapid growth during my tenure. As such, we employed Addie as a part-time Science teacher from August 2007 to June 2009, to assist us in our transition to a larger student population and greater course offerings. She taught the Chemistry and Biology sections of Year 8-9 Science and IGCSE Combined Science (Year 10-11). In addition, Addie taught classes in Art and Design and Literature, in a relief position.

Addie has a passion for teaching Science. She engages students through the use of humour and storytelling, and always strives to make material relevant. Addie's animated personality helps students get excited about the topics she teaches. Her obvious concern for all of her students allowed her to develop close relationships with them. Addie encouraged independent learning, particularly with senior students. In all of her classes, she adjusted her approach when necessary to cater for individual student's needs.

Addie demonstrated her commitment to professional development by attending a Chemistry Teacher's course sponsored by IGCSE and participating positively in yearly, in-class appraisals of her teaching. In addition to her official teaching duties, Addie identified and ordered necessary equipment and sketched out a plan for our new Science laboratory. She routinely volunteered in Primary classes to share her expertise in and enthusiasm for Science with the students and support her colleagues at all levels.

Addie was active in volunteer work in Jakarta, and she was responsible for developing a relationship between students and staff of ACGIS and members of Yayasan Kampung Kids. Addie organized field trips and tutoring sessions for our students at the Kampung Kids community center.

In conclusion, I have found Addie to be a caring and capable teacher of students of all backgrounds and levels of ability. Beyond her official duties, she never hesitated to help out in any way that might benefit the students, staff or parents at ACG International School. I strongly recommend Addie for any position that requires, hard work, loyalty, passion and commitment. Please feel free to contact me if you have any questions.

Yours sincerely,

Jude Soper (Mrs)

Former Principal of ACG International School, Jakarta, Indonesia

Current e-mail address: judeandathol@gmail.com

Cell phone: +1347 7515557

current e-mail address:
judesoper1@gmail.com

5 June 2010

To Whom It May Concern:

I am writing this recommendation with regard to Adrienne Larocque (Addie). I have known her for the past 4 years as a friend and as a very reliable colleague. Addie has come to my rescue on numerous occasions as a substitute teacher for my high school science classes. In this capacity I have found her to be extremely dependable, creative, versatile, knowledgeable and enthusiastic; to name a few of her vast range of professionally valuable qualities.

I am a high school teacher at Jakarta International School and have been a teacher for over 30 years. Jakarta International School is a highly competitive college preparation school and academics are emphasized. I teach IB Environmental Systems and Societies, AP Environmental Science and Chemistry. Each of these courses is very demanding and the expectation of the students and our parents are very high. Consequently, loss of student contact time is a critical issue and having an experienced and reliable teacher to step in while I am out of the classroom is essential to the overall quality of the course. Addie has been the absolute best substitute, able to make the most out of unpredictable circumstances.

More specifically, this past school year, I was to be gone during a critical unit in my AP Environmental Science class. Having arranged Addie well in advance, we coordinated the week of lessons. The feedback from the students was very positive and supportive of Addie's competence and confidence in the classroom. Additionally, the students benefited from Addie's advanced knowledge and ability to communicate these concepts to a high school level. They also commented positively on her great classroom personality and energy. They had obviously had a very positive learning experience.

Addie is a fine candidate for a teaching position at any level in almost any science discipline. Her background, experience and strong foundation in the sciences permit her to fill a variety of roles in any school. She will be an asset to the faculty, the students, and to your school community.

Sincerely,

Gregory A Spechalske

Jakarta International School
High School Environmental Sciences
gspechalske@jisedu.or.id → current e-mail address: spechalske@mac.com

JIS
JAKARTA INTERNATIONAL SCHOOL

May 27, 2010

To whom it may concern,

Re.: Mrs. **Adrienne Larocque**

Mrs. Adrienne Larocque has been working as a substitute teacher in various classes in the Middle and High schools (grades 6-12) since August 2006. She has successfully and extensively taught in the High School Science classes, along with classes in both High School and Middle School in the Math, Modern Languages (French) and PE departments.

Even though I have not directly supervised her classroom teaching, I have been in close touch with her and the teachers whose classes she has substituted in. Adrienne is confident and comfortable in dealing with the classes in both middle and high schools. She is a conscientious teacher, is very organized and has always been eager to work. Adrienne has shown professional attitude towards her work and I find her extremely dependable and competent in conducting activities in the classes. Adrienne's previous experience as a teacher and her knowledge of Science has resulted in her being extremely effective in handling the student activities confidently. I am happy to note the positive feedback I have received about her work from various members of faculty, students and parents.

Adrienne's expertise in Environmental Systems and Science, Biology as well as her thorough knowledge in the fields of Chemistry and Physics has made her a very valuable substitute on my list for the Science department. She has excellent social skills, which encourage the students to take liking to her.

Since the requirements of substitute teaching are varied and frequency unpredictable, it is not easy for a substitute teacher to cope with the subject matter at a short notice. In such situations, Adrienne's good social skills come in handy. She communicates and coordinates with faculty to understand the lesson plans so that she can teach well. For planned substitutions, she always has been willing to prepare herself for the classes, by taking textbooks home for a review and by arriving early to school to prepare.

I understand that Mrs. Larocque is planning to leave Indonesia and I recommend her with all my support, in any future work that she will take up.

In case of any further inquiries, please feel free to contact me at rmoghe@jisedu.or.id.

Sincerely,

Rohini C. Moghe

(Mrs.) Rohini Moghe
HS & MS Substitute Coordinator,
Jakarta International School.

current e-mail address:
rcmoghe@gmail.com

Health Canada | Santé Canada
Health Protection Branch | Direction générale de la protection de la santé

Dept. of Geological Sciences
University of Manitoba
Winnipeg, MB
R3T 2N2

September 13, 2000

To Whom It May Concern:

I am pleased to write this letter in support of the application by Adrienne Larocque for promotion to Associate Professor. I am a Research Scientist specializing in analytical and environmental geochemistry in Health Canada's Environmental Health Directorate. Adrienne and I came to know each other through colleagues at the Geological Survey of Canada because of our mutual interest in metals in the environment. In 1996, we co-chaired a symposium entitled "Metals in the Environment: Mobilization to Remediation" at the GAC-MAC meeting held in Winnipeg. We subsequently co-authored the preface paper for a special issue of Environmental Geology containing the proceedings of the symposium. In 1997, Adrienne was recruited by the Metals in the Environment (MITE) Research Network to be the leader of the Sources Domain in their application for funding to NSERC. We currently are working on a review paper on volcanic emissions of metals to the environment and the implications for modelling long-range atmospheric transport of metals.

Adrienne is widely respected by her academic and government colleagues for excellence in research. She is an accomplished lecturer, and is a keen and energetic teacher and mentor to her undergraduate and graduate students. I look forward to future collaborations with Adrienne in multidisciplinary research initiatives that bridge earth sciences and environmental health issues.

Yours truly,

Pat Rasmussen

Dr. Pat E. Rasmussen, Research Scientist
Health Canada, Environmental Health Directorate
1800 Walkley Road, Postal Locator 6402A1
Ottawa, Ontario, Canada K1A 0L2

Canada

Major Paul Keddy
Executive Assistant to the Chief of Staff
Operations
Air Command Headquarters
Winnipeg, Manitoba

Dr. George S Clark
Department of Geological Sciences
University of Manitoba
Winnipeg, Manitoba
R3T 2N2

Dear Sir,

I am writing to express my sincere appreciation for the contributions of Professor ACL Larocque during her evening Earth and Planetary Science course in the second term of 1996. From the commencement of our studies; to the final exam and beyond, Professor Larocque's professional demeanor and focus on the students' academic and personal concerns were beyond reproach. Faced with the challenges typical of all large classes, Professor Larocque has the talent of bringing the class together in their studies and nurturing the achievements most indicative of much smaller and more advanced groups.

As a full-time student on scholarship from the Canadian Forces, I must say that in my 15 years with the service and having attended many hours of lectures and seminars, both within DND and the University of Manitoba, I was impressed with Doctor Larocque's communication and leadership style. She has a natural ability to make her point both in a concise and eloquent way. As a result, I believe her efforts were duly rewarded, judging by the successes of the entire student body on the mid-term and final examinations.

I do not believe the course evaluation did justice in recognizing Professor Larocque's efforts and therefore I thought it would be more fitting to contact you directly. On behalf of the students, please pass on our compliments to Dr. Larocque and accept my congratulations for providing the course with an exceptional professor.

Sincerely,