

JOINT COMMUNIQUÉ

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Scientists and Engineers Agree to Exclusion for the Practice of Natural Science

The Canadian Council of Professional Engineers (CCPE) representing the twelve professional engineering associations in Canada, and the Natural Science Societies of Canada (NSSC) representing twelve natural science societies in Canada have reached an agreement on an exemption clause to protect the interests of natural scientists so that engineering Acts throughout Canada do not unintentionally restrict the practice of natural scientists while at the same time ensuring that engineering is practised by qualified individuals.

To encourage national standardization and facilitate mobility for professional engineers, the CCPE developed a national guideline for the Definition of the Practice of Professional Engineering in 1992. The CCPE Definition states:

The "practice of professional engineering" means any act. of planning, designing, composing, evaluating, advising, reporting, directing or supervising or managing any of the foregoing

that requires the application of engineering principles, and

that concerns the safeguarding of life, health, property, economic interests, the public welfare or the environment.

The Natural Scientist Exemption Clause reads:

Nothing in this Act shall prevent an individual, who either

(i) holds a recognized honours or higher degree in one or more of the physical, chemical, life, computer or mathematical sciences, or who possesses an equivalent combination of education, training, and experience, or

(ii) is acting under the direct supervision and control of an individual described in the preceding paragraph

from practising natural science which, for the purposes of this Act, means any act (including management) requiring the application of scientific principles, competently performed

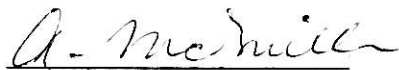
In 1993, discussions between representatives of CCPE (representing 160,000 professional engineers) and NSSC were convened to address concern over the CCPE national Definition of the Practice of Professional Engineering raised by NSSC. NSSC is a group of major Canadian scientific societies having a total membership in excess of 25,000. One of the main reasons for NSSC's formation was concern by the scientific community over the possibility that the CCPE Definition could be interpreted to cover aspects of the practice of the natural sciences and could therefore unintentionally restrict that practice.

The concern was brought to the attention of a wide range of interested parties across Canada, and CCPE and NSSC are now pleased to announce a mutually accepted resolution of this issue, resulting from ongoing negotiations.

In recognition of the overlap between the legitimate practices of professional engineering and natural science, and to clarify that the CCPE Definition does not cover the practice of natural science, NSSC and CCPE now recommend that the above exclusion clause be included in any legislation that uses the CCPE Definition of the Practice of Professional Engineering.

CCPE is modifying its National Guideline for the Definition of the Practice of Professional Engineering to recommend the inclusion of this separate, accompanying exclusion clause related to the practice of natural science, for use in all future amendments to relevant legislation.

We are pleased to bring these discussions to a successful resolution.



Dr. Ann McMillan
on behalf of
Natural Science Societies of Canada



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CANADIAN ENGINEERING QUALIFICATIONS BOARD
BUREAU CANADIEN DES CONDITIONS D'ADMISSION EN GÉNIE

GUIDELINE ON THE DEFINITION OF THE PRACTICE OF PROFESSIONAL ENGINEERING

GUIDE SUR LA DÉFINITION DE L'EXERCICE DE LA PROFESSION D'INGÉNIEUR



CANADIAN COUNCIL OF PROFESSIONAL ENGINEERS
CONSEIL CANADIEN DES INGÉNIEURS



**CANADIAN COUNCIL OF PROFESSIONAL ENGINEERS
CONSEIL CANADIEN DES INGÉNIEURS**

Guideline on the Definition of the Practice of Professional Engineering

Prepared by the
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a standing committee of the
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Guide sur la définition de l'exercice de la profession d'ingénieur

Un document produit par
le Bureau canadien des conditions d'admission en génie
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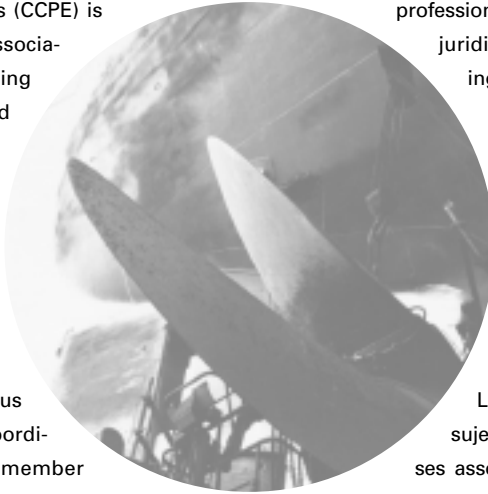
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Provincial and territorial associations of professional engineers are responsible for the regulation of the practice of engineering in Canada. Each association has been established under an act of its provincial or territorial legislature and serves as the licensing authority for engineers practising within its jurisdiction. The Canadian Council of Professional Engineers (CCPE) is the national federation of these associations. CCPE provides a coordinating function among the provincial and territorial associations, fostering mutual recognition among them and encouraging the greatest possible commonality of operation in their licensing functions.

CCPE issues guidelines on various subjects as a means to achieve coordination among its constituent member associations. Such guidelines are an expression of general guiding principles which have a broad basis of consensus, while recognizing and supporting the autonomy of each constituent association to administer its engineering act. CCPE guidelines enunciate the principles of an issue but leave the detailed applications, policies, practices, and exceptions to the judgement of the constituent associations.

Au Canada, la réglementation de l'exercice de la profession d'ingénieur relève des associations/ordre provinciaux et territoriaux d'ingénieurs. Chacune de ces associations/ordre a été établie par une loi sur les ingénieurs promulguée par sa législature provinciale ou territoriale et possède le pouvoir exclusif d'émettre des permis d'exercice de la profession d'ingénieur dans les limites de sa juridiction. Le Conseil canadien des ingénieurs (CCI) est la fédération nationale de ces associations. Le CCI coordonne les activités des associations provinciales et territoriales en promouvant leur reconnaissance mutuelle et en favorisant l'homogénéité la plus grande possible dans leurs fonctions d'admission à l'exercice.

Le CCI publie des guides sur divers sujets pour coordonner les activités de ses associations constituantes. Ces directives sont l'expression de principes directeurs, fondés sur un consensus général, qui reconnaissent et appuient l'autonomie de chaque association constituante dans l'administration de sa Loi sur les ingénieurs. Les guides du CCI énoncent les principes d'un sujet et laissent les constituantes libres de décider des politiques et des modalités de mise en œuvre.





DEFINITION OF THE PRACTICE OF PROFESSIONAL ENGINEERING DÉFINITION DE L'EXERCICE DE LA PROFESSION D'INGÉNIEUR

The "practice of professional engineering" means any act of planning, designing, composing, evaluating, advising, reporting, directing or supervising, or managing any of the foregoing,

that requires the application of engineering principles,

and

that concerns the safeguarding of life, health, property, economic interests, the public welfare or the environment.

L'« exercice de la profession d'ingénieur » consiste à préparer des plans, des études, des synthèses, des évaluations et des rapports, à donner des consultations, et à diriger, surveiller et administrer les travaux précités, lorsque cela

exige l'application des principes d'ingénierie

et

est associé à la protection de la vie, de la santé, de la propriété, des intérêts économiques, de l'environnement et du bien-être public.

INTERPRETATION AND USE OF THE DEFINITION INTERPRÉTATION ET L'UTILISATION DE LA DÉFINITION

Each Provincial and Territorial Engineering Act defines the practice of engineering for the purpose of restricting practice to those individuals who meet qualifications standards appropriate to ensure the protection of the public. Interpretation of the definition with respect to its application in individual circumstances is carried out by each provincial/territorial licensing body and its local judiciary. The following exemption clause is recommended as a companion clause to the definition when it is used to define engineering practice in legislation.

“Nothing in this Act shall prevent an individual who either holds a recognized honours or higher degree in one or more of the physical, chemical, life, computer, or mathematical sciences, or who possesses an equivalent combination of education, training and experience, or is acting under the direct supervision and control of an individual described in the preceding paragraph from practising natural science which, for the purposes of this Act, means any act (including management) requiring the application of scientific principles, competently performed.”

The exemption retains a distinction between the practice of engineering and the practice of natural science.

Au Canada, dans chaque province et territoire, l'exercice du génie est réglementée par une loi provinciale. Chacune de ces lois définit l'exercice du génie dans le but de la limiter aux personnes qui satisfont à des normes de compétences visant à assurer la protection du grand public. Il incombe à chaque organisme d'accréditation provincial ou territorial et à son organe judiciaire d'interpréter la définition dans le contexte de son application à des circonstances particulières. On recommande l'adoption de la clause d'exemption suivante, à titre de clause d'accompagnement à la définition lorsque celle-ci sert à définir l'exercice du génie à l'intérieur des textes législatifs.

« Rien dans la présente loi n'empêche une personne qui détient un baccalauréat ou un diplôme supérieur dans un ou plusieurs domaines des sciences mathématiques, informatiques, chimiques, physiques ou de la vie, ou possède une combinaison équivalente d'études, de formation et d'expérience, ou l'exerce sous la supervision et le contrôle d'une personne décrite dans l'alinéa précédent d'exercer dans le domaine des sciences naturelles qui, pour les fins du présent paragraphe, signifie toute action (y compris la gestion) pratiquée de manière professionnelle qui requiert l'application de principes scientifiques ».

L'exemption maintient une distinction entre l'exercice du génie et la pratique des sciences naturelles.



*Developed by the Canadian Engineering
Qualifications Board, a standing committee of the
Canadian Council of Professional Engineers*

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*Produit par le Bureau canadien des conditions
d' admission en génie, un comité permanent du
Conseil canadien des ingénieurs*

The Ontario Professional Engineers Act

Introduction

In 1981, Peter Kirkby, who is now chairman of the Division of Industrial and Applied Physics, gave CAP advance warning of the impending revision of the Ontario Professional Engineers Act, and of the effects such a revision might have on the freedom of physicists to practise their profession. The subsequent actions taken by the CAP have been described by Allan Crawford (Physics in Canada, Vol. 38 page 127) and Peter Kirkby (ibid Vol. 39 page 60 and 63). These actions culminated in a July 1982 meeting with staff of the Policy Division of the Attorney General's Office, at which the Association of Professional Engineers of Ontario and the Ontario Association of Certified Engineering Technicians and Technologists were also represented. The meeting resulted in an agreement which provided satisfactory protection for scientists.

Unfortunately the Discussion Draft circulated in April 1983 did not adequately reflect this agreement. CAP therefore decided that it should seek legal advice, and its subsequent actions have been planned and executed with the help of Mr. Brian Flood of Tory, Tory, DesLauriers and Binnington.

CAP's comments on the Discussion Draft were sent to the Attorney General's Office in June 1983 and copies of the CAP brief were sent to some 20 scientific associations encouraging them to make their own responses and to exchange briefs.

No satisfactory reply was received from the Attorney General's Office and the shape of the new legislation was not revealed until Bill 123 received first reading, in the Ontario Legislature, on November 17, 1983. It turned out to be most unsatisfactory. The problem, which is fully discussed in the CAP Submission (see below) arises from the new definition of professional engineering. Section 1(m) reads:

"practice of professional engineering" means any act of designing, composing of plans and specifications, evaluating, advising, reporting, directing or supervising wherein the safeguarding of life, health, property or the public welfare is concerned and that requires the application of engineering principles;

This definition is fundamentally different from that in the Discussion Draft, which itself represented a major extension of the definition in the present Act. The redefinition was intended to clarify the dividing line between scientists and professional engineers, but evidently it is not completely successful. Furthermore, Bill 123 contains no statement to the effect that the Act does not prevent a person from practising as a scientist. The present Act and the Discussion Draft do contain exclusion clauses and the absence of any such clause in Bill 123 was obviously of very serious concern to CAP.

CAP acted promptly to register its concern and request an opportunity to restate its case. By this time the original committee, comprising Geoff Hanna, Ray Hoff and Peter Kirkby, had been joined by Boris Stoicheff and Allan Carswell. Boris, as President of CAP, agreed to take responsibility for preparing the CAP's case and addressing the Standing Committee of the Legislature. At the same time he took the leading part in contacting members of this Committee and other influential representatives of government and opposition.

On Tuesday January 31st, the Standing Committee on Administration of Justice (of Ontario) began public hearings on Bill 122, an Act to revise the Architects Act, and on Bill 123, an Act to revise the Professional Engineers Act. The Committee had received numerous written briefs, prior to the hearings, and listened to about 30 presentations in 3 days of morning, afternoon, and evening sittings.

The proceedings began at 10 a.m. with an introduction of the objectives of the Bills by the Attorney General of Ontario, the Honourable Mr. McMurtry. The first presentation was made by the Association of Professional Engineers of Ontario (APEO), and the President and 4 representatives were questioned until 1 p.m. It is important to note that during the long morning session, Dr. P.A. Lapp, past president of APEO, referred to the meeting held July 20th 1982 in the Ministry's Office and cited the agreement reached with CAP that scientists should be excluded in any revised Act, and that scientists should not be required to perform their work only under the supervision of a professional engineer, two exclusions which are in force in the present Professional Engineers Act.

At 2 p.m., Boris Stoicheff, accompanied by Raymond Hoff (Environment Canada), Allan Carswell (York University, and Optech Inc.) and Brian Flood (Tory, Tory, DesLauriers and Binnington) our legal advisor, briefly reviewed the highlights of CAP's written presentation (printed on p.). He ended with

While there may be various ways of giving the assurance we have asked for, we suggest two alternative ways. The one that is by far the cleanest, which we state as recommendation 1, is to add to the definition of "practice of professional engineering" as it appears in Bill 123 "but does not include practising as a natural scientist".

The Hon. Mr. McMurtry:

"It might be helpful if I were to make a comment at this time. I apologize, first of all, for not being here for the beginning of your presentation, but certainly I do not have any difficulty with anything you have said during my presence. Indeed, we have tried to abide by the principles you have laid down in the legislation, as you know.

We think we can accept your recommendation 1; we do not think we have any difficulty with it. We had really hoped it would not be necessary, but obviously some very wise people think it is. I do not think we have any difficulty at all with it; my information is that our friends and colleagues in the Association of Professional Engineers of Ontario are of a similar view. So if accepting recommendation 1 is agreeable to the committee, the ministry will support it."

Boris Stoicheff:

"Thank you very much, sir".

By 2:20 p.m., it was over; and three years of hard work by our Committee on behalf of the physics community and of natural scientists generally, came to a successful conclusion.

Comments Regarding Bill 123, An Act to Revise the Professional Engineers Act A Submission to the Standing Committee on the Administration of Justice, Government of Ontario

The Canadian Association of Physicists

The Canadian Association of Physicists (CAP) is the Canadian national physical society. Its membership consists of over 1,800 individuals and 33 corporations. CAP was founded in 1945 and incorporated in 1951. Its objectives are:

- to further the advance of the science of physics;
- to promote the use of physical discoveries in the interests of mankind;

- to promote knowledge in the physical sciences and the dissemination of information relating thereto in and between all sections and regions of Canada;
- to advance mutual understanding and cooperation between physicists on the one hand, and universities, colleges, secondary schools, research organizations and industry, on the other.

Since 1945, CAP has published, bi-monthly, its bulletin "Physics in Canada" and has organized an annual congress. Attendance at

the congress ranges from 400 to 600 CAP members and guests. Through its Educational Trust Fund, CAP arranges and finances lectures throughout Canada, and conducts an annual programme of physics examinations and awards for high school students in each province, and nationally for undergraduates. From time to time it produces special reports on the state of physics in Canada, the latest being a major review entitled "On Future Research Opportunities in Physics" prepared in 1982 for the Natural Sciences and Engineering Research Council.

CAP's Concerns with Bill 123

In introducing Bills 122 and 123 to the Ontario Legislature, the Honourable R. Roy McMurtry, Q.C. stated:

"As a general principle, every person should be free to utilize his or her abilities, education, training and experience in earning a livelihood. Therefore, it is wrong to create a restriction on this general principle by establishing licences, unless this Legislature is satisfied that licensing is necessary to protect the public."

In his remarks to the Legislature Mr. McMurtry emphasized the need to differentiate between the scope of practice of architects and that of professional engineers. He explained that Bills 122 and 123 embody an agreement on the "scope of practice" made between the Ontario Association of Architects and the Association of Professional Engineers of Ontario (APEO) that, "the architects should do architecture and professional engineers should do professional engineering".

The concern of CAP and its members is that while these Bills may help to clarify, in the public interest, the difference between the "scope of practice" of professional engineers and that of architects, Bill 123 does not differentiate between the "scope of practice" of professional engineers and the "scope of practice" of natural scientists, a body overwhelmingly larger than architects, and almost as large as the engineering profession. The possible effect of Bill 123, if enacted, on the right of members of CAP and of other natural scientists to freely carry out their occupations in Ontario is alarming. There is a serious risk that, without a professional engineering licence or without operating under the supervision of a licensed professional engineer, physicists and other natural scientists will be prevented from doing many of the things which they do under existing legislation, without a licence and without supervision. We believe this is not in the best interest of scientists nor in the best interest of the Province of Ontario.

CAP has previously expressed to the Ministry of the Attorney General the importance of differentiating between scientist and professional engineers in new professional engineering legislation. We believe that the Minister attempted to address these concerns in the definition of the "practice of professional engineering" in Bill 123. Mr. McMurtry explained the intent of the definition in the following manner:

"The new definition should help to relieve the concerns of many in the scientific community by making a clearer dividing line between the work of scientists and that of professional engineers."

CAP recognizes this intent and agrees with its objectives. After careful study of Bill 123, however, a committee of CAP members and officers, who practice physics in industry, government institutions, and universities, has concluded that the definition in Bill 123 does not establish the stated objective. This conclusion is supported by a Toronto law firm which we have consulted on this matter, as indicated in the letter from the law firm accompanying this submission as Appendix 1.

In the interests of scientific freedom in Ontario the new legislation should ensure:

- that natural scientists are able to practice science without being licensed as professional engineers;
- that natural scientists are able to practice science without being supervised by a licensed professional engineer.

Bill 123 does not give scientists the necessary protection in either area.

The Problem

Simply stated, the proposed definition of the "practice of professional engineering" set out in paragraph (m) of Section 1 of the Bill is so broad as to include many of the activities regularly carried on by natural scientists. Specifically,

- "any act of designing, composing of plans and specifications, evaluating, advising, reporting, directing or supervising," is as much a daily task of the natural scientist as it is of the professional engineer;
- it is difficult to envisage a situation where, in performing any of these acts, the scientist will not have "a concern" for, "the safeguarding of life, health, property or the public welfare";
- "the application of engineering principles" cannot ordinarily be distinguished from scientific principles since both are based on the same scientific laws.

It is no accident that the interests, concerns, and activities of the natural scientist and professional engineer are so intimately intertwined. The preparation, education and training at secondary school and university levels of scientists and engineers are very similar. In fact, in Ontario and across Canada many universities instituted programmes of engineering physics in the 1930's which today continue to be among the most popular and most prestigious engineering programmes. Some are the responsibilities of Engineering Faculties, but most are managed by Departments of Physics. These programmes are generally accredited by APEO and form the academic basis for acceptance of graduates as professional engineers.

In the work place, scientists and professional engineers may bring different skills to bear, but the differences are often subtle. Thus in industry, it is not surprising to find natural scientists and professional engineers working together on projects and problems, and performing identical job functions in doing so. Moreover, one finds natural scientists supervising and managing large groups of scientists and professional engineers in all phases of industrial activity. This is particularly evident today in Ontario's hi-tech industries where the technologies of aerospace, energy, communications, micro-electronics, lasers, biotechnology, and robotics are used. To be sure, often scientists are more involved at the initial stages of research and development, and professional engineers more often with the development of the final product. However, the efforts of both professions result in products, services, and processes which are important to society. In keeping with this long tradition of professional cooperation, natural scientists as well as professional engineers must be free to assume full responsibility for all aspects of a project falling within the area of their technical qualifications. Only in this way will we achieve the general principle stated by Mr. McMurtry, that, "every person should be free to utilize his or her abilities, education, training and experience in earning a livelihood". To which we would add, free to use his or her skills and competence for the economic well-being of the Province of Ontario and Canada.

The Solution

From the above discussion of our concerns and our views of the problems, we see that, in the public interest:

- (a) Scientists should be permitted to practice their profession freely. In particular, scientists in the industrial environment when operating within the realm of their scientific and technical competence must be free to undertake the tasks of "designing, composing of plans and specifications, evaluating, advising, reporting, directing and supervising".
- (b) Scientists must not be required to perform these tasks only under the supervision of a professional engineer. The acceptance of this practice is vital if the scientist in industry is not to be cast in the role of a second-class citizen who must always operate under engineering supervision. The overall

perception of this concept in the technical community is extremely important because of the influence it has on hiring and promotion practices.

- (c) Scientists should not be blocked from performing their tasks by an unsubstantiated claim that a licence is required. Therefore, in the application of Bill 123 there should be no perception that scientists would have to acquire APEO membership in order to freely practice their profession and to ensure adequate career opportunities.

To the best of our knowledge there has been no significant difficulty between scientists and professional engineers. Indeed, in July 1982 we were invited, along with APEO and the Ontario Association of Certified Engineering Technicians and Technologists, to attend a meeting in the offices of the Attorney-General with a view to resolving any differences among the various associations as to the scope of the practice of professional engineering. This meeting resulted in the execution of an agreement which was to be considered in the preparation of new legislation, and which provided:

"4. Nothing in the Act prevents any natural scientist from practising his profession."

And this cooperation and harmony between professional engineers and scientists has not, to the best of our knowledge, resulted in risk or harm to the public.

Our objective in this submission is to convince the Committee that this harmony should not be jeopardized in the new legislation. And that the Legislature should not attempt to protect the public against something where there is no evidence that protection is necessary or advisable.

We recognize the difficulty the draftsmen of Bill 123 have had with an appropriate definition of the "practice of professional engineering". They have attempted to describe the activities of an engineer and then to limit the situations in which performing those activities requires licensing to areas of public safety. As explained above we believe strongly that the results of these attempts create serious risk to scientific freedom. Our Association has considered several alternatives to satisfy our concerns, and those being addressed by the draftsmen, by more precisely defining "the practice of professional engineering". But we have now concluded that this is the wrong approach. The differences between the activities of a professional engineer and a natural scientist are too imprecise and vague to deal with in a definition. CAP believes that the realistic solution is to incorporate in Bill 123 specific assurance that a natural scientist may practice as a natural scientist without being licensed as a professional engineer and without the necessity of being supervised by a professional engineer. This is consistent with prior legislation. And to the best of our knowledge it has worked.

The Professional Engineers Amendment Act of 1937, the first act requiring licensing of engineers stated:

"2(d) Nothing in this Act contained shall prevent or be deemed to prevent any person from practising his profession, trade or calling as a bacteriologist, chemist, geologist, mineralogist or physicist."

A similar exemption was incorporated in the Professional Engineers Act of 1968-69 and subsequent amendments in 1970 and 1972, namely

"2(d) Nothing in this Act prevents any person from practising as a bacteriologist, chemist, geologist, mineralogist or physicist."

The Recommendations

Our solution can be effected in the new legislation in one of two ways:

Recommendation I: Add to the definition of "the practice of professional engineering" as it appears in Bill 123:

"but does not include practising as a natural scientist."

Alternatively,

Recommendation II: Add as a new subsection of Section 12 of Bill 123:

"subsections (1) and (2) do not apply to a person practising as a natural scientist."

and to ensure that a person practising as a natural scientist (and whose activities may otherwise fall within the definition of the practice of professional engineering) need not be supervised by a professional engineer, Section 17(1) of Bill 123 should read:

"It is a condition of every certificate of authorization that the holder of the certificate shall provide services *requiring such certificate* only under the personal supervision and direction of a member of the Association or the holder of a temporary licence."

B.P. Stoicheff, OC, B.A.Sc., Ph.D.
President of CAP, and Professor of Physics

Appendix 1

Re: Bill 123 — An Act to Revise the Professional Engineers Act

Bill 123, an Act to Revise the Professional Engineers Act ("Bill"), received first reading in the Legislature of the Province of Ontario on November 17, 1983 and second reading on November 29, 1983. We understand that the Standing Committee on Administration of Justice intends to conduct public hearings to consider the Bill. You intend to make oral and written submissions to the Committee. In connection with your submissions you have asked us to advise you as to the effect that the Bill may have on the right of physicists to practice physics without complying with the licensing, certificate of registration and supervision requirements of the Bill.

Subsections (1) and (2) of Section 12 and Subsection (1) of Section 17 of the Bill provide that:

- Any person engaging in the "practice of professional engineering" must have a licence, limited licence or temporary licence;
- Any person engaging in the business of providing services to the public that are within the "practice of professional engineering" must do so under and in accordance with a certificate of authorization;
- Any persons holding a certificate of authorization and providing services which are within the "practice of professional engineering" must be personally supervised and directed by a member of the Association of Professional Engineers of Ontario or a holder of a temporary licence.

Accordingly, if the acts performed by a physicist in practicing physics fall within the definition of the "practice of professional engineering" in the Bill the licensing, certificate of authorization and supervisory requirements described above must be complied with by the physicists in performing such acts.

You have informed us that:

- (a) "engineering principles" frequently cannot be distinguished from "scientific principles";
- (b) in engaging in the practice of physics, a physicist applies scientific principles and frequently performs one or more of the following acts described in the definition of the "practice of professional engineering" in the Bill, namely: designing, composing of plans and specifications, evaluating, advising, reporting, directing or supervising; and
- (c) the acts performed by physicists in practicing physics involve, in varying degrees, a concern for safeguarding life, health, property or the public welfare. You cited as examples the concerns of a physicist with his own safety and that of his colleagues in carrying out scientific endeavours and the activities of a physicist employed in industry who has responsibility for ensuring the constant supply of hydro electric power to a particular area.

Nothing of which we are aware has led us to believe that the information set out in paragraphs (a), (b) and (c) above is inaccurate.

Based on the foregoing, we are of the opinion that there is serious risk that a physicist engaging in the practice of physics, by applying principles of physics, while performing one of the acts referred to above, would be engaging in the "practice of professional engineering" as defined in the Bill.

Yours truly,

TORY, TORY, DesLAURIERS & BINNINGTON

CAP OFFICE / BUREAU DE L'ACP

CAP AND ENGINEERS RATIFY MODEL NATURAL SCIENCE EXEMPTION CLAUSE FOR ENGINEERING ACTS

by Paul S. Vincett, CAP Vice-President

SUMMARY

The November, 1993, issue of *Physics in Canada*⁽¹⁾ gave a status report on a major effort by a group of Canadian natural science societies, mobilized and led by the CAP, to stop proposed legislative changes which could destroy the Canadian natural sciences professions as we know them. (This group of societies is now known as the Natural Science Societies of Canada, or NSSC). The problem arose when the Canadian Council of Professional Engineers (CCPE) developed a new definition of engineering which encompasses what most physicists and many other natural scientists do. Provincial Engineering Associations were preparing new Engineering Acts which would have made it illegal for non-engineers to perform such tasks. When CAP became aware of the situation, the first such Act (in B.C.) was only weeks from becoming law. If passed, such Acts could impact virtually all physicists: unless you were a Professional Engineer, it would be illegal to perform almost any activity which involved the use of scientific principles and which impacted economic interests, property, public welfare, or other very broad areas, including the environment. Directing or managing such activities would also be illegal. This would directly affect almost all applied and industrial and most government physicists. Moreover, scientists' inability to manage technical teams would have had an obvious impact on students' perceptions of career prospects in physics; the effect on university physics enrollments, and thus on university physics itself, could therefore also have been profound.

The present article describes the extensive work which CAP has done on this matter since the last article appeared. This includes negotiations with the CCPE for more than a year, and interventions which forestalled new Acts in 5 Provinces and Territories, often at the last minute. In particular, we report a major success in the form of an exemption clause, recently ratified by the CCPE, which (if incorporated into Provincial Engineering Acts) would explicitly exempt natural scientists from the provisions of those Acts, and thus protect the right of natural scientists to practice. While the Provincial Engineering Associations are not bound to use this clause, it has already appeared in one Engineering Act, and the Engineering Association in other Province has indicated that it intends to utilize it. CAP and eight other NSSC member societies have so far ratified the exemption clause.

While this is a very important success, much continued effort is required. We must strive to ensure that all new Acts contain the agreed clause, and that the government lawyers who draft the final legislation do not make changes which compromise its intent. This requires constant monitoring of the situation in each Province and Territory. More strategically, the breadth of exclusivity accorded to engineers, which we believe to be at the root of problems of this kind, should continue to be questioned by NSSC and

CAP. Without doubt, CAP will need to remain heavily involved in this issue for a number of years.

Finally, the success of NSSC in this effort illustrates vividly the importance of strong Canadian scientific societies, particularly when they act in concert. CAP and our NSSC partners are working to try to establish NSSC as a strong ongoing voice for Canadian science. While such efforts are extraordinarily challenging and time-consuming, they could have a major impact on the long-term health of Canadian science.

INTRODUCTION

In Canada, each Province and Territory has its own Provincial Engineering Association ("PEA") with the authority to regulate the practice of professional engineering in its Province. (For brevity, I will henceforth refer to Provinces and Territories collectively as 'Provinces'). The practice of engineering in each Province is exclusive, in the sense that no one (except a few specified groups) may practice 'Engineering', as defined in the particular Provincial Act, unless they are qualified as an engineer and a member of the PEA. In Ontario, for example, you could be fined \$15,000 for a first offense for performing a single 'engineering' act, and up to \$30,000 for subsequent offenses.

This exclusive state of affairs, while questionable from a public policy point of view, did not have a major potential impact on scientists while 'engineering' was defined in narrow terms; usually, the definition was a 'laundry list': engineering means building canals, building bridges, etc. The problem with this, from the engineers' standpoint, is that technology evolves so fast that such explicit definitions quickly become out of date. Some PEAs, and their national federation, the Canadian Council of Professional Engineers (CCPE), therefore worked for many years to develop a more general ("expansive") definition. As long ago as 1984, an early definition of this type was introduced in Ontario, and was sufficiently broad that it could have prevented natural scientists from practising. A long campaign by the CAP, led by Peter Kirkby, resulted in an exemption for natural scientists being included in the definition of professional engineering at that time.

THE CCPE DEFINITION

In 1990, the CCPE released the following definition as a guideline for the PEAs for use in new Engineering Acts:

The "practice of professional engineering" means

any act of planning, designing, composing, evaluating, advising, reporting, directing or supervising,

or managing any of the foregoing

that requires the application of engineering principles, and

that concerns the safeguarding of life, health, property, economic interests, the public welfare or the environment.

While this is not at all a bad description of the totality of what engineers, taken as a group, actually do, the exclusive nature of all the Engineering Acts would mean that any scientist who also performed any such act would be breaking the law! Note that there is no exemption for natural scientists. To understand the problem in more detail, consider the definition clause-by-clause:

- *any act of planning, designing, composing, evaluating, advising, reporting, directing or supervising,*

This is clearly very broad and certainly covers the daily activities of scientists and many others.

- *or managing any of the foregoing*

This particularly important addition would cover not just the performance of the acts, but their management. Thus, a scientist would apparently not even be able to manage a mixed group of scientists and engineers, which would obviously have major implications on career progression, and hence on students' views of the relative career prospects in engineering versus science.

- *that requires the application of engineering principles*

Here is the nub of the definitional issue, since engineering principles obviously cannot be distinguished from scientific principles. (PEAs have even been known to refer to the principles of physics and chemistry!)

- *and that concerns the safeguarding of life, health, property, economic interests, the public welfare or the environment*

Note how very broad this is. Unless one were doing very fundamental research, it is hard to see how most natural scientists could escape this. Note also that even protection of the environment could now be exclusively the domain of professional engineers, if 'engineering' principles were involved.

In summary, then, in any Province which adopted an Act containing this definition, only the most fundamental of scientists could have practiced legally, and few scientists could have managed any team containing scientists or engineers! Of course, there were those who argued that the PEAs might not in practice have taken a scientist to court for doing science. The first problem with this, of course, is that no profession should be capable of being destroyed at the whim of another group. More practically, it would have been open to any third party (perhaps, for

example, an engineer aggrieved at losing a job competition to a physicist) to blow the whole situation wide open with a single lawsuit. Worse perhaps even than this, such a definition would have sent a strong message to potential science students that engineers were the prime technological profession, and that (at least outside of academia) scientists were subservient and less likely to win advancement. And let there be no doubt, as news of the proposed definition and its implications became known, exactly this message was in fact being received loud and clear by students. In short, such a definition, while it would not have destroyed Canadian science overnight, would certainly have had a major corrosive effect in the medium to long term.

ACTIONS IN 1993

While the problems with the CCPE definition are clear, it had been created with rather little public input, and its existence was not initially known to most of the scientific community. The first indication that something was seriously wrong came in the Spring of 1993 when CAP learned, via Peter Kirkby, that a new Act in B.C. was at an advanced stage; the draft Act used a definition of engineering based on the CCPE version. Doug Milton, then CAP President, immediately made CAP's concerns known to the responsible politicians and started the process of alerting other scientific societies and mobilizing local scientists to express their concerns. To cut a long story short, even though the draft Act had been within weeks of becoming law, the new definition was shelved once it became clear to the B.C. authorities that there was significant opposition, not only from CAP but also from the other societies and individuals whom we had alerted.

A similar pattern was repeated several times over the next 18 months as four more PEAs proposed new Acts incorporating definitions based on the CCPE mode. In each case, CAP (sometimes with only hours' notice) made strong representations, and alerted other national societies and local scientists to the problem. As can be imagined, this whole process consumed endless hours of Executive time, but the upshot in all cases was to buy time for a more lasting solution.

CCPE NEGOTIATIONS

Soon after the problem surfaced, CCPE proposed a meeting with CAP to try to come to grips with the issue. CAP was very clear that this was a problem for all scientists, not just physicists, so the first meeting did not occur until October 1993. By then, CAP had convened a group of major scientific societies to act in concert on the matter. This group later became known as the Natural Science Societies of Canada, or NSSC (pronounced affectionately as "Nessie"!). The present members of NSSC are:

- Canadian Association of Physicists
- Association of Chemical Profession of Ontario
- Canadian College of Physicists in Medicine
- Canadian Federation of Biological Sciences

Canadian Mathematical Society
 Canadian Meteorological and Oceanographic Society
 Canadian Society for Chemistry
 Canadian Society of Environmental Biologists
 Statistical Society of Canada
 Canadian Applied Mathematical Society
 Canadian Information Processing Society
 Canadian Land Reclamation Association

At the two formal (very formal!) plenary meetings held between CCPE and NSSC in late 1993, the NSSC members argued strongly that this was a major issue. The engineers were initially very skeptical, perhaps because there was some misunderstanding of what scientists really do. After much discussion, however, the two sides agreed that there might indeed be an overlap of practice. At first, the engineers were not anxious to agree to an exemption clause for natural scientists, because they felt that the existing one in Ontario ("but does not include practising as a natural scientist") was too broad and undefined. While there were doubts amongst the scientists on the matter, the CAP argued strongly that natural science (or natural scientists) could be defined in a way which would protect both scientists and the public. All parties agreed to try this approach, and (having argued that it could be done) the CAP accepted the lead rôle in developing an appropriate clause.

The effort to develop the clause took from late 1993 to late 1994. Much of the detailed drafting, redrafting, and discussions with the CCPE were undertaken by an ad hoc NSSC negotiating team consisting of then-CAP President Ann McMillan (who by then had become Chair of NSSC) and myself; CCPE was represented by senior engineers across the country, chaired by Bill Kerr, a Past-President of CCPE. Something like 20 drafts were circulated for comment to well-known physicists, CAP's lawyer, NSSC members and eventually CCPE. Many NSSC meetings were devoted to discussing strategy and smoothing out problems, and several versions were formally presented to CCPE, amended by them, reworked by ourselves, and so on. Finally, after two face-to-face meetings between ourselves and Bill Kerr, the CCPE negotiating team accepted the version discussed below. Since then, the CCPE has formally ratified the clause and 9 of the 12 NSSC Societies (including CAP at our 1994 October Council meeting) have so far done so.

In December, the Yukon, with whom CAP and NSSC had been corresponding for some time, became the first jurisdiction to incorporate the clause, almost word-for-word, in a new Engineering Bill presented to the legislature. Since that time, another PEA has indicated in writing that it intends to use the clause, and it seems likely that others will do so in the months to come.

THE EXEMPTION CLAUSE

The exemption, which is designed to be used as a stand-alone clause separate from the definition of professional engineering, reads as follows:

Nothing in this Act shall prevent an individual who either

(i) holds a recognized honours or higher degree in one or more of the physical, life, computer or mathematical sciences, or who possesses an equivalent combination of education, training, and experience, or

(ii) is acting under the direct supervision and control of an individual described in the preceding paragraph,

from practising natural science which, for the purposes of this Act, means any act (including management) requiring the application of scientific principles, competently performed.

While the clause is apparently simple, it reflects a great deal of careful thought, so let me comment briefly on it.

- *Nothing in this Act shall prevent an individual who either*

With some exceptions, this overrides anything to the contrary, so even if there were to be some unforeseen provision affecting scientists, but not based directly on the definition of engineering, this clause should generally catch it. In addition, the broadly declarative nature of the clause should ensure that it is visible to anyone reading the Act, even if he/she does not read the detailed definitions carefully; this is important since the perception of the Act's provisions could have an important bearing on how it is interpreted by employers, students, etc.

- *(i) holds a recognized honours or higher degree in one or more of the physical, life, computer or mathematical sciences, or who possesses an equivalent combination of education, training, and experience, or*

There was a great deal of discussion within NSSC about the level of degree to specify and the name to use. The general consensus in NSSC was that 'honours', while not universally used, is broadly understood and generally corresponds to the level which one would normally expect to require of an 'independent' professional. The equivalency clause should catch those situations (often older scientists) who might be entirely competent, but not have the paper qualifications.

The implicit definition of natural science (physical, life, etc.) should be broad enough to allow for future new branches of science, but is sufficiently precise as to indicate the general areas contemplated. There is still some discussion as to whether 'chemical' should be

inserted, since (although it was clearly the intent to include such sciences) it has recently been pointed out that some authorities may not include them within the broad 'physical' designation.

- *(ii) is acting under the direct supervision and control of an individual described in the preceding paragraph,*

This addresses the problem that a 'professional' scientist, while he or she could practice, could be prevented from employing say a student assistant. In essence, this paragraph allows for the use of 'non-professional' help, so long as the 'professional' takes full responsibility for the work. Some Engineering Acts have analogous provisions for engineers.

- *from practising natural science which, for the purposes of this Act, means any act (including management) requiring the application of scientific principles, competently performed.*

Natural science is simply defined as any act requiring application of scientific principles (by implication the principles of the specified fields mentioned elsewhere in this clause).

Very importantly, management is specifically included as one of the permitted tasks of a qualified individual. This clearly enables a scientist to manage teams involving scientists and/or engineers, but the 'scientific principles' quite properly would not permit the manager to second-guess an engineering opinion in which he/she was not qualified.

THE FUTURE

I believe that this clause is a major success in CAP's and NSSC's campaign to protect the position of the natural scientist in Canada. It provides a simple means by which each Province can balance the need to allow the best individuals to work on our pressing technological problems, while not compromising the public's right to be protected from unqualified people. In the course of the process, I believe that the engineering community has been sensitized to scientists' valid concerns in this area, and is less likely to inadvertently attempt to circumscribe scientists' proper practice in the future. More positively, there is now a real chance that engineering and scientific organizations can start to cooperate on the many problems of concern to us all, rather than fighting over turf.

Is this the end of the story? No!

As I have explained, PEAs could choose to omit the exemption clause, or they (or government lawyers) could change it in ways which inadvertently compromise it. It is critical that CAP should be aware of, and involved in, all new Engineering Act discussions at the Provincial level. With Peter Kirkby's untimely death, we have lost our best source of contacts in the Provincial governments. It is therefore even more critical that each CAP member should keep his/her ear to the ground and alert the CAP Executive

immediately of new developments which may escape our attention. Our new paid Science Policy effort being undertaken by Francine Ford will help a great deal in this regard, but we must rely on you for timely local information!

More strategically, it has always been CAP's position, and that of most of our NSSC partners, that problems of this sort arise from the very broad exclusivity granted to engineers in Canada. In our opinion, it is necessary for only a small proportion of engineers (broadly 'consulting' engineers) to have such exclusivity. A similar position has recently been discussed within the engineering community itself, and (perhaps as a result of CAP's pressure) within at least two Provincial government departments. Last year, CAP and NSSC presented a major brief, written by Peter Kirkby, to the Law Reform Commission of Manitoba, which was investigating occupational regulation generally. The Commission has just reported, and has taken exactly our position: exclusive practices should be granted on the basis of the specific tasks which actually require it, rather than in blanket fashion to a whole occupation. CAP, and we hope NSSC, will continue to advance this view.

More strategically still, a possible more pro-active defense of scientists' positions will continue to be an important topic. Many of us feel that further exclusive practices, in this case for scientists rather than engineers, are not only likely to be very difficult to obtain, but may even be undesirable from a public policy point of view. If this is the case, various possibilities suggest themselves: (i) we could do nothing in this area; (ii) we could attempt to obtain Provincial reserves of title (a title that only physicists can use, for example) as Peter Kirkby strongly urged; (iii) as suggested by a provincial government lawyer, we could perhaps obtain a Federally-trademarked designation and grant it to those physicists who request it and are qualified; (iv) we could even try to work with the PEAs to obtain umbrella Technology Acts, in which each occupation would remain independent. It is easy for those of us who are well-advanced in our careers to resist such new-fangled approaches, but (as a recent spirited debate at CAP Council showed) many of our younger members feel the need for designations of some kind: they could be important to employers, and (especially outside academia) they could, to some extent, satisfy a legitimate public wish to be assured of practitioners' competence.

Finally, and most broadly of all, this process has shown the power of scientific organizations when we act in concert. The CCPE, via its constituent PEAs, has a membership of over 150,000, roughly 100 times that of the CAP! Together, though, the NSSC societies possess a significant fraction of the CCPE membership. Government officials have said privately, in other contexts, that they can usually 'pick off the sciences one at a time'. While individual societies based on individual disciplines remain the cornerstone of Canadian scientific societies, I believe that we simply have no choice but to cooperate more on matters of shared concern. CAP and many of our NSSC partners are keen to see NSSC become a more permanent organization devoted to some of these areas, but still non-bureaucratic and low-cost. Notwithstanding the great time demands that such efforts impose, the Executive will

try to support this and to drive it forward in any way we can. Please let us know how you would like to see NSSC evolve from physicists' point of view!

CONCLUSION

These are complex areas, but critical to the profession. They illustrate, in my opinion, the critical need for strong Canadian scientific societies: we cannot expect foreign societies to fight these kinds of battles for us, and politicians probably would not listen if they tried. We have come further in a year and half than any of us dared to hope. We need your help and your input to continue the work!

ACKNOWLEDGEMENTS

The first and most important acknowledgement must be to Peter Kirkby. It is terribly ironic that we must report the tragic news of his death in the same issue of *Physics in Canada* in which we also report such important progress. Peter was involved in this issue from the early 1980's, when he led the successful effort to get a natural scientist exemption in Ontario. He was instrumental in keeping the whole issue alive within the CAP in the intervening years. His constant monitoring of the situation led to the initial alarm about B.C., and he was a key leader in all the subsequent efforts. We must ensure that we carry on his work.

CAP also owes a great debt to Ann McMillan, who led the NSSC efforts as its first Chair while she also carried the heavy load of CAP President. She has continued as NSSC Chair since the end of her CAP term, and she was absolutely critical to the negotiation efforts. We also owe much to the efforts of Doug Milton and of CAP members in the various Provinces, perhaps most notably to Bev Robertson in Saskatchewan, but also the team in B.C., and to other local efforts in Alberta, Nova Scotia, and elsewhere. In addition, many people who have held various positions in CAP over the years provided extremely helpful comments on various drafts of the exemption.

The NSSC Societies, and in particular the representatives who came (and continue to come) to our monthly committee meetings, have been our essential partners in these matters, and I hope they will continue to be. No society could have done this alone. Finally, I thank Bill Kerr, Laurie Macdonald (CCPE's Director of Professional Affairs) and the other members of the CCPE negotiating team; we had many disagreements, of course, but once the CCPE team was convinced of the reality of the problem, they negotiated fairly, consistently, and constructively.

REFERENCES

1. "A Status Report on the Action of the CAP and Other Science Societies to Defend the Natural Science Professions in Canada", *Physics in Canada*, Vol. 49 (1993), p. 323.