

# THE KEYSTONE PROFESSIONAL



The Association of Professional Engineers and Geoscientists  
of the Province of Manitoba

JUNE 2001  
www.apegm.mb.ca

## Manitobans Win Awards at PDAC Convention

By: J.W.P. Lengyel, P.Geo.

Two prestigious awards were presented to Manitoban geoscientists at the recent Prospectors and Developers Association of Canada (PDAC) annual convention in March. The PDAC convention is held in Toronto and it is the largest annual mining convention in the world.

### DISTINGUISHED SERVICE AWARD –

*Bruce Dunlop*



Bruce Dunlop was one of two geoscientists awarded the “Distinguished Service Award” this year at the PDAC convention. Bruce Dunlop has championed the interests of Canadian prospectors for many years. This award recognizes and honours his outstanding work on their behalf. The award is also a tribute to his tireless efforts and battles fought for the exploration industry in Manitoba and for his lifetime of loyalty, commitment and service to the Prospectors and Developers Association of Canada.

Bruce, who started his own exploration company in Manitoba in 1964, has been active in mineral exploration across Canada. He has signed options with most of the

major mining companies, and these agreements have resulted in the expenditure of millions of exploration dollars.

His discoveries have included the Lost Hope Mine Extension at Lynn Lake, the Oxford Lake North gold discovery with Noranda Mines, and the Morgan Lake discovery with Granges Exploration. He also discovered the Number 3 and Birch zones at Snow Lake, part of the operating New Britannia Mine. It was here at the PDA meeting that he and fellow Nova Scotian David Mosher agreed to combine these two properties, an action that rejuvenated the community of Snow Lake.

Bruce has also championed the interests of the Canadian prospector. He has been a regional representative of the PDAC for the past 25 years and continues in his mission to make governments aware of the importance of mine development to provincial and national economies.

Andy Chater, vice-chairman of the 2001 Convention Planning Committee, presented the award. Bruce’s acceptance speech reportedly caused quite a reaction. He reminisced, talked about the importance of the individual prospector, and expressed his concerns about the lack of attention paid to prospectors.

### PROSPECTOR OF THE YEAR AWARD –

*Hudson Bay Exploration and Development Limited (HBED) exploration team: Donald Birak, Ted Baumgartner, P.Geo., Donald Colli, P.Geo., Kelly Gilmore, P.Geo., and James Pickell, P.Geo.*

This year’s Prospector of the Year Award at the PDAC annual conven-

tion was presented to a team of Manitoban geoscientists. The award, presented by John Steele, President, PDAC, recognizes their geological expertise, innovative exploration techniques, foresight, and persistence in the discovery of the Triple 7, Konuto Lake, and Photo Lake orebodies in and around Flin Flon, Manitoba.

Flin Flon is one of Canada’s oldest and most productive mining camps. Twenty nine mines have been brought into production since

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*Donald Birak*



*Ted Baumgartner, P.Geo.*



*Donald Colli, P.Geo.*



*Kelly Gilmore, P.Geo.*



*.James Pickell, P.Geo.*

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**JUNE 2001**

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The Communications Committee would like to hear from you. Comments on your newsletter can be forwarded to us through the Association office. Members are also encouraged to submit articles and photos on topics that would be of interest to the membership.

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## Licences Issued March & April 2001

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D.A. Pederson (SD)	L.M. Sargent (IA)	W.K.T. Tong (BC)
D.L. Post (IA)	L.R. Schoeneman (SD)	

## Members-In-Training Enrolled March & April 2001

M.M. Altun	H. Deng	R.C.P. Hicks	S.F. Silverman
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## *In Memoriam*

The Association has received with deep regret, notification of the death of the following member.

Terence William Algeo



## President's Message

Alan J. Pollard, P.Eng.

### Governance and Committees

As APEGM moves forward to a governance model based on policy, Council is coming to grips with some basic changes in the way we accomplish our goals. In the parlance of this governance science, the results or benefits produced by the Association are called 'ends' and how we get to the ends are called 'means'. What this means (no pun intended) for Council is that we will now spend most of our time on the ends. In a traditional board, the board members spend much of their time on HOW to achieve the organization's goals. The usual activities are receiving reports, reviewing information and making decisions and action-plans for staff and committees to carry out. A policy-style board, by contrast, spends a lot of time determining what the organization should be trying to accomplish, for whom and what those results are worth. The usual activities are enhancing the relationships with stakeholders, in particular listening

to input both from members and from the public in whose best interests we govern and evaluating the Association's accomplishments.

The basic change is sometimes described as a conversion from management to governance. Council no longer micro-manages the Executive Director and staff but, rather, thinks through and clearly articulates the ends of the APEGM and allows the Executive Director to get the job done. At the same time, there are things that we, as a Council and a profession, would not consider acceptable in the accomplishment of the ends. And that, too, is part of the model. Inherent in any model of governance are the laws. They are called 'executive limitations' and take the same written form as laws. The phrase 'shall not' figures in many and they are the clear articulation of actions that are not acceptable to Council and to the profession. Within that framework, the Executive Director has reason-

able freedom to accomplish the ends. Council does monitor both the accomplishment of the ends and the adherence to the executive limitations.

So, where do committees fit in this new world? As we move to a regime where Council compels itself to focus on the end results of the organization, committees, too, must contribute to the accomplishment of the ends and must abide by the same rules. The challenge is to organize the committees with a focus on the ends, and with clarity of accountability. Our existing committee and board structure is mostly the result of a lot of evolution over the years. Some of that evolution seems to be non-Darwinian and we have a few oddities in the way the various parts interact. (A question for the reader here – how many boards and committees does APEGM have? The answer will appear later in this column.) The structure has evolved to solve a 'problem of the moment' in some cases and in others was caused by legislative or other external force. The Engineering and Geoscientific Professions Act only requires APEGM to have Registration, Investigation and Discipline committees and has almost nothing to say about how those committees fit into the rest of the Association. Thus

there is little guidance as to how a committee structure would best support the ends of the Association. On the good-news side, there are also few limitations. As Geoscientists and Engineers, we are at our best in such circumstances. We are, at the core, solvers of problems given a set of constraints. I am confident that we can come up with a set of committees that will bring the best skills that APEGM has to bear on the challenges that face us in the years to come.

Many members of Council, myself included, found the actual number of boards and committees (twenty-seven) to be a surprise.

It is clear that we, as an Association, have not done enough to recognize the work done by the volunteers who serve on those bodies and their contribution to the success of APEGM. The 'Evening of Recognition' does recognize the work of volunteers in general but does not really bring to light the sheer volume of committee activity on which we now rely. Accordingly, a Committee Evening event is planned to recognize the hard work of our committee members and chairs and to give Council the opportunity to explore new initiatives for the future as we continue to refine the Association's ends and seek ways to involve the members in accomplishing them. ■

### Are You Doing R&D? You May Qualify for Cash Refunds or Tax Credits.

By: D.D. Himbeault, P. Eng.

Did you know that if you are developing new or improved materials, products, or processes, you may qualify for investment tax credits (ITCs) or even a cash refund under the federal government's Scientific Research and Experimental Development (SR&ED) program? The SR&ED program, administered by Canada Customs and Revenue Agency (CCRA, formerly Revenue Canada), is designed to encourage Canadian businesses of all sizes to engage in R&D that will lead to new, improved, and/or technologically advanced products, services, or processes.

The benefits available through the SR&ED program are among the most generous in the world. In the government's 1998 fiscal year, about \$1.3 billion in benefits were paid to over 11,000 claimants.

Despite this, many businesses entitled to benefits under the program fail to take full advantage of it. According to recent statistics, about less than 30% of qualifying projects are claimed against the program.

In the program, ITCs may be earned at a rate of up to 50% (including the provincial ITC) of the project expenditures on items such as wages, materials, machinery, equipment, some overhead, and R&D contracts. To qualify for the program, a project must generate information that advances our understanding of scientific relations or technologies; it must address scientific or technological uncertainty which must be overcome to achieve the intended scientific or technological advance; and it must incorporate a systematic investigation by qualified personnel.

To see if you can benefit from this program, advisory services are available from CCRA staff in the form of seminars that can be given at your work location, individual claimant education, first-time claimant service, and the Preclaim Project Review (PCPR) service. The PCPR service is a new service that can provide an upfront preliminary opinion on the eligibility of projects for SR&ED tax credits, and gives guidance on whether anticipated or actual expenditures qualify for the tax credits. For more information, you can visit the SR&ED Web site at [www.ccra-adrc.gc.ca/sred](http://www.ccra-adrc.gc.ca/sred) to view SR&ED publications, or you can contact a SR&ED representative who can explain the program and its requirements in more detail. In Manitoba, call Don Himbeault at (204) 984-1770 or e-mail at [don.himbeault@ccra-adrc.gc.ca](mailto:don.himbeault@ccra-adrc.gc.ca). ■



After almost 20 years with APEGM, we wish to announce the retirement of Membership Administrator Elaine Ryan.

Elaine brought dedication and integrity (as well as a keen sense of humour!) to her position, and she will be missed.

Best wishes, Elaine, and enjoy your retirement; you've earned it! ■

# Consulting Engineers of Manitoba – 2001 Awards of Excellence

By: R.G. Rempel, P.Eng.

Innovation and excellence were honoured at the second annual Manitoba Awards of Excellence in Consulting Engineering held on April 19, 2001. This prestigious event, hosted by the Consulting Engineers of Manitoba (CEM), was held at the Western Canada Aviation Museum and was attended by over 250 consulting engineers and their guests. Honoured guests included Mr. Reg Alcock M.P., Government of Canada, the Honourable MaryAnn Mihychuk, P. Geo., Minister of Industry, Trade and Mines, Government of Manitoba, His Honour Mayor Glen Murray, City of Winnipeg, and Tim Page, President and CEO of the Association of Consulting Engineers of Canada (ACEC). The event was hosted by Mr. Peter Jordan, Gemini-award winning host of the CBC television show "It's a Living".

Twelve firms submitted 23 projects for consideration of awards. The CEM Awards Program continues to grow, building on the tradition established at last year's inaugural event. While the number of participating firms and submitted projects continues to grow each year, it was also clear that participating firms exceeded last year's efforts in producing extremely high quality submissions and project displays. The awards have come to celebrate a dedication to the highest quality of product, value, and service that CEM firms provide to their clients through state of the art projects in Manitoba, Canada, and throughout the world. The CEM



Hon. Mary Ann Mihychuk, P. Geo., presents Acres with the Award of Excellence in International Projects.

Awards are a celebration of the fact that "Engineering is everything" in the success and comfort of modern-day society.

Judging of the entries was conducted by a team of leading industry professionals, chaired by Mal Symonds, P.Eng., recently retired from Bristol Aerospace. The judging panel included Barry MacBride, M.Sc., M.B.A., P. Eng., City of Winnipeg, Dr. Doug Ruth, P. Eng., Dean of Engineering, University of Manitoba, Bob Eastwood, FRAIC, MAA, OAA, M. Arch., Number Ten Architectural Group, and Esther Bugsdrucker, RPA, Lombard Place Limited. The event's major sponsors were Manitoba Hydro and DPIC Companies/Oldfield Kirby Esau Inc.

The 2001 Consulting Engineers of Manitoba Awards of Excellence

were awarded to the following firms in five categories:

## AWARDS OF EXCELLENCE:

### Resource Development

**KGS Group** –  
Pointe du Bois Generating Station-  
Powerhouse Stabilization

### International

**Acres International Limited** –  
Owen Falls Extension, Uganda

### Environment

**TetrES Consultants Inc.** –  
Simplot Groundwater Recovery  
Study

### Innovation

**UMA Engineering Ltd.** –  
Rehabilitation of the Shoal Lake  
Aqueduct

## Infrastructure

**Wardrop Engineering Inc.** –  
Wharf Stabilization and Repairs at  
the Port of Churchill

## AWARDS OF MERIT:

### Environment

**TetrES Consultants Inc.** –  
Corporate Risk Management for  
Industrial Chemical Facilities

### Environment

**ND LEA Engineers and Planners  
Inc.** – Omand's Creek Crossing

### Innovation

**Wardrop Engineering Inc.** –  
Wardrop/Faroex Glass Fibre-  
Reinforced Polymer Deck

### Innovation

**Crosier Kilgour and Partners Ltd**  
– Impact-Echo Technology for  
Assessment of Stone Cladding  
Integrity

## Infrastructure

**Acres Manitoba Limited** –  
Floodway Entrance Improvement  
Project

## Infrastructure

**UMA Engineering Ltd.** –  
Application of Waste Heat for  
Watermain Freezing Prevention

Congratulations to all firms entered in the 2001 CEM Awards Program, in particular to the firms who won Awards of Excellence and Awards of Merit. We look forward to next year's event, and urge all engineers to begin planning for project submissions for next year. Visit [www.consultingengineersmanitoba.com](http://www.consultingengineersmanitoba.com) for more information on the 2001 awards event and the winning projects. ■



CEM Awards Master of Ceremonies Peter Jordan (left) and invited guest Mayor Glen Murray.



Oldfield Kirby Esau Inc., present TetrES with the Award of Excellence in Environment.

## Professional Development

# Electronic Commerce is exploding – Are your contract and signature legal?

By: W.T. Jackson, EIT

The interest in the answer to such questions is so intense that the committee organizing a presentation on the topic was forced to place more than a dozen people on the waiting list, promising that another presentation would have to be hastily scheduled. About 90 people crowded into the Norwood Hotel banquet hall for breakfast on Wednesday, January 17, for a presentation sponsored by the Professional Development Committee of the APEGM.

All eyes and ears were trained on Lynn Romeo, a lawyer with the Manitoba Department of Justice, as she outlined the recently passed Electronic Commerce and Information Act. Ms Romeo was a member of the government working-group that assisted in the presentation of the Electronic Commerce and Information, Consumer Protection Amendment and Manitoba Evidence Amendment Act. Highlights of her presentation included the rules relating to electronic contracts, satisfying legal requirements for signatures, special consumer protection provisions, and what is happening in other jurisdictions.

The growth of the Internet and Electronic Commerce has been so explosive, says Romeo, that individuals and businesses want to know that they can transact business, exchange electronic documents, and enter contracts on-line and still be assured that their contracts are valid and that legal requirements have been met. Courts have begun to come to terms with technology as paper is being replaced by electronic communications, but legal uncertainty persists. Romeo said the questions linger. Will electronic communications satisfy a statutory requirement for a document in writing or for a signature? What is an original electronic document? She went on to point out that the second area of uncertainty relates to legal relationships, particularly contracts which depend on the intentions of the parties. Contracts are often formed with an electronic agent, so can an electronic agent form the intent necessary to contract? Can I



communicate my intent by clicking on an icon?

The Manitoba government recognized that these questions needed to be answered in order to provide businesses with added confidence. The Act was passed in August, 2000, and five of the seven main parts came into effect on October 23, 2000. The Consumer Protection Amendments will come into force on March 19, 2001. Romeo indicated that there are four main principles underlying the Act. First, the legislation is enabling only. It allows but does not require anyone to use or accept electronic communications. Secondly, the Act is described as technology neutral. It is left up to the public, businesses, consumers, and government departments as to how they will communicate. Thirdly, certain parts of the Act apply to other statutes and regulations on an opt-in basis and is most relevant when businesses and consumers deal with the government. Fourthly, Electronic Commerce often involves transactions that take place across provincial and international borders. The need for harmonization of the law is obvious.

Speaking to an audience consisting mainly of engineers, Romeo acknowledged that the electronic signature was on the minds of many,

and dedicated much of her address to this issue. She explained that the Act provides that when the law requires a person's signature, an electronic signature may meet that requirement. The highly secure form of digital signature meets the definition as does including your name on an e-mail message.

The Act does not impose any requirements or rules for e-signatures EXCEPT where the signature is required by another act or regulation. For these circumstances the Act sets out three different tests for signature, ranging from consent to a reliability test. Most business-to-business and business-to-consumer transactions are not governed by acts or regulations and so the signing rules in the E-Commerce Act don't apply. In these transactions, the importance of controlling risk in a cost-effective manner when using the electronic signature must be considered, and she said there are three main circumstances. Dealings between you and your bank or a fellow professional would bear a relatively low risk of repudiation or fraud. The second circumstance is the value of the transaction. If the transaction involves a significant amount of money or creates significant financial legal liability, then you will want to look at more secure technology and, she stressed, you

would definitely want to look at more security if the transaction is likely to be subject to audit or needed as proof in court.

Commenting on electronic commerce in other jurisdictions, Romeo said the Federal government proclaimed its electronic documents legislation as part of the privacy legislation passed last year. Most other Canadian provinces and territories have either passed or are considering legislation. Many other countries have recently passed e-commerce legislation including the United States, Australia, Japan, India and China. ■

### Prospectors and Developers Association Awards

*Continued from page 1*

the discovery of the original mine in 1915 yet the period 1993 to 1999 has been the most successful exploration period for Hudson Bay since that first discovery, thanks in large part to the contributions of the HBED team.

The Triple 7 deposit is one of the most important new discoveries in the history of the camp and will ensure that the company and the community prosper well into the 21st century. Production is on-target for 2004. Photo Lake, located close to the community of Snow Lake, and Konuto Lake, 20 kilometres west of the town of Flin Flon, were both discovered by the SPEC-TREM airborne EM system. All of these discoveries demonstrate magnificently that diligent exploration and the application of sound geological principles still have a place in the mature base-metal camps of Canada.

Members will recognize Kelly Gilmore, a recently elected councillor with APEGM. Jim Pickell, another Flin Flon native, is also a common face in the exploration and mining community of Manitoba. Ted Baumgartner, a true veteran of exploration in Manitoba, recently retired but still resides in Manitoba. Donald Birak and Donald Colli have since moved on to Nevada with Anglo Gold.

Congratulations to you all!

*Text and imagery courtesy of the PDAC (<http://www.pdac.ca/pdac/mcont/index.html#AWARDS>)* ■

# Manitoba's EIT Program – How Do We Stack Up?

By: J.L. Corkery, EIT and J.A. Blatz, P.Eng

In January 1995, APEGM implemented a mandatory pre-registration program as a requirement to become registered as a Professional Engineer in the Province of Manitoba. As part of this mandatory pre-registration program, the experience requirement for EITs was increased from two years to four years. Manitoba was one of the first provinces to take this step recommended by the Canadian Council of Professional Engineers (CCPE) a few years earlier. To many graduates this change seemed unfair when compared with requirements for graduates from previous years, and with other Provincial and Territorial Professional Engineering Associations who were slower to adopt the national recommendation. Today all provinces with the exception of Quebec have a mandatory four-year experience requirement.

This article will show how the Manitoba program compares to accepted CCPE guidelines and other Associations, and its benefits to EITs. Information for this article was obtained from a survey administered by a CCPE task force, supplemented by reviews of Association web-sites and e-mail contact with Association representatives.

In an attempt to achieve consistency in registration procedures across the country, CCPE, in consultation with the Associations, developed an Admissions Guideline for Associations in 1992. This guideline includes a recommendation on pre-registration programs. According to the CCPE guideline, applicants with accredited engineering degrees must obtain a minimum of four years of acceptable engineering work-experience before registering as a Professional Engineer. The guidelines indicate that the experience should be evaluated against the Canadian Engineering Qualifications Board (CEQB) acceptable engineering-experience criteria. Required work-experience focuses on demonstrated professional engineering experience in the following areas:

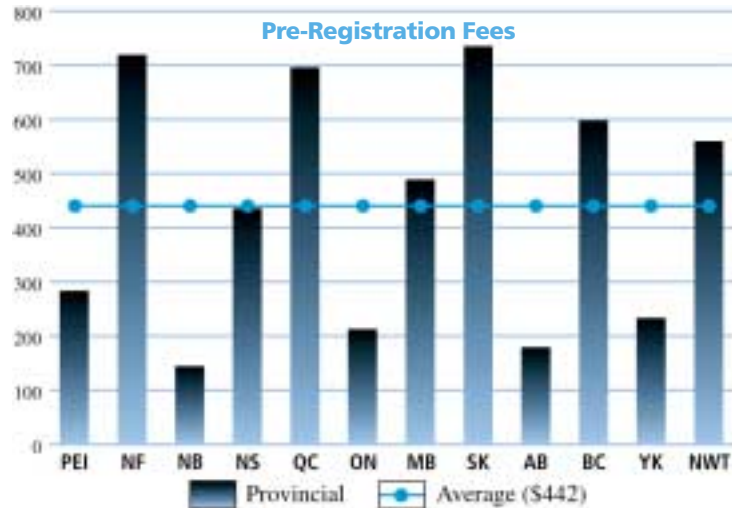
- 1) the application of theory,
- 2) exposure to practical experience,
- 3) exposure to management,
- 4) exposure to communication,
- 5) exposure to the social implications of engineering, and
- 6) ethics and professionalism.

Beyond the categorical list of experience requirements, applicants must demonstrate growth in responsibility under the guidance and supervision of a professional engineer. CCPE expects Associations to provide a formal EIT program whereby EITs keep a detailed experience record and report it regularly to the Association. The Association must then provide guidance and feedback on the acceptability of the applicant's work experience. The guidelines recently changed to allow up to one-year of pre-graduation experience. Pre-graduation experience is defined as engineering experience that meets the CEQB criteria and is obtained after completion of at least one-half of an accredited undergraduate program.

Surprisingly, only half of the Associations' pre-registration programs are mandatory at this time. Manitoba, Nova Scotia and Saskatchewan have policies requiring mandatory EIT enrollment and reporting for pre-registration experience to be counted towards the experience requirement. Over the four-year period, formal reporting of EIT experience is required eight times in Manitoba and Saskatchewan and ten times in Nova Scotia, while other Associations generally accept submissions either once at the end of four years or up to four times. British Columbia's Association is now planning a requirement of eight reports with the ability to submit reports online.

Manitoba's formal report requires the EIT to address the noted CCPE criteria for acceptable work experience. Applicants detail their experience in the six areas mentioned earlier. Manitoba's EITs are also required to participate in, and report on, a specified amount of continuing education/professional development and professional service activities. These Manitoba requirements exceed the current national standard.

All Associations are now accepting appropriate pre-graduation experience with the majority allowing up to 12 months. Suggestions to pre-approve co-op employment (prior to graduation) for pre-graduation experience have been presented as a method to ensure quality pre-graduation work experience for students. However, a lack of control over individual experiences and the time



of issue of pre-graduate credits are details still under review by many Associations. Manitoba's Association reviews applications for pre-graduation experience only after 12 months of post-graduation work-experience has been accepted.

With the exception of Saskatchewan, all Associations have programs for undergraduate engineering students (i.e. 'student memberships'). Manitoba student memberships cost \$10. All other programs are free

except for British Columbia, where fees paid for the undergraduate program are credited towards pre-registration membership following graduation. Ontario's Association has a student membership web-page that allows online registration. Members receive all regular Association publications. These programs give students advanced experience with the Associations and give the Associations an opportunity

Continued on page 9

## Interested in the Quality of Manitoba Waters?

By: D.M. McCartney, P.Eng.

Do you think our Manitoba Surface Water Quality Objectives (MSWQO) are out of date? Apparently Dwight Williamson thinks so! Dwight is the Manager of the Water Quality Section, Manitoba Conservation. As you read this, he and I'm sure a large supporting cast, are polishing the numbers and the wording of the new Manitoba Water Quality Standards, Objectives, and Guidelines (MWQSOG). (Hmm...I don't like that acronym.) Anyway, this is an opportunity for you, yes you, to get involved. Dwight is looking for feedback on the draft document until October 31, 2001. The current review process is in Phase 2 of a three-phase review process which began over a year ago. The draft document and reviewer guidance can be found at [www.gov.mb.ca/enviro/ptgareas/water.html](http://www.gov.mb.ca/enviro/ptgareas/water.html). Information on the Development of Nutrient Management Strategies for

Surface Waters in Southern Manitoba, another initiative, is also available for review at the web site. "Why are changes necessary?", you ask. The MSWQO were last updated in 1988 and a lot has changed since then. For example, a tremendous amount of new environmental and health-risk data have been generated since 1988. In addition to updating the risk data, the general changes proposed are: (1) adopting a three-tier approach; (2) inclusion of groundwater; and (3) including objectives for overall biological integrity. This is your chance to be involved. Participate in this important initiative! ■

This FYI article was brought to you by your Environment and Sustainable Development (ESD) Committee. If you know of other information that should be brought to the attention of our membership, please contact any member of the ESD Committee. Daryl McCartney is an Associate Professor in the Department of Civil and Geological Engineering at the University of Manitoba.

## Council Reports

**Tuesday, March 14, 2001**

By: A.N. Kempam, P.Eng. (Ret.)

### COUNCIL EXPERIENCES A "CERTIFICATE OF AUTHORIZATION" BACKLASH

Spring was struggling to gain a foothold outside and was barely succeeding, while inside a hardy group of Councillors sat around the large conference table, keen to conduct the business of the Association. Present for this meeting were Councillors Permut, Poetker, Hamilton, Barakat, Bogan, Ferchoff, Ruff, along with Past President Hosang, Executive Director Dave Ennis and CCPG Director Alan Bailes. At the head of the table President Alan Pollard presided.

This year brought a new institution to the engineering world in Manitoba, the Certificate of Authorization, or C of A. Since January, APEGM has been issuing Certificates of Authorization to organizations which sell engineering services. A condition for issuing a C of A is that the receiving organization must have liability insurance. What seemed a straightforward requirement has developed into a case of unintended consequences. Many organizations have found that the cost of this insurance is so high as to make their businesses un-competitive. To a degree, the high cost is due to insurance agencies being unfamiliar with the nature of the risk and as a result being ultra-cautious. Whatever the case, the insurance requirement has developed into a problem.

In addition to the insurance issue, Council heard from a few members who questioned the whole concept of the C of A. One disgruntled member described the \$349 fee as an "administrative rip off". Another member wrote that the profession didn't receive any benefit from getting a C of A. Council passed a motion authorizing Executive Director Ennis, Dr. Barakat, and Mr. Ferchoff to form a task-force to formulate improvements. One of the options was an amendment to the Act.

Still on the subject of letters, a P.Eng. wrote to the Association expressing his dismay at a recent letter published in *The Keystone Professional*. The offending letter was written by a member who had gone before the Investi-

gation Committee and was served a penalty. The disciplined member said in the letter that while he disagreed with the outcome of the disciplinary process, he had no choice but to comply. The P.Eng. thought the disciplined member should be expelled for his letter. President Pollard said that they couldn't throw people out for disagreeing because that would be censorship.

In between the trouble and strife, Council dealt with a party issue for relief. It was time for the Academy Awards of consulting, the Manitoba Awards of Excellence in Consulting Engineering. Council agreed to sponsor a table at a cost of \$1200. They noted that under Policy Governance®, next year Executive Director Ennis could deal with this himself.

Past President Hosang brought a question to Council. A public-sector union of professional engineers had given their bargaining unit a mandate to call a strike. Mr. Hosang wished to know what position APEGM would take if a strike materialized, and if the Association was asked for a reaction. Councillor Permut said that if a strike didn't affect public safety there should be no reason for APEGM to be involved. President Pollard said that as long as there were no complaints about violations of the Act, APEGM would not respond. Councillors also noted that other professional organizations do not become involved in the collective-bargaining process either.

Council dealt with another appeal, this time from a person who was unhappy with a decision of the Registration Committee. In addition to the appellant's fundamental disagreement with the Committee's decision, he or she also felt that the \$500 deposit required to initiate the appeal was much too high, especially for someone not yet earning a professional salary. Council agreed with this and decided to set the deposit to the fee for a year of full practicing membership in APEGM. Should the appellant prevail, the deposit would be applied to his or her dues.

A few interesting FYI's came before Council. One was a letter from Manitoba's Minister of Labour and Immigration informing the Association that Catherine Stewart, former Councillor and President of APEGM, had been appointed to serve on the Advisory Council on Workplace Safety and Health.

Near the end of the meeting Executive Director Dave Ennis had an interesting fact for Council. APEGM is the only engineering association to hold twelve Council meetings a year. President Pollard ended on an encouraging note for both Councillors and reporters – he was trying to reduce the length and number of meetings at the Association. ■

**Tuesday, April 11, 2001**

By: A.N. Kempam, P.Eng. (Ret.)

### WHAT SHOULD COUNCIL DO WITH LATE PAYMENTS?

The meeting started with a unique event. Every Council meeting agenda has what are called "consent agenda items". These are items which Council accepts without debate because they are routine. The meeting was informed that Councillor Ball had requested, by e-mail, the removal of a consent agenda item. The request was honoured by Council and the subject was inserted into the discussion agenda.

Next, Canadian Council of Professional Geoscientists (CCPG) Director Alan Bailes spoke about the CCPG Mobility Agreement. He requested that Council approve the agreement and he noted that it included a "notwithstanding" clause which could be used to override the agreement, if absolutely necessary. Dr. Barakat commented that if the clause was used too often then there was no mobility. After the vote Mr. Bailes thanked Council for accepting the agreement.

After approving the minutes of the March meeting, Council moved into a lengthy "in camera" session lasting well over an hour. In all previous cases at least the subject of the "in camera" meeting was known to reporters. In this case not even that minimal information was divulged, making it the most secret discussion to date.

After a brief respite Council returned to another round of debate on the Certificate of Authorization. Executive Director Dave Ennis had been in meetings with insurance agents and reported that liability insurance continued to be a complex problem. He felt that the solution was a change in legislation and that only one section of the Act would be affected. Another thing

that needed clarification, he said, was the distinction between selling a "product" and selling a "service". Once the insurers moved out of the consulting field they believed that their liability rose astronomically and their premiums followed suit. He said that, to date, 60 Certificates of Authorization had gone out the door – to firms with the right type of insurance.

Past President Peter Washchyshyn, our Canadian Council of Professional Engineers director, briefed Council on a recent meeting. He described a parliamentary reception he'd attended and wondered if we could organize a similar event on the provincial level as a way of keeping politicians informed about engineering issues. Mr. Washchyshyn said that CCPE has dropped the term "engineered" from its list of protected marks, mainly because its widespread usage outside engineering made it indefensible.

Council reviewed a letter from the Consulting Engineers of Manitoba requesting that APEGM participate in preparing a new GUIDE TO SELECTING A CONSULTING ENGINEER brochure. As a side question, Councillor Ball wanted to know why APEGM had a salary schedule for consulting engineers? No one knew why, only that it was always done.

Finally, Council got to the agenda item that Councillor Ball asked to have removed from the consent agenda. This year, as happens most years, a few members are caught off-guard and fail to pay their membership dues before the deadline. Three people found themselves in this predicament and their letters told varying tales of postal-system failure, vacation disruption, and job pressure. All accepted responsibility for their lapses and were asking for reinstatement according to APEGM policy. Councillor Ball had taken exception to this yearly parade of supplicants and thought that APEGM should have the same dates for when membership fees are due and when they are in default. Currently there is a gap of several months between these dates. If the

## The 2001 Great Northern Concrete Toboggan Race

By: B. Flisak

Following the resounding success of the 2001 Great Northern Concrete Toboggan Race (GNCTR) in Kingston, Ontario, a group of students and professionals from Manitoba submitted a bid to host the event in 2002. The bid was successful and the University of Manitoba Great Northern Concrete Toboggan Race Host Committee, consisting of recent and past participants in the competition, is now preparing to conduct the most memorable GNCTR to date. The competition is set for January 30th to February 3rd, 2002. The Race Day will be held at Spring Hill Winterpark on February 2nd, and there will be a Technical Exhibition of all the competing toboggans on February 1st at the Multipurpose Room, in University Centre, at the University of Manitoba.

they base their concrete toboggan's aesthetics, team uniforms, and team cheers. Competing teams are judged on best race time, top speed, toboggan aesthetics, frame and braking system design, concrete mix design, team spirit, and a technical report describing the design and construction of their toboggan.

The competition incorporates all aspects of engineering today, including imagination, design, construction, management, technical communication, and most importantly, cooperation and teamwork between individuals to achieve a mutual goal. Young engineers who participate in GNCTR come away with skills that allow them to excel in the full spectrum of engineering careers. This fact is evident in the multitude of past participants who occupy advanced positions in their



2001 University of Manitoba Concrete Toboggan Team in Kingston, Ontario.

The Great Northern Concrete Toboggan Race, held annually, is an event that brings together enthusiastic engineering students from across North America, and around the world. In a relatively short period of time the Great Northern Concrete Toboggan Race has developed a reputation of exceptional competition through engineering innovation and design, while maintaining a unique level of camaraderie and spirit between the competing universities and colleges.

Competing teams must construct toboggans with concrete running surfaces, and braking and steering systems, all the while assuring that the total weight of their toboggan remains below 300 pounds. Each team assumes a theme, upon which

respective workplaces, both within Canada and internationally.

Sponsorship from the engineering community in Manitoba will be necessary to hold a successful GNCTR. A tiered sponsorship program is being adopted by the Host Committee, allowing for gold, silver, and bronze sponsorship levels by interested parties. In addition to financial support, the Host Committee also encourages interested companies to enter their own teams in the competition. For more information on the GNCTR 2002, event sponsorship, or team entry, please contact Nelson Ferreira, Co-chair, University of Manitoba GNCTR 2000 Host Committee, at 474-8072, or [umferre4@cc.umanitoba.ca](mailto:umferre4@cc.umanitoba.ca). ■

## Photonic Chips

*Science et Vie, Oct 2000*

*Translated by V.L. Dutton, P.Eng. (Ret.)*

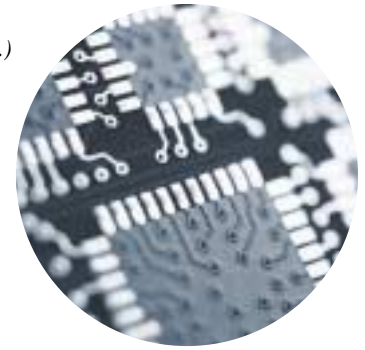
"The 20th Century was the century of electronics but the 21st Century will belong to photonics." For those accustomed to thinking of electrons and protons, the switch to working with photons will require new ways of thinking about things.

The physicists have been working in this field for some years with exciting results. A group at Montpellier have made "significant advances toward creating an entirely optical integrated-circuit."

At the University of Kyoto they have made, in the interior of an artificial crystal, a tiny tunnel some thousandths of a millimetre in diameter capable of carrying light around a right-angle while conserving 95% of its intensity.

There are three techniques for "putting photons in a cage" – Pile of Wood, Yablonovite, and Opal. The group at the University of Toronto, under Sajeew John, have developed a variation of the Opal technique. In the illustration of the three methods, the U of T method appears to give the best results.

At Caltech, they have made the world's smallest laser. "Thanks to a



photonic crystal, photons remain enclosed in a cube of photonic crystal 0.03 micrometre on a side."

Amongst the many uses photonic crystals will have, perhaps the one associated with portable telephones will be the most important. The problem with such devices is the high-frequency electro-magnetic radiation associated with their antenna. The article does not explain how it is done other than to say "Placed at the base of the antenna, the photonic crystals would channel this radiation...and prevent it from passing through the cranium of the user." No, the article does not say anything about how the automobile accident-rate will be affected by users of such modified mobile-telephones while they are driving. ■

## Cultural Differences in Engineering

By: A.N. Kempan, P.Eng. (Ret.)

Canadian engineers, as part of a society that tends to value action and speed, are likely to be pragmatic and focus on the specifics of the problem at hand. On the other hand, French and Mexican engineers, coming from societies that value theory and comprehensiveness, analyse a problem in general terms and seek a general solution which they can apply to the specific problem. Cultural differences like these can lead to problems on the job, according to Lionel Laroche, P. Eng., in an article in *Engineering Dimension* (January - February, 2001).

Mr. Laroche reached these conclusions after studying the mechanical engineering programs at nine different universities in Canada, the United States, France, and Mexico. It is likely that differences in the education of engineers are at least partly responsible for the differences in style. When comparing

the concentration of engineering courses in different countries he found that it ranged from 21 per cent at l'École Polytechnique de Paris, to 64 per cent at the University of Waterloo. In Canada, engineering programs are geared to accreditation. In the U.S. there's more latitude in what schools can teach, and Mexican universities tend to emulate the U.S. However, in France students are encouraged to have a wide breadth of education rather than specialize in one area.

Mr. Laroche concludes that firms with multinational workforces can capitalize on these differences in problem-solving by combining them and thereby achieving synergistic results.

If you want to read this article in its entirety, point your browser to: <http://www.peo.on.ca/Communications/dimensions/janfeb2001/WhatMakesAnEngineer.pdf> ■

## Professional Development

### The Engineer as an Expert Witness

By W.T. Jackson, EIT

About 90 people attended the breakfast meeting sponsored by APEGM at the Norwood Hotel on Wednesday, March 14. "The Engineer as an Expert Witness" was the focus of the presentation by Richard Swystun of the Winnipeg law firm Scurfield Tapper Cuddy.

Mr. Swystun described the role of an expert witness in court. He explained how an expert witness is treated differently from an ordinary witness when giving evidence. In a number of recent cases in the United States, the courts have placed rather strict limits on the type of evidence that may be presented in court by an expert witness. Swystun said these cases illustrate instances in which the American courts have indicated a willingness to receive expert testimony only if such testimony is the product of reliable scientific principles and methods, and is based upon reliable facts and data.

After discussing the American situation, Richard then described how this area is being dealt with in

Canada. With reference to some recent examples, he explained that the American approach to the admissibility of expert testimony is being adopted slowly in Canada. He pointed out that the Canadian courts are becoming more and more concerned about the objectivity of expert witnesses and that the courts have frowned upon experts giving testimony that is really advocacy "dressed up" as an expert opinion. ■



Speaker Richard Swystun.

### Manitoba's EIT Program – How Do We Stack Up?

Continued from page 6

to educate undergraduate students on the pre-registration requirements.

One of the most interesting results of the survey pertained to voting privileges. EITs are allowed to vote in Newfoundland, Quebec and Saskatchewan. EITs are not allowed to vote in Manitoba.

Assuming a four-year pre-registration timeline, the cost of being an EIT in Manitoba is \$491 compared to a national average of \$422. These costs include application fees, annual dues for each of four years, and all applicable taxes. The graph compares the costs of being an EIT across the country and indicates the national average.

There is general agreement amongst the Associations that a uniform program across the country would be beneficial. In considering this, Manitoba, Ontario and

Saskatchewan have indicated reluctance to change their current standards. At present, some provinces accept experience approved by other Associations at face value while others require submissions according to their individual guidelines. Manitoba accepts experience approved by other Associations. The good news for Manitoba's EITs is that, with the documented evidence required by APEGM, mobility to other Associations should be a relatively simple process.

Overall, the Manitoba program meets the CCPE national guidelines and in some cases exceeds them. This indicates that EITs in Manitoba are gaining the nationally accepted level of experience required to become registered professional engineers. On the national scale, EITs in the Manitoba program should enjoy ease of mobility with their documented experience that should be easily transferable to other Associations. ■

### Devils Lake Flooding – Should Manitoba be Worried?

By: W.T. Jackson, EIT

The short answer is "YES". The details were presented by Dwight Williamson at a luncheon sponsored by APEGM's Professional Development committee on Wednesday, March 28 at the Caboto Centre. Mr. Williamson is the Manager of the Manitoba government's Water Quality Management section.

The region of Devils Lake in North Dakota has experienced severe flooding for the past 8 years. In fact, since 1993, Devils Lake has risen 8 metres (25 feet) and the area of the lake has tripled. The flooding has affected homes, roads, farmlands and entire communities, with damage surpassing 300 million dollars. From a Manitoba perspective, Mr. Williamson says the biggest threat is the damage that could be done to Manitoba by the introduction of foreign aquatic species into our waterways. Mr. Williamson said the principle concerns include the direct transfer of harmful organisms with large volumes of untreated water, the increased connection between systems that are at present isolated and the possibility of irreversible, permanent harm being done to Manitoba's water system, which in some cases would be catastrophic.

One of the solutions proposed by North Dakota to cope with flooding is the construction of an artificial outlet, and then pumping the water to the Sheyenne and Red rivers. Manitoba government officials were scheduled to meet with the US Army Corps of Engineers in April to investigate the plan to drain



Speaker Dwight Williamson.

Devils Lake. The Corps plans to complete its evaluation by September 2002, and the project would then have to be approved by the US Congress. Williamson explained that the Manitoba government, with support from the Federal government, would present its opposition to North Dakota officials, along with alternatives such as storing excess water in basins and improving levees which protect residents. In the meantime, North Dakota is already proceeding with plans to build a temporary outlet. The state Senate and the House of Representatives have approved a bill that would allow North Dakota to expropriate land that is needed to build the controversial outlet.

Dwight Williamson has worked with Manitoba Conservation for over 25 years and he currently sits on a number of inter-provincial and international committees related to water quality. ■

## APEGM VISION

*APEGM is the leader and a facilitator of the process that ensures excellence in engineering, geoscience, and applied technology for the public of Manitoba.*

# 10 Commandments for Engineers and Their Businesses

By: M. E. Baril, P. Eng.

In early March, ENCON Group Inc., a firm that offers Canadian engineers and architects Professional Liability Insurance, held an information session to help educate the local engineers and architects about their insurance policies and what to do in the case of a claim against them or their company. They gave an overview of a general insurance policy, reviewed and compared a "good claim" versus a "bad claim", and gave an overview of the types of claims and settlements made in Canada, breaking these down into engineering

sectors and client sectors. Along with the literature given out at the meeting was a sheet titled "THE TEN COMMANDMENTS OF GOOD PRACTICE". This list offers good advice and highlights areas of focus for professionals and their businesses to avoid potential claims. It has been reproduced below with permission of ENCON Group Inc. I hope you will find the list useful and timely as Manitoba has now adopted a mandatory requirement for insurance if you want to acquire a Certificate of Authorization.

## 1 SELL YOUR FIRM AND YOUR SERVICES FAIRLY.

- Corporate Brochure – THE DANGERS OF SUPERLATIVES.
- Impressive C.V.'s – CAUTION.
- Upbeat Feasibility Study – REALISTIC EXPECTATIONS.

## 2 EDUCATE YOUR CLIENT.

- About Time and Cost ESTIMATES.
- About Your Services as a CONSULTANT versus a CONTRACTOR.
- You are NOT a GUARANTOR of the Work.
- Certification Without Proper Field Services – DANGER.

## 3 INSIST ON AN EQUITABLE WRITTEN CONTRACT.

- Oral Contracts – Enforceability – Reliance on Memory?
- Advantages of Standard Documents CCAC#6 and ACEC#31.
- If You Deviate, Seek Legal Advice.
- Cut and Paste Contracts – DISASTER.
- Deal in Depth with the Issue of FIELD SERVICES.
- Dealing with Uninsurable Risks.
- Hold Harmless Clauses – May VOID Coverage.
- Contract Review Service.

## 4 DO NOT PLAY LAWYER WHEN:

- Client Hires a Lawyer for Contract.
- In Doubt About By-Laws and Regulations.
- Writing Special Legal Clauses.

- Writing Insurance And Indemnity Specifications.

## 5 SPECIFIC PROJECT PLAN.

Develop and Enforce:

- Early Identification of Human Resources.
- All Team Members to FULLY Understand Job Mandate.
- Inter-Disciplinary Coordination – One Individual/Senior.
- Design and Calculation Checks.
- Field Services – When and By Whom.

## 6 KEEP YOUR CLIENT INFORMED.

- CLIENT Makes DECISIONS.
- Based on Your Advice, You are the CONSULTANT.
- Informed Clients = No Claims.
- Check Risks Re.:
  - Low Bidder;
  - Extras;
  - Delay;
  - Changes or Substitutions.

## 7 DEAL PROMPTLY WITH PROBLEMS.

- Sweeping Under the Rug – Invitation to Disaster.
- Keep Client Informed – Work WITH Client.
- DO NOT Allow Contractor to Accumulate Differences for Later.
- Again CLIENT Makes DECISIONS.
- Persistent Problems – Inform Your INSURER.

## 8 WRITTEN RECORDS.

- Changes in Contract or Mandate.
- Design Changes.
- Changes in Scheduling.

- Substitution of Materials.

- Job Site Meetings.

- Communications with Contractors.

- Communications with Manufacturers.

- Manufacturers' and Suppliers' Written Material.

- After an Incident or Accident, State Objective Facts Only – No Opinions.

- Preserve Written Records.

## 9 DO NOT CERTIFY THAT WHICH YOU HAVE NOT SEEN.

- Discuss at the Outset Certification Required.
- Field Services Mandate Commensurate with Required Certification.

## 10 THINK BEFORE SUING FOR FEES.

- Billing Practice.
- Self-Analysis – Why is Client Not Paying?
- Suing for Fees – Inevitable Results: Countersuit for Malpractice. ■

# Manitoba to Post Exploration Reports Online

Manitoba has become the first province in Canada to put its complete library of non-confidential exploration reports online.

Assessment files contain exploration data and detail the work done on mineral dispositions within the province. Some of the files date back to when claim-staking first began in Manitoba. Assessment files are submitted to Industry, Trade and Mines by companies and individuals.

With the click of a mouse, assessment reports are now available from the GIS Map Gallery at <http://www.gov.mb.ca/em>. Users can navigate interactive maps, execute queries, download reports, print maps, and link to other sites. The assessment reports are the latest addition to the map gallery which also provides access to mineral disposition information and geological maps. ■



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## THOUGHTS ON

## Design

## ...about "the best change"

By: M.G. Britton, P.Eng.

In the April issue of the Keystone Professional, Koen's Engineering Method was discussed from the point of view of design as a "strategy". The second concept in his definition that is worth exploring is "best change". The idea that design causes change is, as the math prof says, intuitively obvious. Design causes something to come into existence where only a problem existed before. Surely this is a classic definition of change.

On the other hand, "best change" is more a question of perspective. Consider the question of flood protection for Winnipeg. Since its con-

struction the Winnipeg Floodway has prevented many millions of dollars in damages within the area it was built to protect. Indeed, Winnipeg remains a viable urban centre largely because of this protection. So, from the perspective of those within the protected area, this was definitely a "best" solution.

All three levels of government probably see this design as a "best" change because its existence has saved almost undefinable levels by minimizing compensation to flood victims and loss of production during floods. Given that provincial and federal governments also have

responsibilities beyond the city, they may be somewhat less enthusiastic in their support but, on balance, they probably remain in the "best" camp.

The 1997 flood pointed out that the Floodway has a finite capacity, and it has rekindled the debate over the level of protection that actually exists. Two alternate "designs" are now under discussion – either increase the capacity of the Floodway or build a second dam to provide water storage at some point south of Winnipeg. Each solution has its proponents with their own definitions of "best".

The need to provide protection to Winnipeg doesn't seem to be a point of contention. How that need is met, and what the ultimate design

will look like, is apparently open to debate. Cost, of course, is always an issue. However cost can be defined in a number of ways. Construction cost is relatively straightforward. Political and social costs are not as easily defined. The question of how an individual perceives "best" will depend on how they are impacted by the eventual decision.

My intention is not to pass judgement on this project, but rather to use a current design issue to illustrate the complexity of the problem of arriving at the "best" change. Both of the potential designs will cause change, and that change will be physically measurable at some future date. Both will also spark a debate over the question of "best". This latter debate will always be subject to perspective of individuals.

In virtually every design project we undertake, there is some level of debate over the question of "best". At one time "best" probably meant that the outcome of the design didn't suffer from a physical or operational failure. In today's world, "best" needs to meet a much broader range of conflicting perceptions, all of which cannot be met. Indeed, the search for the "best change" may be the most difficult part of design at the beginning of the 21st century. ■

## National Engineering Scholarships and Endowment Winners for 2000

(Original document by CCPE) Edited by H. Foerster, P.Eng.

The Canadian Council of Professional Engineers (CCPE) announced the winners of its 2000 National Scholarships and Endowment Competition. Scholarships are offered in three categories: the CCPE – Manulife Financial Scholarship, valued at \$10,000 each, is awarded to three engineers returning to university to pursue postgraduate studies or research in an engineering field; the CCPE - Meloche Monnex Scholarship, valued at \$7,500 each, is awarded to two engineers returning to university to pursue postgraduate studies in a non-engineering field; CCPE – Encon Endowment, valued at \$7,500, is awarded to an engineer returning to university to pursue postgraduate studies or research in engineering risk failure investigation, risk management, and/or materials testing. The applicants are evaluated based on several criteria including the applicants' previous engineering experience; career goals; the likely benefits of their work to Canadian society; their prior academic performance and research interest.

Gary Kramer, P.Eng., Thambirajah Ravichandran, P.Eng., and Aaron Fyke, P.Eng. are the win-

ners of the CCPE – Manulife Financial Scholarship.

Mr. Kramer, a member of Professional Engineers of Ontario (PEO), is pursuing a Ph.D. in civil and environmental engineering at the University of Western Ontario. He is researching a new type of grouting material that will significantly reduce the expense and time required to construct large diameter tunnels, allowing them to be used as cost-effective, environmentally friendly options for mass transit systems; road and rail transport; sewage and storm water removal; drinking water distribution; and power generation.

Mr. Ravichandran is researching the development of intelligent, multi-objective control strategies, employing artificial intelligence, fuzzy logic, neural networks, multi-criteria decision making, and evolutionary algorithms. His work could lead to increased production, reduced costs and improved product quality in the manufacturing, mining, forestry, energy production and agri-food sectors. A member of PEO, Mr. Ravichandran is pursuing a Ph.D. in electrical and computer engineering at the University of Waterloo.

Mr. Fyke, a member of the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC), plans to make a significant contribution to both the fuel cell industry and Canadian society when he graduates from the Massachusetts Institute of Technology's Leaders for Manufacturing Program in 2002 with an MBA and an M.Sc. in engineering. His vision is to take fuel cells from the concept to the manufacturing stage, and to see them used as a virtually pollution free power source in products ranging from automobiles to megawatt power stations.

Mark Grambart, P.Eng., and Andrew Milne, P.Eng., are the winners of the CCPE – Meloche Monnex Scholarship.

Mr. Grambart is a member of APEGBC and is pursuing a MBA in international business at the International Institute for Management Development in Lausanne, Switzerland. His goals are to enhance his management skills, improve his ability to think and act strategically, and to become a leader in the global effort to develop cost-effective fuel cells. A mechanical engineer, he

Continued on page 12

## Some Useful Conversions

1. Ratio of an igloo's circumference to its diameter: Eskimo Pi
2. Time between slipping on a peel and smacking the pavement: 1 bananosecond
3. 1 million aches: 1 megahurtz
4. Basic unit of laryngitis: 1 hoarsepower
5. 1 million microphones: 1 megaphone
6. 2 million bicycles: 2 megacycles
7. 2000 mockingbirds: 2 kilomockingbirds
8. 1 kilogram of falling figs: 1 Fig Newton
9. 1 millionth of a fish: 1 microfiche
10. 1 trillion pins: 1 terrapin
11. 10 rations: 1 decoration
12. 100 rations: 1 C-ration
13. 2 monograms: 1 diagram
14. 8 nickels: 2 paradigms ■

# Thermofluids Research at the University of Manitoba

By: Dr. G. Naterer, P.Eng.

In addition to basic curiosity, current thermofluids-research at the University of Manitoba is driven by real and practical needs of society and industry. In conjunction with graduate and undergraduate research assistants, and other collaborators, current research studies are examining problems involving multiphase flows with heat transfer. Practical examples of these studies include atmospheric icing of structures (electric power transmission lines, helicopter engine components), thermal processing of materials and applications of PCMs (Phase Change Materials) to thermal management of electronic assemblies.

CFD (Computational Fluid Dynamics) is a rapidly advancing technology that provides an effective engineering design tool, particularly in cases when experimental testing or prototype building is too expensive or time consuming. Computational simulations (with PHASES software) are currently directed at the above-mentioned applications. With reference to these applications, some of the following goals may be realized:

- (i) more efficient de-icing and vibration damping of power lines,
- (ii) improved material quality (thermal processing of materials) Predictive capabilities of liquid-flow in the melt region can give important clues for reducing material defects during solidification in casting or plastic-injection-molding processes.
- (iii) higher reliability and performance of microelectronic components.

Despite its widespread benefits, CFD challenges remain in its ability to accurately ascertain solution errors and robustness. As a result, experimental testing serves as an important component of our studies. Research facilities, such as a recently acquired water tunnel with PIV (Particle Image Velocimetry), and pulse and continuous-wave laser systems, provide effective methods for flow visualization and fundamental understanding of thermofluids processes. Many processes, ranging from fluid - structure interactions (flow induced vibra-

tions) of a power transmission line, to turbulence at a helicopter engine inlet, can be further understood through these facilities.

A current research focus involves atmospheric icing of power transmission systems and helicopter and aircraft components. In the case of overhead power lines, the objective is to maintain a reliable and efficient power supply during freezing rain and ice storms. Protection of society and industry from natural hazards is an important concern, particularly in view of recently speculated climate change due to global warming, and eastern Canada's recent (1998) ice-storm disaster. In aerospace applications, in-flight icing is a safety threat as well as a problem for engine operation and aerodynamics. Convective heat transfer with wind turbulence and impinging droplets arises in these icing problems. By using PIV flow visualization, freezing rain experiments and CFD simulations, it is anticipated that effective techniques for dealing with these problems can be developed. Some current ideas include thermal de-icing and vibration dampers for power lines, and grooved or stepped surfaces (possibly including MEM activated tabs) for preventing flow and ice blockage at helicopter engine inlets.

In addition to these ice studies, further heat transfer research is examining PCMs as a method of effective energy storage. By releasing or storing latent heat during freezing or melting, pockets of PCMs in a conventional material can serve a variety of useful purposes. PCM drywall can be used to store solar energy. PCM concrete can reduce icing of bridges, and PCM microcapsules in clothing can provide body heat. A current study is examining the feasibility of thermal management of electronic assemblies using PCMs. In a transient mode, PCMs may reduce the component operating temperature thereby allowing additional heat dissipation (at higher CPU speed) while remaining within permissible temperature limits. Furthermore, the application of CFD and heat transfer modelling can further improve the performance of this proposed technique.

As mentioned earlier, error

bounds and robustness measures remain as a challenge to more extensive CFD penetration into the design process. Current studies are examining entropy as a key parameter in this regard. Collaboration with the U.S. Air Force Research Lab is underway whereby entropy can identify discrete simulation errors, with applications to CFD, as well as CEM (Computational Electro-Magnetics). It is anticipated that engineering confidence in CFD as a key design component can improve once reliability and robustness are well in hand. Furthermore, entropy serves as a key parameter in achieving the upper limits of performance and quality in many engineering

systems. From optimized passages in a turbine, to highly ordered crystal structures (low entropy) in semiconductors, we find that entropy has major implications for the overall behavior of a system. Optimizing performance by minimizing entropy production, can lead to direct cost savings in engineering systems. Thus we can make a direct link between the optimized thermofluids predictions and cost savings for a company.

These research projects are funded by the Natural Sciences and Engineering Research Council of Canada (NSERC), Manitoba Hydro, GKN Westland Helicopters, Canada Foundation for Innovation (CFI), and the University of Manitoba. As mentioned earlier, human curiosity is a part of this research, but it is also encouraging to have university - industry collaboration and to realize the resulting economic benefits from this interaction. ■

## April Council Report

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dues are late, Councillor Ball said that the member in arrears should be charged interest. Executive Director Ennis said the dates weren't easily changeable because they were in the Act. However, Mr. Ennis had a small latitude for deviation in that he could decide when a payment was "deemed" to have arrived. This usually took care of the close calls.

Council launched into a lengthy discussion of the issue and they soon separated into hawks and doves; those who would penalize late-payers and those who would cut some slack. Councillor Syme

injected a new thought into the discussion when he said that it was ridiculous for Council to discuss this item in detail, particularly when APEGM was moving to the Policy Governance® model. This had a sobering effect on the meeting and they re-instated the three members and charged Mr. Ennis with finding an alternative process, presumably one which would not involve Council.

After Council passed a few motions on governance policy, President Pollard called for adjournment. The call was welcomed, but late. The promise of shorter meetings had evaporated on this occasion because the big clock over the door said 5:10 PM. ■

## National Engineering Scholarships and Endowment Winners

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believes the widespread introduction and use of fuel cells around the world will significantly reduce fossil fuel consumption and air pollution.

Mr. Milne, a mechanical engineer and medical biophysicist, is a member of the Association of Professional Engineers of Nova Scotia. He hopes to improve the longevity of hip and knee joint replacements, as well as to insert them in patients, after he completes his medical studies at Dalhousie University. His goals are to practice

orthopedic surgery, conduct biomedical research, and to improve the quality of life for Canadians who require joint replacements as a result of fractures or arthritis.

Bernard Tarleton, P.Eng., is the winner of the CCPE - Encon Endowment. He is a member of the Association of Professional Engineers, Geologists and Geophysicists of Alberta, and is pursuing his MBA and a masters of engineering, specializing in welding engineering at the University of Alberta. His focus will be on risk assessment and integrity management, which will help Canadian companies remain competitive in a world of aging infrastructure and increasing stringent environmental and safety laws. ■