Professional Registration of Geoscientists

Comment on

Professional Registration of Geoscientists — Threatening the Future of Geoscience in Canada
By K.W.F. Howard
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The article by Dr. Ken Howard provides a welcome opportunity to dispel some apparent misconceptions about professional registration (licensure) of geoscientists in Canada, especially on the subject of what qualifies a geoscientist for licensure.

It is unfortunate that Dr. Howard's research on the topic was incomplete. Apart from the reference to Pearson (1996), the only current source of information cited (Nield, 1997) is a precis of a short written report I submitted to the 1997 meeting of the European Federation of Geologists. Information about the philosophy of and progress toward licensure of geoscientists in Canada has been widely publicized and has been readily available for many years. Yearly progress reports of the Professional Registration Committee of the Canadian Geoscience Council (CGC) have been published in the Annual Reports of the CGC since 1990. During the past 2-3 years, articles have also appeared in the newsletters and/or on the Internet web pages of geoscience learned societies in Canada: Geological Association of Canada (*Geolog*), Canadian Society of Petroleum Geologists (*The Reservoir*), Canadian Society of Exploration Geophysicists (*The Recorder*), Atlantic Geoscience Society (*Newsletter*), Canadian Institute of Mining, as well as the International Association of Hydrologists, and others. Internationally, the European Federation of Geologists and the American Institute of Professional Geologists have both published articles during the past 2 years. It would appear either that Dr. Howard is unaware of what is happening among practising geoscientists in Canada, or that he omitted these references intentionally.

It is also unfortunate that Dr. Howard chose to use emotionally charged phraseology ("infamous repute," "police," "suddenly and unwittingly," "hypocritical process," "slamming the door," "appease," "cloning," *etc.*). For many people, such tone and language are considered unprofessional.

Moreover, his assertions are frequently incorrect. Contrary to what was stated in Howard's article, in Alberta geologists and geophysicists were licenced alongside engineers from the very outset, in the 1920s. The founding head of the Geology Department at the University of Alberta was instrumental in forming the first Association of Professional Engineers of Alberta and was one of its early presidents. The practices of geology and geophysics were explicitly identified in the Engineering Act in 1955; the specific reserved titles, Professional Geologist (P.Geol.) and Professional Geophysicist (P.Geoph.), were introduced in 1960; and the Association changed its name to the Association of Professional Engineers, Geologists and Geophysicists of Alberta (APEGGA) in 1966. The Northwest Territories became the second jurisdiction to implement licensure of geoscientists in 1981, followed by Newfoundland in 1988, British Columbia in 1990, and Saskatchewan in 1997. This information is documented in the newsletter articles mentioned above.

The initiatives that led to geoscience licensure in the jurisdictions that require it came from the geoscience community. The same is the case in those jurisdictions that are now working toward registration (Manitoba, Ontario, New Brunswick, and Nova Scotia). Repeated opinion surveys of geoscientists in these provinces have shown that approximately 70-95% were in favor of licensure, and that the preferred mechanism was under combined legislation with the engineering profession because of the extensive overlap of geoscience and engineering. This information is also contained in the newsletter articles and the reports of the Canadian Geoscience Council.

The purpose of licensure is to protect the public, the majority of whom do not have the experience or knowledge to evaluate the qualifications of geoscience or engineering practitioners. Even when they do, they usually do not have any say in selecting the geoscientists or engineers whose work may directly affect their physical, environmental or financial welfare.

The Canadian model of professional licensure is to delegate regulation to self-governing associations of professionals under provincial or territorial legislation, rather than to have governments regulate the professions directly through appointed boards. Delegation typically includes the right to set and enforce entry and practice standards, to evaluate the qualifications of applicants for licensure, to prevent unqualified persons from practising, and to discipline professional members for unskilled practice or unprofessional conduct.

Each provincial and territorial licensing association has full authority, under its legislative act, to establish its own standards, including the academic and experience standards to be met by an applicant for licensure and, for example, to decide on the relative weighting between academic training and experience. Typically, the registration committee or board of examiners of an association places more significance on academic qualifications than on experience for a recent graduate. For an applicant who graduated 10 years ago, the committee usually attaches more importance to experience and will often accept someone whose academic qualifications would have been deemed inadequate immediately after graduation.

Academic requirements for licensure include graduation from a 4-year Canadian undergraduate program (typically Honors or equivalent) in geology, geophysics or earth sciences, or an equivalent combination of undergraduate and graduate programs. Such a program usually contains 40 single-semester university-level courses taken after graduation from high school. Analysis

of university calendars has repeatedly shown that the collective wisdom of several hundred faculty members in more than 20 major university earth science departments (as expressed in the curricula offered by their programs) is that a student graduating with an Honors degree should have approximately 20 single-semester courses in geology or geophysics to prepare for a career in the geosciences. In addition, from six to ten courses in basic supporting sciences, including mathematics, physics, chemistry and biology, are also required and, in many universities, that number has been steadily rising over the years. Academic requirements for licensure in Canada, as embodied in the syllabi of the licensing associations, generally reflect the composition of standard university curricula in the earth sciences: approximately 20 geoscience courses, or 50% of the program of study. This is almost identical to the academic requirements for enrolment as a Chartered Geologist in the Geological Society in Great Britain, held up by Howard as a model. It should be pointed out that the Geological Society does not register (license) geoscientists in the Canadian sense but merely provides a reserved title that practitioners can choose to acquire or not as they see fit.

In addition to meeting academic requirements, in most Canadian provinces and territories an applicant for licensure must have acquired 4 years of professional experience before being eligible for registration. Preferably, experience should be gained under the supervision of a licensed professional, and the type and quality of the experience is critical *(i.e.,* an applicant must have 4 years of progressive experience, not merely 1 year of experience four times).

The practice of "grandparenting," or providing a transition period when licensure is first enacted, to permit established practitioners to register, is derided by Professor Howard as being hypocritical. Grandparenting recognizes significant experience in the profession (coupled with minimum acceptable academic qualifications) which, in his subsequent paragraphs, Howard holds up as the *sine qua non* for registration. Logically, you cannot have it both ways.

Because the practice of geoscience as a profession typically transcends provincial boundaries (and national ones, for that matter, the first draft of this reply having been written in a hotel room in Dakar, Senegal), it is in the best interests of all geoscientists that the academic and experience requirements for licensure in different jurisdictions be as compatible as possible. One of the objectives of the Canadian Council of Professional Geoscientists (CCPG), the national co-ordinating body for the provincial and territorial associations that license geoscientists, is to ensure that Canadian standards for licensure of geoscientists are comparable from one jurisdiction to another. With comparable standards in all provinces and territories, geoscientists will be able to transfer their registration from one to another with a minimum of inconvenience. The CCPG has established the Canadian Geoscience Standards Board to assist its member associations in developing and instituting reasonable, compatible standards for licensure.

Far from being dominated by geoscientists from industry, six of the ten members of the Standards Board are university professors from across Canada, and the Board is chaired by Dr. Philippe Erdmer of the Earth and Atmospheric Sciences Department at the University of Alberta.

The gist of Professor Howard's article is that national syllabi encapsulating academic requirements for licensure unduly stifle progress and innovation in geoscience education. In fact, such syllabi provide a sober second view of academic requirements by practising professionals, including those from industry where the vast majority of graduates find employment. The existence of professional syllabi in geoscience, recognized and accepted by the associations that register geoscientists, helps to ensure that, when changes are made to university curricula, the minimum academic qualifications for professional practice are not compromised.

Instead of threatening the future of geoscience in Canada, as Dr. Howard contends in the title of his article, professional registration may well be the salvation of geoscience, guaranteeing it a recognizable academic content and helping to ensure that geoscientists have a visible and credible profile in Canadian and international professional communities.

Reply

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I agree that there are many good reasons for introducing professional registration of geoscientists across Canada and, as a Chartered Geologist in the UK (CGeol FGS) and a Professional Hydrogeologist (PHG) with the American Institute of Hydrology, I have no objections to licensing as a principle. Furthermore, I am closely involved with the geoscience community in Canada and fully appreciate that a majority of practising geoscientists (and of specialist undergraduate geology students, I might add) generally welcome some form of professional registration. The philosophy behind the licensure of Canadian geoscientists has been espoused *ad nauseam* in numerous articles over the years, and the historical progress towards licensure has been summarized by Pearson (1996) and many others, albeit, it transpires, with occasional minor errors of detail. In any case, it is not the philosophy behind licensure so much as the proposed screening process for entry that merits serious reconsideration and extended debate. While I thank Dr. Williams for being sufficiently aroused by my comments to keep this important issue at centre stage, I am disappointed that he chose to address the key issues I raised concerning the questionable virtue of mandatory academic qualifications in such a roundabout way. He either misses the point or simply prefers to avoid it.

As Dr. Williams indicates, initiatives

that have led to geoscience licensure in various jurisdictions across Canada came from the geoscience community. But let's be honest; these initiatives, at least in recent times, were not driven by a perceived need to "protect the public," or even to "help co-ordinate standards and other activities affecting professional geoscientists in Canada" (Williams, www.apegga.com/Web%2001-98/SubPages/CCPG.html), but by a fervent desire to achieve, deservedly I may add, equal professional footing with the engineers. It is well known, for example, that relatively few geoscientists in Ontario showed much interest in professional registration until the issue was triggered by a Ministerial initiative that would have rejected documents prepared by capable and well-qualified hydrogeologists unless these documents carried the signature of a Professional Engineer (P.Eng.). It was similar professional frustration that inspired the movement toward professional registration of geologists in the UK during the 1970s.

Dr. Williams also states that most geoscientists prefer that professional status be established under combined legislation with the engineering profession "because of the extensive overlap of geoscience and engineering." I would suggest that the degree of overlap is a lot less than he imagines and, in Ontario at least, the primary motives for seeking combined legislation have been expediency and huge savings in legal costs. But, as they say, *caveat emptor* or buyer beware! Combined legislation saves money and time but it also means buying off the shelf and in one size only. It means that we inherit a model for professional registration that closely parallels, if not mimics, the model that was purpose designed for the engineering profession. Herein the problem lies. Geoscientists are entitled to a licensing mechanism that is tailored to the needs, skills and aspirations of its membership. Paleontologists who never received training in the use of indefinite and definite integrals are just as worthy of professional registration as the hydrogeologist with expertise in contaminant transport modelling who was never trained to identify albite in thin section. For licensure, we should demand no more than a good education in science (which establishes the capacity to learn and develop as a practitioner), together with an extended period of appropriate professional experience in one of the many facets of geoscience.

In the UK, geoscientists worked independently of the engineers and developed registration criteria under which a B.Sc. chemist with a post-graduate degree in isotope geochemistry is just as welcome for licensure as a physicist with a post-graduate degree in geophysics. The biologist who never went to graduate school but established a career as a geoscientist specializing in the bio-remediation of soil, sediment and groundwater and learning the important aspects of geology from her peers and supervisors is equally welcome and encouraged. The only difference is that applicants lacking a formal geoscience education may be asked for a minimum of 7 years "on the job" experience instead of the normal 5. As guidance, and no more, the Geological Society (UK) has established an academic syllabus that would facilitate admission to chartered (*i.e.* professional) status in the minimum period of time. However, adherence to the syllabus is not mandatory (this is made explicit) and there is no pressure on the universities to train rather than to educate, or to adjust their programs to conform to the perceived needs of industry. In essence, the Geological Society recognizes that if "grandparenting" is good enough for those first through the gate, it is good enough for all *(i.e.,* it is professional experience rather than exposure to specified undergraduate classes that should be the only mandatory pre-requisite for licensure). I have to agree. Irrespective of Dr. William's interpretation of my comments, I support the concept of "grandparenting" provided that professional experience alone remains explicitly and in perpetuity as an honorable route to professional registration.

Why am I so concerned? Well the major issue I raised and which was largely avoided by Dr. Williams in his comment, is that the imposition of a universally prescribed academic syllabus as a mandatory requirement for licensure is unnecessarily restrictive and may in the long term pose a serious threat to the future of geoscience in Canada. I maintain that it is the synergy of interests and knowledge brought into geoscience over the years by well educated individuals from a range of scientific disciplines (and not simply geoscience alone) that has been a catalyst for many of the major advances in geoscience. A mandatory syllabus that effectively excludes graduates from cognate disciplines from becoming fully fledged geoscientists will cause untold damage to research carried out in our geoscience graduate departments where students with first degrees in chemistry, physics, biology and environmental science have become common and play an important role. The development of geoscience at the undergraduate level will also be seriously impaired. Geoscience programs have evolved considerably over the past decade, many departments adopting a holistic "earth system" approach to geoscience education in which key material such as geochemistry or earth history is presented across a series of course elements rather than as self-contained courses. Students tend to play by the rules and vote with their feet. To students, "mandatory" means exactly that. They will simply avoid undergraduate programs in which the academic requirements for professional registration are not explicitly listed, and universities will have little choice but to revert to the old compartmentalized curricula. Unfortunately the problem does not end here. Not only will universities have to abandon innovation, they will also be required to submit any future curricular changes to the Canadian Geoscience Standards Board "for a sober second look." As a professional educator I find this suggestion offensive. The vast majority of academics are well in tune with the geoscience industry in all its breadth and complexity, and are perfectly capable of designing appropriate educational programs without external policing.

Finally, Dr. Williams is treading on dangerous ground when he implies that the involvement of six university professors on the Canadian Geoscience Standards is indicative of sound support among the academic community for the CCPG initiatives. Given that most professors see the introduction of licensure as inevitable, they would be remiss to avoid an issue that must ultimately impact them directly. The tragedy is that we are being forced to participate in the development of a national geoscience syllabus, not because it's necessarily in the best interest of geoscience, but because that's the way the engineers do it and if we want to proceed under combined legislation we are obliged to follow the engineering approach with little room to manoeuvre.

In conclusion, I would suggest that if anything needs a sober second look it is a registration process for professional geoscientists that focuses exclusively on our similarities with the engineers and completely ignores many very important differences. The proposed process may have worked for the engineers, geologists and geophysicists of Alberta these past 70 years but it is certainly not appropriate for Canadian geoscientists as we enter the next millennium. It is time to move out from under the shadow of the engineering profession, and UK geoscientists have clearly demonstrated how this can be done. Canadian geoscientists have waited far too long for a professional body that is dedicated solely to the interests of geoscientists. Fortunately, in Ontario at least, that time may have come. In a referendum early this year, the Professional Engineers of Ontario overwhelmingly rejected a proposal by the Association of Geoscientists of Ontario (AGO) to establish a licensing program under combined legislation with the engineering profession. Perhaps AGO can be convinced to seize this window of opportunity and provide some much needed leadership in this matter. There is an urgent need to revisit the issue of mandatory academic qualifications and begin to build a licensing body that really will serve the best interests of geoscientists and geoscientists alone.

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