Geoscience Canada

Professional Registration of Geoscientists: Threatening the Future of Geoscience in Canada

Ken W. F. Howard

Volume 24, Number 4, December 1997

URI: https://id.erudit.org/iderudit/geocan24_4icg01

See table of contents

Publisher(s)

The Geological Association of Canada

ISSN

0315-0941 (print)
1911-4850 (digital)

Explore this journal

Cite this article

Howard, K. W. F. (1997). Professional Registration of Geoscientists: Threatening the Future of Geoscience in Canada. *Geoscience Canada*, *24*(4), 199–202.

Issues in Canadian Geoscience

Professional Registration of Geoscientists: Threatening the Future of Geoscience in Canada

Ken W.F. Howard
Groundwater Research Group
University of Toronto at Scarborough
1265 Military Trail
Scarborough, Ontario M1C 1A4
gwater@scar.utoronto.ca

BACKGROUND

In December, 1996 Bill Pearson, President of the Association of Geoscientists of Ontario (AGO) announced to his members (Pearson, 1996) that the Council of PEO (Professional Engineers of Ontario) had approved, on 21 September, a report of an AGO/PEO Task Group recommending that the Professional Engineers Act be amended to include a definition of the practice of geoscience and introduce a process for the professional registration of geoscientists. Once implemented, the revisions would enforce a licensing system for practising geoscientists which would parallel that in place for professional engineers. Bill Pearson entitled his bulletin, "A significant step forward", and for practising geoscientists his statement may prove true. But if the new legislation leads to cloning of geoscientists by channelling them through a national geology syllabus currently being developed by the Canadian Council of Professional Geoscientists (CCPG), licensure of geoscientists could have serious implications for the future of Canadian geoscience.

Licensing programs for geoscientists are not new to Canada. Alberta paved the way in the late 1970s (Maher, 1990) when it enshrined into legislation the Association of Professional Engineers, Geologists and Geophysicists (APEGGA). Within a few years the Northwest Territories had forged an identical alliance between geologists, geophysicists and engineers, leading to passage of the NWT Engineering, Geological and Geophysical Professions Act. During the 1980s, several of the remaining provinces considered similar legislative models for the registration of geologists and geophysicists, but by the end of the decade, only Newfoundland had joined the fold with an Act implemented on 1 December 1989. It was not until the 1990s, that geoscientists in the rest of the country fell into line, and began to cultivate their otherwise, uneasy courtship with the engineers in preparation for a headlong dash to the legislative altar.

In recent times, the engineers have shown to be willing and welcoming partners. Progress, however, has not always been so smooth. In Ontario, for example, the move towards professional registration of geoscientists began formally on 5 March 1989 when an *ad hoc* meeting held at the Royal York Hotel, a geological meeting ground of infamous repute, led to the formation of the Committee for the Professional Registration of Geoscientists in Ontario (CPRGO). Twelve months later this group organised a symposium on the status of professional geoscientists in Canada and Bill Pearson, Chair of CPRGO, announced to the 175 delegates that "positive and constructive" discussions had been held with the Association of Professional Engineers of Ontario. Initial optimism was short-lived, however, and four years later, deliberations were approaching deadlock when the Ontario Ministry of Environment suddenly and unwittingly injected new life into the debate by issuing guidelines for the clean-up of contaminated sites that required all relevant documentation to be signed and approved exclusively by professional engineers. This directive incensed a large group of geoscientists who specialised in this type of work, and also somewhat embarrassed the engineers who acknowledged that "there exist site practitioners who are not professional engineers who may be equally competent to certify the completion of site remediation activities" (CPRGO, 1995). Since that time the move towards licensure of geoscientists in Ontario has never looked back.

By the end of 1996, five of Canada's 12 provinces and territories (Alberta, Newfoundland, Saskatchewan, British Columbia and Northwest Territories) had introduced legislation requiring geoscientists to be licensed as a condition of employment. Manitoba, Ontario, New Brunswick and Nova Scotia are closely following suit. In each case professional registration is being achieved through legislative amendment to acts that currently police professional engineers. In Quebec, where the structure is somewhat different, the Quebec Board of Professionals has agreed to admit geologists and geophysicists, thus creating a separate professional corporation of geologists. While the Quebec government has agreed in principle to certify this group and provide "right-to-title", the necessary legislation apparently has been stalled at cabinet level for over two years (Nield, 1997). Despite the difficulties facing Quebec, the Canadian Council of Professional Geoscientists (CCPG) estimates that by the end of the century, 10,000 Canadian geoscientists will be covered by legislation that requires them to be licensed to practise (Nield, 1997).

QUESTIONABLE MERITS OF LICENSURE

Like most products newly introduced onto the market, it is unlikely that the advertising claims for professional status will be anywhere near fulfilled. Licensure should certainly put geoscientists on an equal footing with engineers, thus eliminating a frequent source of annoyance and frustration amongst geoscientists who interact professionally with engineers on a day-to-day basis. It will also allow geoscientists to boldly put their stamp where it has never gone before! However, there's a monetary price to be paid for these privileges (Miller, 1997; Fig. 1) and, there are no guarantees that either the professional geoscientist or the public will see tangible benefits of any great significance. As argued by Miall (1997), licensure is not going to prevent the type of wilful fraud that plagued Bre-X, and an ability to pass a required exam on ethics is unlikely to improve the work habits of geoscientists any more than it has influenced those of the engineers. This having been said, there's really no value in re-opening a debate over the merits of licensure, a debate which, although rarely entertained and never satisfactorily resolved, is certainly over. The industry has obviously decided that professional registration is essential in these times of increasing public scrutiny and heightening risk of litigation (Eyles, 1997), and the licensing of geoscientists will happen throughout most of Canada before long whether the debate is resurrected and carried to its proper conclusion or not. It's as they say, "a done deal"; but it's certainly not too late for Canadian geoscientists to demand and ensure that licensing achieves the aims and needs of its proponents without compromising the future of Canadian geoscience, i.e. the very foundation of the profession it is purporting to serve and protect. This issue becomes a very real concern if admission procedures ignore the evolving nature of geoscience education in many Canadian universities and focus too rigidly on industry-developed national geoscience syllabi as mandatory entry requirements.

ACADEMIC REQUIREMENTS AND SYLLABUS

The crux of the issue is the screening process that dictates who may or may not become a professional geoscientist. For the majority of us who have been working in the geosciences for many years, this is not a problem. It really doesn't matter that we graduated from a geology/geophysics program that allowed us to avoid structural geology. It is irrelevant that our undergraduate education began in chemistry, biology, or geography, or that we managed to sidestep a formal course or two in calculus. We qualify for membership via a hypocritical process known as "Grandfathering," a convenient mechanism for bolstering the association's numbers with a minimum amount of fuss and contention, before slamming the door on all others who may wish to follow a similar educational route. In the engineering profession, the screening of candidates for professional status is normally achieved by formal "accreditation" of appropriate and acceptable undergraduate programs, a practice which must inevitably discourage educational innovation and stifle undergraduate program development. For professional registration of geoscientists in Ontario, AGO has rejected any notion of program accreditation. However, it plans to introduce a mandatory geoscience syllabus that will, in effect, perform the same function *i.e.,* it will "accredit" certain Ontario undergraduate geoscience programs through a process that must automatically disqualify and exclude programs that do not meet the syllabus requirements. The only difference is that without formal accreditation, the universities will not know whether their programs fully meet AGO requirements until their graduates seek licensure and come before the Academic Requirements Committee to present their transcripts for scrutiny and evaluation. This lingering uncertainty is a direct consequence of the proposed geoscience syllabus, the contents and nature of which have been the focus of considerable debate.

The development of core syllabi for geoscientists is a dangerous game, especially when it is used to sieve and grade scientists into "professional" categories. Moreover, the exercise runs counter to modern developments in geoscience, both within the universities and at the broader level. For example, in 1994, the Canadian Geoscience Council (CGC) commissioned a report, "The Barnes Report" (Barnes *et al.*, 1995), to examine the status and future development of earth sciences in Canada. A recurrent theme within this report is the advocacy of "earth system science" (Mackenzie, 1998), with the recommendation that "the academic community re-forms curricula to provide a quantitative earth systems foundation". The report also recommended that "all sectors commit to a new era of changed attitude, behaviour, and leadership, with a shared concept of earth system science, a recognition of the severe future global environmental and resource issues, and a responsibility to make Canada more efficient, productive, and sustainable, thereby turning crisis into opportunity". In Ontario, many geoscience departments were beginning to move in these directions well before the report was unveiled. Unconstrained by accreditation issues and the need to explicitly meet mandated syllabi, several universities had already recognised the need to study planet Earth as an integrated dynamic system (e.g. Eyles, 1997) and began to make important changes to its curricula and to the delivery of its geoscience education. These changes include new programs in environmental science, new interdisciplinary courses, and the appointment of new specialist faculty, notably from disciplines such as biology and physical geography.

In its first attempt to define minimum academic requirements for professional registration, AGO/PEO proposed a 40-course undergraduate geoscience syllabus that included (in the case of the geology stream) seven core mathematics and science courses, eight core geology courses, 15 specialist science/math/geo-

Margaret A. Miller, P.Eng. President of the Association of Professional Engineers and Geoscientists of Saskatchewan (APEGS) in her address to members (Miller, 1997):

" Saskatchewan law requires that a person engaged in the practice of engineering or the practice of geoscience must be registered with APEGS. To obtain that registration a fee must be paid, and to retain membership and a licence to practice another fee must be paid. To register and practice in other Canadian jurisdictions, additional fees must be paid. If an engineer were registered in all the provinces in 1996, the fees would have totalled $1,780."...

"While that may seem like a sizeable amount of money, in comparison to many professions we get off lightly." ...." APEGS annual fees that amount to less than one per cent of a full-time salary [for practising solely in Saskatchewan] seem quite reasonable to me".

Figure 1 Quotes from Miller (1997) reveal that the cost of practising as a Professional Engineer or Geoscientist is not insignificant if the workplace extends across several provincial jurisdictions.

science course electives, nine breadth electives, and one complementary study course (AGO/PEO,1997a). Critics argued that this program was too rigid and showed disregard for "the multi-disciplinary nature of geoscience," "the evolving nature of the discipline" and "the earth system approach" to geoscience teaching, important elements which AGO had purported to acknowledge. AGO subsequently revisited the issue, but avoided making changes to its fundamental approach, and simply streamlined the base syllabus, (Table 1; AGO/PEO, 1997b) replacing mandatory "courses" with mandatory "subject areas". Subject areas are defined in the document's appendices, but no consideration is given to the depth to which the material should be covered.

Universities that objected to the earlier syllabus on the grounds that the course approach was inflexible and did not recognise the changing character of geoscience education should be equally disturbed by AGO's awkward attempt to appease their concerns. The new syllabus does little to resolve the key issues and, if anything, creates confusion and uncertainty. From the university perspective, a potential conflict remains between its responsibility to provide students with the very best geoscience education and its responsibility to ensure the student is adequately prepared for entering the profession. For example, should universities risk innovation and teach the principles of stratigraphy as part of a field course in the Grand Canyon, or perhaps at a more mundane level, include computing as part of a GIS course, when there are no explicit guarantees that the Academic Requirements Committee will find this approach acceptable, or for that matter, even recognise that the material was taught at all? To play safe, universities will be faced with two options: either seek reassurance from the professional body through a formal accreditation process, or abandon the new teaching initiatives and present material in the traditional compartmentalized manner.

From the standpoint of a prospective student, the revised syllabus poses even greater problems. Since AGO has shown no intention of accrediting individual programs, it will be incumbent upon the student to evaluate program suitability, presumably by poring over course descriptions in an attempt to match them with AGO's "subject area" listings and "content descriptions". This is obviously an impossible task for a high school graduate, unfamiliar with geoscientific terminology. To attract career-oriented students, and remain competitive, universities will need to offer geoscience programs with course listings that closely mimic the AGO syllabus in both nomenclature and subject descriptions.

It has become evident that the defined syllabus approach to screening applicants for professional licensure is not in the best interests of geoscience education. It is a model that best suits the engineering profession where a strong emphasis has always been placed on basic training. It does not adequately recognize the fundamental differences between engineering and geoscience, and is being thrust upon the university geoscience departments in the interests of expediency i.e. to facilitate the passage of legislative amendments to existing engineering acts. In recent years, many universities in Ontario have embraced the earth system approach to teaching and have shown that there is more than one way to package and deliver an excellent undergraduate geoscience education. Academic screening processes that do not **explicitly** recognise these important innovations promise to halt the development of Canadian geoscience in its tracks.

AN ALTERNATIVE APPROACH

Canadian geoscientists have a world-wide reputation for excellence but this excellence does not stem from a rigorous **training** in geoscience at the university level; neither does it stem from the ability to pass mandatory undergraduate courses in petrology or earth history. Instead this reputation comes from a good basic **educa-**

Table 1 AGO proposed syllabus: draft of the AGO/PEO Task Group, November 1997.

	Geology	**Geophysics**	**Terrain Science (*i.e.*, Geoenvironmental)**
FOUNDATION MATH AND SCIENCE (7 subject areas)	Foundation Mathematics (1) Foundation Mathematics (2) Foundation Mathematics (3) or Computing Physics (I) or Biology (I) Physics (II) or Biology (II) Chemistry (I)	Calculus (I) Calculus (II) Statistics Physics (I) Physics (II) Chemistry (I) Chemistry (II)	Foundation Mathematics (1) Foundation Mathematics (2) Foundation Mathematics (3) or Computing Physics (I) or Biology (I) Physics (II) or Biology (II) Chemistry (I) Chemistry (II)
FOUNDATION (8 subject areas)	Physical Geoscience Earth History Mineralogy Petrology Stratigraphy/Sedimentation Structural Geology Field School Earth Processes	Physical Geoscience Earth History Mineralogy Petrology Stratigraphy/Sedimentation Structural Geology Field School Geophysics/Earth Physics	Physical Geoscience/Earth History Mineralogy/Petrology Quaternary/Glacial Geology Geomorphology/Soil Science Remote Sensing/Air Photography Hydrogeology Hydrology Field School
ELECTIVES	Plus 15 geoscience electives from a specified list and 9 breadth electives	Plus 15 geoscience electives from a specified list and 9 breadth electives	Plus 15 geoscience electives from a specified list and 9 breadth electives
COMPLEMENTARY STUDIES (one of)	Professional Practice/Law Technical or Business Writing Engineering or Resource Economics	Professional Practice/Law Technical or Business Writing Engineering or Resource Economics	Professional Practice/Law Technical or Business Writing Engineering or Resource Economics

tion in a wide array of science subjects (including geology) and an opportunity to **train** and **develop** (as practitioners) in a diverse range of geological environments, and under challenging conditions. Geoscience in Canada flourishes because of the mix of practising individuals. The majority are mainline geology graduates, but many others come from chemistry, mathematics, physics, biology and environmental science disciplines, this second group bringing a valuable and essential dimension to the geoscience industry. It is the synergy of interests/knowledge brought together by individuals educated in a range of scientific disciplines (as opposed to being trained specifically as geoscientists) that has brought geology in Canada to the world stage. Before the gate is shut on individuals who don't fall out of the mandated classical mold, perhaps we should examine the undergraduate roots of geoscientists who have done much to elevate the profile of the profession. Many paleontologists, for example, will have come from biological backgrounds and may "lack" one or more of math/physics/chemistry on their undergraduate transcripts. Yet these individuals are geoscientists in every sense of the word and make an immense contribution to the advancement of geoscience in Canada. Do we really want to introduce curricula with **mandatory** courses or subject material that might exclude such individuals? Would we also want to exclude a graduate chemist who has gained considerable expertise in ore geology just because his/her first degree was not in a program that contained stratigraphy? If the proposed syllabi come into force, then we can forget accepting graduate chemists and many physical geographers into our university earth science **graduate** programs because it is unlikely they will ever be able to gain entry to the profession. In these progressive times, students from cognate disciplines heavily populate our earth science graduate programs. They enrich geoscience with their diverse skills and should not be excluded from the geoscience profession; neither should they be discouraged.

The industry should be commended for a number of its recent proposals. The industry can only benefit from stricter professional standards and continuing education. However, restricting its intake of "professionals" to graduates who have been channelled through nationally-established "geoscience" curricula with mandatory requirements will undoubtedly cause long-term damage both to the industry and to geoscience in Canada as a whole. Universities have a responsibility to educate in its broadest sense, a task that cannot be fulfilled adequately when curricula must focus on training needs. Geoscientists should reject any attempt by AGO to put a shackle on the education of geoscientists in Ontario.

If AGO is serious about establishing a "Professional status" that can protect the future of Canadian geoscience, it should consider basing this status almost exclusively on **professional** experience and **professional** development. This is the approach adopted in the UK during the 1970s when the fledgling APIPG (Association for the Promotion of the Institution for Professional Geologists) began its work towards establishing the Institution of Geologists. APIPG included faculty from university geology departments on its founding board and was therefore acutely aware of the potential damage it could cause to the science, to the industry and to the teaching profession, by interfering with well established and highly regarded undergraduate programs. As a very satisfactory resolution to the membership issue, APIPG recommended that professional status be awarded to individuals with virtually any type of honours geology degree, provided they could demonstrate, through validated documentation, 5 or more years of relevant professional experience. The period of professional development was simply extended to a minimum of 7 years for those whose first degree happened to be in a science outside the geosciences. Twenty years later, these admission criteria remain essentially unchanged. The present governing body for the registration of professional geoscientists in UK, the Geological Society, has introduced a voluntary accreditation scheme to streamline procedures. However, it does not define a core syllabus as a requirement for accreditation, and welcomes all single honours degrees in geoscience, all joint honours degrees in geoscience with a cognate subject such as physics, chemistry biology or engineering, all single honours degrees in environmental science in which geoscience subjects form at least 50% of the program, and any modular degree program in which geoscience modules are similarly represented. Moreover, the Geological Society **explicitly** acknowledges that "accredited [programs] by no means offer the only possible route to [professional registration]". It goes on to say, "Geoscience benefits greatly from the contributions of scientists and engineers whose initial training lies in other disciplines but who by virtue of their postgraduate training and/or professional development acquire geoscientific skills and expertise of high order". In developing its "all-inclusive" approach to professional registration in UK, the Geological Society has shown a vision for the future of geoscience that is not unlike that espoused by the Canadian Geoscience Council. This type of approach to the registration of professional geoscientists is ideal in many respects and provides a model that could be adopted in Ontario, and perhaps Canada as a whole, if geoscientists can be united in their opposition to the AGO syllabus proposals.

REFERENCES

AGO/PEO, 1997a, Proposed syllabi and degree requirements for admission: Admissions Sub-Committee of the joint PEO/AGO Task Group on Geoscientists, briefing and consultation document, 5 p.

AGO/PEO, 1997b, A discussion document on the proposed academic requirements for licensure of geoscientists in Ontario: AGO, November 1997.

Barnes, C.R., Bornhold, B.D., Mayer, L.L., McIlreath, I.A., Skinner, B.J., VanDine, D., and Wallis, R., 1995, Future challenges and trends in the geosciences in Canada: Geoscience Canada, v. 22, n. 1 and 2, 1995, p. 1-99 (published 1996).

CPRGO, 1995. MOEE Clean-up guidelines draws heated response. Geoscientists newsletter Vol. 4, No.1, March 1995. 4p.

Eyles, N., 1997, Geology on campus: crisis or opportunity: Geoscience Canada, v. 24, n. 2, p. 108-111.

Mackenzie, F.T., 1998, Our changing planet. An introduction to Earth System Science and Global Environmental Change, 2nd ed.: Prentice Hall, New Jersey, 486 p.

Maher, J., 1990, Alberta: Symposium on the status of professional geoscientists in Canada, 15 March 1990, CPRGO, Toronto, ON, Proceedings, p. 3-9.

Miall, A. D., 1997, Bre-X and the State of the Universe: Geoscience Canada, v. 24, n. 2, p. 116-117.

Miller, M. A., 1997, Public Services or Member Services? President's message to members of the Association of Professional Engineers and Geoscientists of Saskatchewan (APEGS). http://www.apegs.sk.ca/pres_msg.htm.

Nield, T., 1997, Licensing is a dead cert in Canada: Geoscientist, v. 7., n. 8, p. 2.

Pearson, W. N., 1996. A significant step forward: Association of Geoscientists of Ontario, Update, n. 2, 4 p.